

CMA-INTER NOTES ON

Paper-9 OMSM

BY CMA SUMIT RASTOGI

Content Covered

- ✓ **MCQ + T/F**
- ✓ **SHORT NOTES ON OMSM**
- ✓ **BIT QUESTIONS**
- ✓ **SUGGESTED ANSWERS(JUNE-2017 TO JUNE-2023)**
- ✓ **ALL MTP(JUNE-2017 TO DEC-2023)**

SUMITRASTOGICLASSES

D-223,3rdFLOOR,LAXMICHAMBER,LAXMINAGAR,DELHI-92

CMA-INTER (MCQ + T/F)

OMSM (PAPER-9)

CMA-INTER

MCQ + TRUE/FALSE

(CHAPTER WISE)

ON

OMSM

(PAPER - 9)

BY

SUMIT RASTOGI

CMA, B.COM (HONS)

SUMIT RASTOGI CLASSES

D-223, 3rd FLOOR, LAXMI CHAMBER, LAXMI NAGAR, DELHI-92

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CHAPTER – 1**INTRODUCTION TO OPERATIONS MANAGEMENT****MCQ**

- 1) Which one of the following recent trends in Production/Operations management involves drastic measures or break through improvements to improve the performance of a firm?
 - A. Corporate Downsizing
 - B. Re-Engineering
 - C. Technology
 - D. TQM

- 2) Out of the following trends in production/operations management, which one is sometimes called as agile manufacturing?
 - A. Re-engineering
 - B. Supply-Chain Management
 - C. Lean Production
 - D. Flexibility

- 3) The recent trend in the Production/Operations management which suggests the use of minimal amount of resources to produce a high volume of high-quality goods with some variety is referred to as:
 - A. SCM
 - B. TQM
 - C. Lean Production
 - D. Just-In-Time

- 4) Conversion of inputs into outputs is known as
 - A. Application of technology
 - B. Manufacturing products
 - C. Product
 - D. Operation management

- 5) Out of the following trends in production/operations management, which one is sometimes called as agile manufacturing?
 - A. Re-engineering
 - B. Supply-Chain Management
 - C. Lean Production
 - D. Flexibility

- 6) The example of worker involvement, as a recent trend in production/operations management is
 - A. SCM
 - B. Just-in-Time
 - C. Quality Circle
 - D. MRP

7) The desired objective of Production and Operations Management is:

- A. Use cheap machinery to produce
- B. To train unskilled workers to manufacture goods perfectly
- C. Optimal utilisation of available resources
- D. To earn good profits.

8) In Operation Planning:

- A. The planner plans each operation to be done at work centres and the sequence of operations
- B. Decide the tools to be used to perform the operations
- C. Decide the machine to be used to perform the operation,
- D. Decide the materials to be used to produce the product

ANSWERS

1	2	3	4	5	6	7	8
B	D	C	D	D	C	C	A

TRUE or FALSE

- 1) Customer service is a key objective of operations management
- 2) Technology does not affect the scale of production operations
- 3) Rucker plan is a group incentive plan.
- 4) Customer service is a key objective of operations management.
- 5) Training boosts employee morale.
- 6) When demand does not exist in the market, we should start Production Incentives.
- 7) A work stoppage generally reduces the cost of production.
- 8) Incentive scheme is introduced by Management with a view to reduce direct labour cost.
- 9) Operation process chart incorporates all five symbols.

ANSWERS

1	2	3	4	5	6	7	8	9
True	False	True	True	True	False	False	False	True

CHAPTER -2**OPERATIONS PLANNING****MCQ**

- 1) **The act of assessing the future and make provisions for it is known as**
 - A. Planning
 - B. Forecasting
 - C. Assessment
 - D. Scheduling

- 2) **For a marketing manager, the sales forecast is:**
 - A. Estimate of the amount of unit sales or a specified future period
 - B. Arranging the sales men to different segments of the market
 - C. To distribute the goods through transport to satisfy the market demand
 - D. To plan the sales methods.

- 3) **The time horizon selected for forecasting depends on:**
 - A. The salability of the product
 - B. The selling capacity of Salesman
 - C. Purpose for which forecast is made
 - D. Time required for production cycle

- 4) **In general, medium range forecasting period will be approximately:**
 - A. 5 to 10 Years
 - B. 2 to 3 days
 - C. 3 to 6 months
 - D. 10 to 20 years

- 5) **The range of Long-range forecasting period may be approximately:**
 - A. 1 to 2 weeks
 - B. 2 to 3 months
 - C. 1 year
 - D. Above 5 years

- 6) **Medium range forecasting is useful in:**
 - A. To assess the loading capacity of the machine
 - B. To purchase materials for next month
 - C. To plan for-capacity adjustment
 - D. To decide whether to receive production orders or not

- 7) **Line of Best fit is another name given to:**
 - A. Method of Least Squares
 - B. Moving average method
 - C. Semi average method
 - D. Trend line method

- 8) **The effective capacity is NOT influenced by which of the following factors:**
- A. Forecasts of demand
 - B. Plant and labour efficiency
 - C. Subcontracting
 - D. None of the above
- 9) **Out of the following factors that are affecting Capacity Planning, which one is Less Controllable one?**
- A. Machine break-downs
 - B. Amount of labour employed
 - C. Facilities installed
 - D. Shifts of work per day
- 10) **To plan for future man power requirement:**
- A. Short term forecasting is used
 - B. Long range forecasting is used
 - C. Medium range forecasting is used
 - D. There is no need to use forecasting, as future is uncertain
- 11) **Long range forecasting is useful in:**
- A. Plan for Research and Development
 - B. To Schedule jobs in Job production
 - C. In purchasing the material to meet the present production demand
 - D. To assess manpower required in the coming month
- 12) **To decide work load for men and machines:**
- A. Medium range forecasting is used
 - B. Short term forecasting is used
 - C. Long range forecasting is used
 - D. A combination of long range and medium range forecasting is used.
- 13) **Important factor in forecasting production is:**
- A. Environmental changes
 - B. Available capacity of machines
 - C. Disposable income of the consumer
 - D. Changes in the preference of the consumer.
- 14) _____ is typically found wherever a particular bottleneck machine exists in the process of manufacturing.
- A. Load control
 - B. Block control
 - C. Flow control
 - D. Order control
- 15) **The study of relationship between the load on hand and capacity of the work centres is known as:**
- A. Scheduling
 - B. Loading
 - C. Routing
 - D. Controlling

- 16) One of the aims of loading is:**
- A. To finish the job as early as possible
 - B. To Minimise the material utilization
 - C. To improve the quality of product
 - D. Once materials are issued to the departments, personally check how they are used.
- 17) One of the important basic objectives of inventory management is:**
- A. To calculate EOQ for all materials in the organisation is:
 - B. To go in person to the market and purchase the materials
 - C. To employ the available capital efficiently so as to yield maximum results
 - D. Once materials are issued to the department, personally check how they are used.
- 18) Most suitable layout for Job production is:**
- A. Line layout
 - B. Matrix layout
 - C. Process layout
 - D. Product layout.
- 19) Most suitable layout for Continuous production is:**
- A. Line layout
 - B. Process Layout
 - C. Group technology
 - D. Matrix layout.
- 20) One of the product examples for Line layout is:**
- A. Repair workshop
 - B. Welding shop
 - C. Engineering College
 - D. Cement
- 21) To determine where the plant should be located for maximum operating economy and effectiveness, refers to which one of the following?**
- A. Plant layout
 - B. Facility location
 - C. Capacity planning
 - D. Capacity requirement
- 22) Which of the following is NOT the Plant Layout Principle?**
- A. Principle of sequence
 - B. Principle of usage
 - C. Principle of maximum travel
 - D. Principle of minimum investment
- 23) Arrangement of machines depending on sequence of operations happens in**
- A. Process Layout
 - B. Product Layout
 - C. Hybrid Layout
 - D. Group Technology Layout

- 24) The time by which an activity can be rescheduled without affecting the other activities preceding or succeeding is called as:
- A. Slack
 - B. Independent Float
 - C. Free Float
 - D. Total Float
- 25) Production planning in the intermediate range of time is termed as
- A. Production planning
 - B. Long range production planning
 - C. Scheduling
 - D. Aggregate planning
- 26) Inventory cost per product in intermittent production is:
- A. Higher
 - B. Lowest
 - C. Medium
 - D. Abnormal
- 27) One of the requirements of Aggregate Planning is:
- A. Both output and sales should be expressed in a logical overall unit of measuring
 - B. Appropriate time period
 - C. List of all resources available
 - D. List of operations required.
- 28) In aggregate planning not one of the methods in modification of demand is:
- A. Differential Pricing
 - B. Lay off of employees
 - C. Over time working
 - D. Sub-contracting
- 29) In aggregate planning one of the methods used to modification of supply is
- A. Advertising and sales promotion
 - B. Development of complimentary products
 - C. Backlogging
 - D. Hiring and lay off of employees depending on the situation
- 30) With reference to Aggregate Planning identify which of the following statements is NOT correct?
- A. It is an Intermediate-term planning.
 - B. It is made operational through a master schedule, which gives the manufacturing schedule.
 - C. Facility planning and scheduling are closely related with the aggregate planning
 - D. It deals with the strategic decisions, such as purchase of facilities introduction of new products, processes, etc.
- 31) The lead-time is the time:
- A. To place holders form materials
 - B. Time of receiving materials
 - C. Time between receipt of material and using materials
 - D. Time between placing the order and receiving the materials

32) MRP stands for:

- A. Material requirement planning
- B. Material reordering planning
- C. Material requisition procedure
- D. Material recording procedure

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	A	C	C	C	C	A	D	A	B
11	12	13	14	15	16	17	18	19	20
A	B	B	A	B	D	C	C	A	D
21	22	23	24	25	26	27	28	29	30
B	C	B	B	D	A	A	A	D	D
31	32								
D	A								

TRUE or FALSE

- 1) In general, short – term forecasting will be more useful in production planning.
- 2) Results available from work sampling study is not 100% accurate.
- 3) Load control is typically found wherever a particular bottleneck machine does not exist in the process of manufacturing.
- 4) Multiple activity charts deal with layout problems.
- 5) No handling is the best handling.
- 6) Lift same as an elevator.

ANSWERS

1	2	3	4	5	6
True	True	False	False	True	False

CHAPTER – 3**DESIGNING OF OPERATIONAL SYSTEM AND CONTROL****MCQ**

- 1) **Key aspects in process strategy does NOT include which of the following**
 - A. Make or buy decisions
 - B. Capital intensity
 - C. Process flexibility
 - D. Packaging

- 2) **Production planning in the intermediate range of time is termed as**
 - A. Production planning
 - B. Long range production planning.
 - C. Scheduling.
 - D. Aggregate planning.

- 3) **Which of the following process types is used when a very highly standardized product desired in high volumes?**
 - A. Repetitive Process
 - B. Batch Process
 - C. Project Process
 - D. Continuous Process

- 4) **Which of the following stages of Product Life Cycle does attribute beginning substantial increase in Sales and Profits?**
 - A. Introduction
 - B. Growth
 - C. Maturity
 - D. Decline

- 5) **In which of the following stages the management should try to change its approach by changing its strategy from "buy my product" to "try my product"?**
 - A. Introduction
 - B. Growth
 - C. Maturity
 - D. Decline

- 6) **With reference to the characteristics of a good product design, which one of the following is referred to "the ease of manufacture with minimum cost"?**
 - A. Reliability
 - B. Producibility
 - C. Specification
 - D. Simplification

- 7) **State which of the following does not affect the Production Design:**
 - A. Cost/Price Ratio
 - B. Process Capability
 - C. Reliability
 - D. Product Quality

- 8) Issuing necessary orders, and taking necessary steps to ensure that the time targets set in the schedules are effectively achieved is known as:
- A. Routing
 - B. Dispatching
 - C. Scheduling
 - D. Inspection
- 9) Number of product varieties that can be manufactured in Mass production is:
- A. One only
 - B. Two only
 - C. Few varieties in large volumes
 - D. Large varieties in small volumes
- 10) The material handling cost per unit of product in continuous production is:
- A. Highest compared to other systems
 - B. Lower than other systems
 - C. Negligible
 - D. Cannot say
- 11) In general number of product varieties that can be manufactured in Flow production is:
- A. One only
 - B. Ten to twenty varieties
 - C. Large varieties
 - D. Five only
- 12) Generally, the size of the order for production in Job production is:
- A. Small
 - B. Large
 - C. Medium
 - D. Very large
- 13) Generally, in continuous production the production is carried out to:
- A. Customer's order,
 - B. Government orders only
 - C. For stock and supply
 - D. Few rich customers
- 14) The starting point of Production cycle is:
- A. Product design
 - B. Production Planning,
 - C. Routing
 - D. Market research.
- 15) Preferred numbers are used to:
- A. To determine the number of varieties that are to be manufactured
 - B. To the test the design of the product
 - C. To ascertain the quality level of the product
 - D. To evaluate the production cost.

- 16) Application of technology or process to the raw material to add use value is known as:
- A. Product
 - B. Production
 - C. Application of technology
 - D. Combination of technology and process
- 17) Manufacturing system often produces:
- A. Standardized products
 - B. Standardized products in large volumes
 - C. Substandard products in large volumes
 - D. Products and services in limited volume.
- 18) Which of the following stages of Product Life Cycle does attribute beginning substantial increase in Sales and Profits?
- A. Introduction
 - B. Growth
 - C. Maturity
 - D. Decline
- 19) Variety reduction is generally known as:
- A. Less varieties
 - B. Simplification
 - C. Reduced varieties
 - D. None of the above
- 20) In Continuous manufacturing system, we need:
- A. General purpose machines and Skilled labours
 - B. Special machine tools and highly skilled labours
 - C. Semi-automatic machines and unskilled labours
 - D. General purpose machines and unskilled labours
- 21) In Process Planning we plan:
- A. Different machines required
 - B. Different operations required
 - C. We plan the flow of material in each department
 - D. We design the product
- 22) The quantities for which the planner has to prepare production plan are known as:
- A. Optimal quantity of products
 - B. Material planning
 - C. Quantity planning
 - D. Planning quantity standards
- 23) The document, which is used to show planning quantity standards and production plan, is known as:
- A. Planning specifications
 - B. Route sheet
 - C. Bill of materials
 - D. Operation sheet

24) The first stage of Production control is:

- A. Dispatching
- B. Scheduling
- C. Routing
- D. Triggering of production operations and observing the progress and record the Deviation

25) Production control concerned with:

- A. Passive assessment of plant performance
- B. Strict control on labours
- C. Good materials management
- D. Good product design

26) Computers are used in Production control in this area:

- A. Follow-up activity
- B. To control labour
- C. To disseminate information
- D. Loading, Scheduling and Assignment works.

27) The starting point of Production cycle is

- A. Product design
- B. Production planning
- C. Routing
- D. Market research

ANSWERS

1	2	3	4	5	6	7	8	9	10
D	D	D	B	B	B	C	B	C	B
11	12	13	14	15	16	17	18	19	20
A	A	C	D	A	B	A	B	B	B
21	22	23	24	25	26	27			
C	D	A	D	A	D	D			

TRUE or FALSE

- 1) The life cycle of a product has many points of similarity with the human life cycle.
- 2) The term “aesthetics” which appeals to the human sense does not add value to the product.
- 3) The primary concern of production planning and control is the delivery of products to customers or to inventory stocks according to some predetermined schedule.
- 4) The term “aesthetics” which appeals to the human sense does not add value to the product.
- 5) Production planning is an essential function in a factory.
- 6) Two – handed process chart is the most suitable recording technique in electronics assembly industry.
- 7) Is the use of metric system of weight and measures compulsory in india?

ANSWERS

1	2	3	4	5	6	7
True	False	True	False	True	False	True

CHAPTER – 4**PRODUCTION PLANNING AND CONTROL****MCQ**

- 1) **The first stage in production planning is:**
 - A. Process planning
 - B. Factory planning
 - C. Operation planning
 - D. Layout planning

- 2) **Example of production by disintegration is:**
 - A. Automobile
 - B. Locomotive
 - C. Crude oil
 - D. Mineral water

- 3) **Tempering is a process of:**
 - A. Joining
 - B. Heat Treatment
 - C. Surface Treatment
 - D. Forming

- 4) **For production planning:**
 - A. Short term forecasting is useful
 - B. Medium term forecasting is useful
 - C. Long term forecasting is useful
 - D. Forecasting is not useful.

- 5) **In Production by disintegration the material undergoes:**
 - A. Change in economic value only
 - B. Change in physical and chemical characteristics
 - C. Change in technology only
 - D. None of the above.

- 6) **In Production by service, the product undergoes the changes in:**
 - A. Shape and size of the surface
 - B. Shape of the surface only
 - C. Size of the surface only
 - D. Chemical and Mechanical properties.

- 7) **The scope of Production Planning and Control is:**
 - A. Limited to Production of products only
 - B. Limited to production of services only
 - C. Limited to production of services and products only
 - D. Unlimited, can be applied to any type of activity

- 8) **Two important functions that are to be done by Production department are:**
- A. Forecasting
 - B. Costing
 - C. Scheduling and loading
 - D. Inspecting
- 9) **The act of releasing the production documents to the production department is known as:**
- A. Planning
 - B. Routing
 - C. Dispatching
 - D. Releasing
- 10) **In an organisation the production planning and control department comes under**
- A. Planning department
 - B. Manufacturing department
 - C. Personal department
 - D. R& D department.
- 11) **In Job production system, we need:**
- A. More unskilled labours
 - B. Skilled labours
 - C. Semi-skilled labours
 - D. Old people
- 12) **Production planning deals with:**
- A. What production facilities is required and how these facilities should be laid out in space available
 - B. What to produce and when to produce and where to sell
 - C. What should be the demand for the product in future?
 - D. What is the life of the product
- 13) **One of the important production documents is:**
- A. Design sheet of the product
 - B. List of materials
 - C. C Route card
 - D. Control chart
- 14) **The way in which we can assess the efficiency of the production plan is by:**
- A. Efficient dispatching
 - B. By manufacturing a good product
 - C. By comparing the actual performance with targets specified in the specified programme
 - D. By efficient production planning
- 15) **Conducting Occasional check-ups of the products manufactured or assembled to ensure high quality of the production is known as:**
- A. Planning
 - B. Scheduling
 - C. Inspection
 - D. Routing

- 16) **In route sheet or operation layout, one has to show**
- A. A list of materials to be used.
 - B. A list of machine tools to be used.
 - C. Every work centre and the operation to be done at that work centre
 - D. The cost of product.
- 17) **Addition of value to raw materials through application of technology is:**
- A. Product
 - B. Production
 - C. Advancement
 - D. Transformation.
- 18) **Variety reduction is generally known as:**
- A. Less varieties
 - B. Simplification
 - C. Reduced varieties
 - D. None of the above
- 19) **Which of the following aims at finding the best and most efficient way of using the available resources men, materials, money and machinery?**
- A. Method Study
 - B. Work Study
 - C. Time Study
 - D. Motion Study
- 20) **This aims at finding the best and most efficient way of using the available resources - men, materials, money and machinery:**
- A. Time Study
 - B. Work Study
 - C. Method Study
 - D. Job Evaluation
- 21) **Routing and Scheduling becomes relatively complicated in**
- A. Job production
 - B. Batch production
 - C. Flow production
 - D. Mass production
- 22) **Total station time/Cycle time x Number of work stations) x 100 is known as:**
- A. Line Efficiency
 - B. Line smoothness
 - C. Balance delay of line
 - D. Station efficiency
- 23) **The cycle time, selected in balancing a line must be:**
- A. Must be greater than the smallest time element given in the problem
 - B. Must be less than the highest time element given in the problem
 - C. Must be slightly greater than the highest time element given in the problem
 - D. Left to the choice of the problem solver.

- 24) In solving a problem on LOB, the number of workstations required is given by:
- A. Cycle time/Total time
 - B. Cycle time/Element time
 - C. Total time/Element time
 - D. Total time/ Cycle time
- 25) When work centres are used in optimal sequence to do the jobs, we can:
- A. Minimise the set-up time
 - B. Minimise operation time
 - C. Minimise the breakdown of Machine
 - D. Minimise the utility of facility
- 26) One of the activities of expediting is:
- A. To file the orders in sequence
 - B. To decide the sequence of operation
 - C. To record the actual production against the scheduled production
 - D. To examine the tools used in production
- 27) Which one of the following statements is NOT correct?
- A. LFT is calculated from the LFT of the head event.
 - B. Slack can be calculated by adding EFT and LFT of any job.
 - C. EFT is the sum of the EST and the time of duration for any event.
 - D. The Total Project time is the shortest possible time required in completing the project
- 28) Which of the following models deals with the physical movement of goods from different supply origins to a number of different demand destinations?
- A. Simulation
 - B. Transportation
 - C. Lean operations
 - D. Line balancing
- 29) Linear Programming is a technique used for determining:
- A. Production Programme
 - B. Plant Layout
 - C. Product Mix
 - D. Manufacturing Sequence
- 30) The most powerful and popular method for solving LPP is
- A. Simplex method
 - B. Graphical method
 - C. Transportation method
 - D. Assignment method
- 31) JIT stands for
- A. Just in time purchase
 - B. Just in time production
 - C. Just in time use of materials
 - D. Just in time order the material
- 32) Scheduling deals with:
- A. Number of jobs to be done on a machine
 - B. Number of machine tools used to do a job
 - C. Different materials used in the product
 - D. Fixing up starting and finishing times of each operation in doing a job

- 33) **Fixing Flow lines in production is known as:**
- A. Scheduling
 - B. Loading
 - C. Planning
 - D. Routing
- 34) **Scheduling shows:**
- A. Total cost of production
 - B. Total material cost
 - C. Which resource should do which job and when
 - D. The flow line of materials
- 35) **The activity of specifying when to start the job and when to end the job is known as:**
- A. Decide the optimal allocation of available resources
 - B. To decide what type of labour to be used
 - C. To decide how much of material is required
 - D. To count how many orders, he has on his hand.
- 36) **Before thinking of routing, the production planner has to:**
- A. Decide the optimal allocation of available resources
 - B. To decide what type of labour to be used
 - C. To decide how much of material is required
 - D. To count how many orders, he has on his hand.
- 37) **Final stage of production planning, where production activities are coordinated and projected on a time scale is known as:**
- A. Scheduling
 - B. Loading
 - C. Expediting
 - D. Routing
- 38) **One of the principles of Scheduling is:**
- A. Principle of optimal product design
 - B. Principle of selection of best material
 - C. Principle of optimal operation sequence
 - D. Principle of optimal cost.
- 39) **The following establishes time sequence of operations:**
- A. Routing
 - B. Sequencing
 - C. Scheduling
 - D. Dispatching
- 40) **Issuing necessary orders, and taking necessary steps to ensure that the time targets set in the schedules are effectively achieved is known as:**
- A. Routing
 - B. Dispatching
 - C. Scheduling
 - D. Inspection

ANSWER

1	2	3	4	5	6	7	8	9	10
B	C	B	A	B	A	D	C	C	B
11	12	13	14	15	16	17	18	19	20
B	A	C	C	C	C	B	B	B	B
21	22	23	24	25	26	27	28	29	30
B	A	C	D	A	C	B	B	C	A
31	32	33	34	35	36	37	38	39	40
B	D	D	D	B	A	A	C	C	A

TRUE or FALSE

- 1) Job Evaluation is a systematic approach to ascertain the labour worth of a job.
- 2) Production planning and control is essentially concerned with the control Finished goods.
- 3) In carrying out Job Evaluation studies, point system is the best method.
- 4) If the total float value is zero, it means the resources are just sufficient to complete the activity without delay.
- 5) Job-shop process is used when a very highly standardized product is desired in high volumes.
- 6) Addition of value to raw materials through application of technology is production.
- 7) In general, long-range forecasting is more useful in production planning.
- 8) Activity Sampling is not a technique of Job Evaluation
- 9) Production planning and control is essentially concerned with the control of Finished goods.
- 10) The time horizon selected for forecasting depends on time required for production
- 11) Industrial engineering is not concerned with scheduling, performance standards, work methods, quality control and material handling.
- 12) Work study aims at finding the best and most efficient way of using the available cycle.
- 13) In carrying out Job Evaluation studies, point system is the best method.
- 14) Method study should precede work measurement.
- 15) It is desirable to conduct work measurement after method study.
- 16) Job Evaluation is a systematic approach to ascertain the labour worth of a job.
- 17) Job Evaluation is used to measure absolute job worth.
- 18) It is justified to consider the effect of working condition both in Work Measurement and Job-Evaluation.
- 19) Ranking is one of the Job Evaluation Techniques.
- 20) Job Evaluation does not help in performance Rating. There is no difference between Method study and Value Engineering.

- 21) Assignment problem is solved by Johnson and Bellman method.
- 22) Routing' and 'Scheduling' are not interconnected and both can be carried out separately and independently.
- 23) Queue Discipline refers to the order in which customers are processed.
- 24) A Stochastic Model uses random inputs and gets the same output every time you calculate.
- 25) A good material handling system always consists of conveyors.
- 26) Material handling is an integral part of sales process.
- 27) The Linear Programming problem has two basic parts: the objective function and the constraint set.
- 28) Linear Programming does not consider uncertainties
- 29) Just-in-time production uses a product layout with a continuous flow.

ANSWERS

1	2	3	4	5	6	7	8	9	10
True	False	True	True	False	True	False	True	False	False
11	12	13	14	15	16	17	18	19	20
False	True	True	True	True	True	False	True	True	False
21	22	23	24	25	26	27	28	29	
True	False	True	False	False	False	True	False	True	

CHAPTER – 5**PRODUCTIVITY MANAGEMENT AND TQM****MCQ**

- 1) Which one of the following standards is associated with the "Quality Assurance in Production and Installation"?
 - A. ISO 9001
 - B. ISO 9002
 - C. ISO 9003
 - D. ISO 9004

- 2) Which one of the following standards is associated with the "Quality Assurance in Final Inspection Test"?
 - A. ISO 9001
 - B. ISO 9002
 - C. ISO 9003
 - D. ISO 9004

- 3) Conducting Occasional check-ups of the products manufactured or assembled to ensure high quality of the production is known 'as':
 - A. Planning
 - B. Scheduling
 - C. Inspection
 - D. Routing

- 4) Which one of the following standards is associated with the "Quality Management? and Quality System Elements-Guidelines"?
 - A. ISO 9001
 - B. ISO 9002
 - C. ISO 9003
 - D. ISO 9004

- 5) One limiting level of quality in an acceptance sampling plan is the limit at which the buyer wants to be quite certain that the lot will not be passed is:
 - A. Lot Tolerance Percentage Defectives
 - B. Upper Control Limit
 - C. Lower Control Limit
 - D. Acceptable Quality Level.

- 6) Which one is NOT an index of Productivity?
 - A. Man-hour output
 - B. Productivity ratio
 - C. TQM
 - D. Use of Financial Ratios

- 7) Use of any process or procedure designed to transform a set of input elements into a set of output elements is known as:
 - A. Transformation process
 - B. Transformation of input to output
 - C. Production
 - D. Technology change

- 8) **Most important benefit to the consumer from efficient production system is:**
- A. He can save money
 - B. He will have product of his choice easily available
 - C. He gets increased use value in the product
 - D. He can get the product on credit.
- 9) **The act of going around the production shop to note down the progress of work and feedback the information is known as:**
- A. Follow up
 - B. Dispatching
 - C. Routing
 - D. Trip card
- 10) **The best way of improving the productivity of capital is:**
- A. Purchase automatic machines
 - B. Effective Labour control
 - C. To use good financial management
 - D. Productivity of capital is to be increased through effective materials management.
- 11) **Addition of value to raw materials through application of technology is:**
- A. Product
 - B. Production
 - C. Advancement
 - D. Transformation

ANSWERS

1	2	3	4	5	6	7	8	9	10	11
B	C	C	D	A	C	C	C	A	D	B

TRUE or FALSE

- 1) The most widely used index of productivity is to work out the output per machine-hour
- 2) A Productivity Index is a device of expressing the ratio between outputs and the inputs of the resources numerically.
- 3) Merit Rating is used to determine the cost of a product.
- 4) The productivity is a measure of how much input is required to achieve a given output
- 5) ISO Standards are reviewed every four years and revised if needed.
- 6) There is a limit beyond which labour productivity cannot be improved.
- 7) Merit Rating is used to determine the cost of a product.
- 8) A Productivity Index is a device of expressing the ratio between outputs and the inputs of the resources numerically.
- 9) Increased productivity leads to cost reduction.
- 10) Preventive maintenance is useful in reducing inspection cost.
- 11) The increase in productivity can be attributed to the application of Industrial Engineering/Techniques, particularly the work study.
- 12) Increase in productivity leads to retrenchment of work force.
- 13) In view of rapid technological advancement, we would not concentrate on labour productivity.
- 14) Piece wage system is a substitute for proper supervision.
- 15) Personnel Manager has nothing to do with productivity. It is the job of Technical personal.
- 16) Do standard Times allow for relaxation of the Operators?

ANSWERS

1	2	3	4	5	6	7	8	9	10
False	True	False	True	False	True	False	True	True	False
11	12	13	14	15	16				
True	False	False	False	False	True				

CHAPTER – 6**PROJECT MANAGEMENT - NETWORK ANALYSIS****MCQ**

- 1) **With reference to project management, identify which of the following statement is NOT Correct?**
 - A. Gantt chart is a principal tool used in scheduling and also in some methods of loading
 - B. Routing is the first step in the production planning
 - C. The cost of any activity is proportional to its time of completion.
 - D. The free float can be calculated by subtracting EFT from EST.

- 2) **In a network diagram, the activity that must be completed prior to the start of an activity is called as**
 - A. Successor activity
 - B. Predecessor activity
 - C. Concurrent activity
 - D. Dummy activity

- 3) **One of the important charts used in Programme control is**
 - A. Gantt chart
 - B. Material chart
 - C. Distribution chart
 - D. Maintenance chart

- 4) **The method used in scheduling project is:**
 - A. A schedule of break-down of orders
 - B. Outline master programme
 - C. PERT& CPM
 - D. Schedule for large and integrated work

- 5) **The difference between product system and project system is:**
 - A. Project system the equipment and machinery are fixed where as in product system they are movable
 - B. In Product system the machinery and equipment are fixed and in project system they are not fixed
 - C. Project system produces only standardized products and product system produces only unstandardized products
 - D. Products cannot be stocked whereas projects can be stocked

- 6) **Z' chart is a chart used in:**
 - A. Programme control
 - B. Job control
 - C. Cost control
 - D. Quality control

- 7) **Z-chart can be used to show:**
 - A. Process used in production
 - B. Quality level of the product
 - C. Both the plan and the performance, and deviation from the plan
 - D. To show cost structure of the product.

ANSWERS

1	2	3	4	5	6	7
D	B	A	C	B	A	C

TRUE or FALSE

- 1) If the total float value is zero, it means the resources are just sufficient to complete the activity without any delay.
- 2) PERT is designed for repetitive projects, whereas CPM is suitable for non-repetitive
- 3) Project costs increase as the duration of the project increases.
- 4) One of the limitations of Gantt Chart is that it does not clearly indicate the details regarding progress of activities.
- 5) The CPM has the advantage of decreasing completion times by probably spending more money.
- 6) An objective of maintenance management is to maximize the repair time and repair cost.
- 7) If the total float value is zero, it means the resources are just sufficient to complete the activity without delay.
- 8) Vertical lines of authority and responsibility must be kept as short as possible.
- 9) Project costs increase as the duration of the project increases.
- 10) If the total float value is zero, it means the resources are just sufficient to Complete the activity without delay.

ANSWERS

1	2	3	4	5	6	7	8	9	10
True	False	True	True	True	False	True	True	True	True

CHAPTER – 7**ECONOMICS OF MAINTENANCE AND SPARES MANAGEMENT****MCQ**

- 1) **Preventive maintenance is useful in reducing**
 - A. Inspection Cost
 - B. Cost of premature replacement
 - C. Shutdown Cost
 - D. Set-up Cost of machine

- 2) **Which one of the following is NOT the advantage of Preventive Maintenance?**
 - A. Better product quality
 - B. Greater safety to workers
 - C. Increased breakdowns and downtime
 - D. Fewer large-scale repairs

- 3) **Reliability and per unit cost of which of the following spares are less?**
 - A. Regular spares
 - B. Insurance spares
 - C. Capital spares
 - D. Ratable spares

- 4) **One of the objectives of maintenance is:**
 - A. To prevent obsolescence.
 - B. To ensure spare parts management.
 - C. To satisfy customers.
 - D. To extend the useful life of plant & machinery without sacrificing the level of performance.

- 5) **Identify which one of the following statements is NOT correct?**
 - A. Preventing maintenance includes lubrication, cleaning, periodic overhaul, etc
 - B. The two types of cost-cost of premature replacement and cost of breakdown- need to be balanced.
 - C. Wear and obsolescence are the two main causes of replacement of machinery in every aspect of life.
 - D. A machine is technically obsolete when another machine can do the same job more efficiently with reduced time and also at a lower cost.

- 6) **Identify which one of the following is NOT the objective of the maintenance:**
 - A. To keep all production facilities and allied facilities in an optimum working condition.
 - B. To ensure specified accuracy to products and time schedule of delivery to customers.
 - C. To keep the down time of the machine at the maximum.
 - D. To keep the production cycle within the stipulated range.

- 7) **Number of product varieties that can be manufactured in Mass production is**
 - A. one only.
 - B. few varieties in large volume.
 - C. two only.
 - D. large varieties in small volumes.

- 8) **Inventory cost per product in intermittent production is**
A. Higher
B. Lowest
C. Medium
D. Abnormal
- 9) **In route sheet or operation layout, one has to show**
A. A list of materials to be used.
B. A list of machine tools to be used.
C. Every work centre and the operation to be done at that work centre.
D. The cost of product,
- 10) **Preventive maintenance is useful in reducing:**
A. Inspection Cost
B. Shutdown Cost
C. Cost of pre-mature replacement
D. Set-up cost of machine
- 11) **The card which is prepared by the dispatching department to book the labour involved in each operation is:**
A. Labour card
B. Wage card
C. Credit card
D. Job card.
- 12) **Cost reduction can be achieved through:**
A. Work sampling
B. Value analysis
C. Quality assurance
D. Supply chain management.

ANSWERS

1	2	3	4	5	6	7	8	9	10	11	12
C	C	A	D	A	C	B	A	C	B	D	B

FILL IN THE BLANKS

- 1) _____ is a Single Purpose Machine Tool designed for cutting gears.
- 2) The Pattern Shop in a factory should ideally be near the_____.
- 3) _____ is the interval between placing an order for a particular item and its actual receipt.
- 4) Product is a combination of potential utilities for a_____.
- 5) A jig contains a device for guiding the_____.
- 6) Factor comparison is a method of
- 7) General purpose machines are less prone to
- 8) focuses on such areas as inventory goals and wages budgets.
- 9) _____ machines are often kept to reduce the loss due to the breakdown of a key machine.
- 10) The investment on machines in a straight-line layout is. than the investment on machines in a functional layout
- 11) Machines are purchased or replaced to the productive capacity.
- 12) A _____ is an appliance which holds the work when it is machined.
- 13) The effectiveness of maintenance can be evaluated in terms of maintenance costs etc. incurred, equipment.
- 14) To evaluate the work done by preventive maintenance, _____ is derived at from the total time of stoppage of the machine for scheduled and unscheduled maintenance work.
- 15) In applications of queuing theory in maintenance, the machine breakdowns are the _____ in the queue and they may have their own _____ distribution

ANSWERS

1	2	3	4	5	6	7
Hobbing machine	Foundry	Lead Time	Consumer	Tools	Job Evaluation	Obsolescence
8	9	10	11	12	13	14
Short range Planning	Standby	Higher	Increase	Fixture	Downtime	Downtime
15						
Arrivals, Frequency						

TRUE or FALSE

- 1) Preventive maintenance ensures greater safety to workers.
- 2) The ratable spares are spare parts which are required regularly and in substantial number.
- 3) A work stoppage generally reduces the cost of production.
- 4) Breakdown maintenance doesn't require use of standby machines.
- 5) Depending on the need, the maintenance activity may be centralized or decentralized.
- 6) Piece wage system is a substitute for proper supervision.
- 7) Most suitable layout for continuous production is Matrix Layout.
- 8) Greater safety for workers, reduced production downtime and fewer repetitive repairs are some of the benefits of preventive maintenance.
- 9) Value engineering aims at reducing work content of a product.
- 10) Depending on the need, the maintenance activity may be centralized or decentralized.
- 11) Breakdown maintenance doesn't require use of standby machines.
- 12) When demand does not exist in the market, we should start Production Incentives.
- 13) A Jig is an appliance which holds the work when it is machined.
- 14) Wear and obsolescence are two main causes for replacement of machinery in every aspect of life.
- 15) Standard performance is the natural rate of working of an average operator when he works under proper supervision but without any financial motivation.
- 16) Allowances for non-availability of materials power failure and breakdown of machine are provided for in the standard time for an operation/job.
- 17) Since breakdown of Plant and machineries is a random phenomenon, it is impossible to do any work measurement in Maintenance are

ANSWERS

1	2	3	4	5	6	7	8	9	10
True	False	False	False	True	False	False	True	False	True
11	12	13	14	15	16	17			
False	False	False	True	False	False	False			

CHAPTER – 8**STRATEGIC MANAGEMENT****MCQ**

- 1) Which one of the following does NOT seem to be an advantage of the strategic management?
 - A. Discharges board responsibility
 - B. Provides a framework for decision-making
 - C. Forces an objective assessment
 - D. It can be expensive

- 2) For an entrepreneur
 - A. Vision is before the mission.
 - B. Mission is before the vision.
 - C. Both are developed simultaneously.
 - D. Vision or mission are un-important issues.

- 3) What are enduring statements of purpose that distinguish one business from other similar Firms?
 - A. Policies
 - B. Mission statements
 - C. Objectives
 - D. Rules

- 4) Which of the following statements can be closely related with the Mission?
 - A. It includes definition of products & services the organization provides.
 - B. It specifies management policies towards customers and societies.
 - C. It provides a roadmap to company's future.
 - D. It indicates the kind that company management is trying to create for future

- 5) Which one of the following is NOT the benefit of a Vision?
 - A. It helps in the creation of common identity and a shared sense of purpose.
 - B. It fosters risk taking and experimentation.
 - C. It fosters short-term thinking
 - D. It represents integrity.

- 6) Board of directors has certain basic tasks as follows:
 - A. To monitor plans and programs of production.
 - B. To design the course of strategic options and appointment of top management.
 - C. To control utilization of resources.
 - D. To monitor courses of actions for marketing management.

- 7) Which one of the following statements is NOT correct?
 - A. Vision is the statement of the future.
 - B. The corporate mission is the purpose or reason for its existence.
 - C. Targets are formed from vision and mission statement of organizations.
 - D. Goals are objectives that are scheduled for attainment during planned period.

8) Benchmarking is

- A. the analytical tool to identify high-cost activities based on the Pareto Analysis'.
- B. the search for industries best practices that lead to superior performance.
- C. the simulation of cost reduction schemes that helps to build commitment and improvement of actions.
- D. the process of marketing and redesigning the way a typical company works. the framework that earmarks a linkage with suppliers and customers

9) Successful differentiation strategy allows the company to

- A. gain buyer loyalty to its brands.
- B. charge too high a price premium.
- C. depend only on intrinsic product attributes.
- D. have product quality that exceeds buyer's needs. segment a market into distinct group of buyers

10) The essential ingredients of Business Process Re-engineering (BPR) are

- A. continuous improvements of products, processes and technologies.
- B. planning for the technologies, processes and strategic partnerships etc.
- C. fundamental re-thinking and radical redesign of business process to achieve dramatic results.
- D. generation, comparison and evolution of many ideas to find one worthy of development, identification and selection of lay-outs most suited for products and processes.

ANSWERS

1	2	3	4	5	6	7	8	9	10
D	A	B	B	A	B	C	B	A	C

CHAPTER – 9

STRATEGIC ANALYSIS AND STRATEGIC PLANNING

MCQ

- 1) **Successful differentiation strategy allows the company to**
 - A. gain buyer loyalty to its brands.
 - B. charge too high a price premium.
 - C. depend only on intrinsic product attributes.
 - D. have product quality that exceeds buyers' needs.
 - E. segment a market into distinct group of buyers.

- 2) **Which of the following analyses 'products and businesses by market share and market growth'?**
 - A. SWOT Analysis
 - B. BCG Matrix
 - C. PEST Analysis
 - D. Portfolio Analysis

- 3) **The BCG growth matrix is based on the two dimensions**
 - A. Market Size and Market Share
 - B. Market Size and Profit Margins
 - C. Market Size and Competitive Intensity
 - D. None of the above

- 4) **Strategic analysis is concerned with stating the position of the organisation in terms of**
 - A. Mission, choice of market segments, product selection, financial targets and external appraisal.
 - B. Mission, goals, corporate appraisal, position audit and gap analysis
 - C. Mission, goals, identification of key competitors, SWOT and environmental appraisal.
 - D. Mission, targeted ROI, manpower planning and position audit.

- 5) **A corporate strategy can be defined as**
 - A. A list of actions about operational planning and statement of organisation structure and control system.
 - B. A statement of how to compete, direction of growth and method of assessing environment
 - C. Abatement of Organisation's activities and allocation of resources.
 - D. A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives.

- 6) **Portfolio Analysis is a term used**
 - A. To identify what strategy is needed to maintain a strong position or improve a weak one.
 - B. To find out a best alternative out of various alternatives available.
 - C. To analyse products and business by market share and market growth.
 - D. To make managers more adaptable to unforeseen change.

ANSWERS

1	2	3	4	5	6
A	B	D	B	D	A

CHAPTER – 10**FORMULATION AND IMPLEMENT OF STRATEGY****MCQ**

- 1) **The essential ingredients of Business Process Re-engineering (BPR) are**
 - A. Continuous improvements of products, processes and technologies.
 - B. Planning for the technologies, processes and strategic partnerships etc.
 - C. Fundamental re-thinking and radical redesign of business process to achieve dramatic results.
 - D. Generation, comparison and evolution of many ideas to find one worthy of development.
 - E. Identification and selection of lay-outs most suited for products and processes.

- 2) **Marketing Research Studies are undertaken**
 - A. To measure brand loyalty of a class of consumers.
 - B. To predict market potential of a product on a future date.
 - C. To understand product-price relationship.
 - D. All of the above

- 3) **Which one of the following is NOT part of the McKinsey's 7-S framework?**
 - A. Skills
 - B. Staff
 - C. Systems
 - D. Supervision

- 4) **Strategic Business Unit (SBU) structure does NOT experience one of the following as an advantage:**
 - A. Higher career development opportunities
 - B. Control of categories of products manufacturing marketing and distributions
 - C. High cost approach
 - D. Help in expanding in different related and unrelated businesses

- 5) **A Strategic Business Unit (SBU) is defined as a division of an organization**
 - A. That helps in the marketing operation.
 - B. That helps in the choice of technology.
 - C. That enables managers to have better control over the resources.
 - D. That helps in identifying talents and potentials of people.

- 6) **McKinney's 7-s framework consists of:**
 - A. Structure, Strategy, Software, Skills, Styles, Staff and Supervision
 - B. Structure, Strategy, Systems, Skills, Styles, Syndication and Shared values
 - C. Structure, Strategy, Systems, Skills, Steering power, Styles and Shared values
 - D. Structure, Strategy, Staff, Skills, Systems, Shared values, Style

- 7) **Business Process Re-engineering is**
 - A. Eliminating loss-making process.
 - B. Redesigning operational processes.
 - C. Redesigning the product and services.
 - D. Recruiting the process engineers.

- 8) **The Product Market matrix comprising of Strategies of Market Penetration, Market Development, Product Development, and Diversification was first formulated by**
 A. Ansoff
 B. Drucker
 C. Porter
 D. Prahalad
- 9) **Which one of the following is NOT a role of Marketing?**
 A. It helps in sustaining and improving the existing levels of employment.
 B. It helps in the economic growth of a country.
 C. It helps in the discovery of entrepreneurial talent.
 D. It diminishes potential aggregate demand and thus reduces the size of the market
- 10) **The competitive position of a company's SBU or product line can NOT be classified as one of the following:**
 A. Dominant
 B. Strong
 C. Favourable
 D. Volatile
- 11) **The best test of a successful Strategy Implementation is**
 A. Whether the strategies and procedures are observed in the strategy supportive fashion.
 B. Whether the structure is well-matched to strategy.
 C. Whether actual organizational performance matches or exceeds the targets spelt out in the strategic plan.
 D. Whether it is made after the strategy is formulated, so that it is supportive to the strategy.

ANSWERS

1	2	3	4	5	6	7	8	9	10	11
C	D	D	C	C	D	B	A	D	D	C

CMA-INTER

SHORT NOTES

ON

Paper-9 OMSM

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STRATEGIC MANAGEMENT

(Paper-9)

SHORT NOTES of ALL MTP

- 1. STRATEGIC PLANNING**
- 2. ENVIRONMENT ANALYSIS**
- 3. MARKETING MIX**
- 4. BUSINESS PROCESS RE-ENGINEERING (BPR)**
- 5. BENEFITS ON CONTINGENCY PLANNING**
- 6. CORPORATE LEVEL MANAGEMENT**
- 7. SWOT ANALYSIS**
- 8. BCG MATRIX**
- 9. STRATEGIC MANAGEMENT FRAMEWORK**
- 10. MARKET PENETRATION STRATEGY**
- 11. FUNCTIONAL ORGANIZATIONAL STRUCTURE**
- 12. RELATED DIVERSIFICATION**
- 13. TYPES OF FIRMS/ORGANISATIONS FOR WHICH BPR CAN BE APPLIED**
- 14. PEST FRAMEWORK**
- 15. LIMITATION OF B.C.G MODEL**
- 16. IMPORTANCE OF STRATEGIC MANAGEMENT**
- 17. THEORY X AND THEORY Y**
- 18. MC KINSEY'S 7 – S FRAME WORK**
- 19. PLANT LOCATION**
- 20. STRUCTURAL DRIVER'S OF CHANGE**
- 21. ORGANISATIONAL ENVIRONMENTAL FACTORS**
- 22. MATRIX ORGANIZATION STRUCTURE**
- 23. PARTICIPATIVE MANAGEMENT**
- 24. FORMULATION OF MISSION STATEMENT**
- 25. ELEMENTS OF STRATEGIC INTENT**
- 26. THREE GOALS OF A COMPANY**
- 27. STRATEGIC VISION**
- 28. ADVANTAGES OF BCG MATRIX**
- 29. DIFFERENCE B/W STRATEGIC MANAGEMENT & STRATEGIC PLANNING**
- 30. TYPES OF ORGANISATIONAL STRUCTURE**

Answer

1. STRATEGIC PLANNING:

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

- A top-down process, in which managers are given targets to achieve which they pass on down the line.
- A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

2. ENVIRONMENT ANALYSIS:

Environmental factors—both internal environment and external environment—are analysed to:

- identify changes in the environment,
- identify present and future threats and opportunities, and
- assess critically its own strengths and weaknesses.

Organisational environment encompasses all factors both inside and outside the organisation that can influence the organisation positively and negatively. Environmental factors may help in building a sustainable competitive advantage.

3. MARKETING MIX:

Marketing mix is the pack of four sets of variables namely, product variables, price variables, promotion variables and place variable.

Marketing Mix refers to the appointment of effort, the combination, designing and integration of the elements of marketing into a programme or mix which, on the basis of an appraisal of the market forces will best achieve the objectives of an enterprise at a given time. Kotler defines the marketing mix as the set of controllable variables and their levels that the firm uses to influence the target market. Such variables are:

1. Product
2. Place
3. Price and
4. Promotion

In addition, for service-there are three more P's They are:

1. People
2. Processes and
3. Physical evidence.

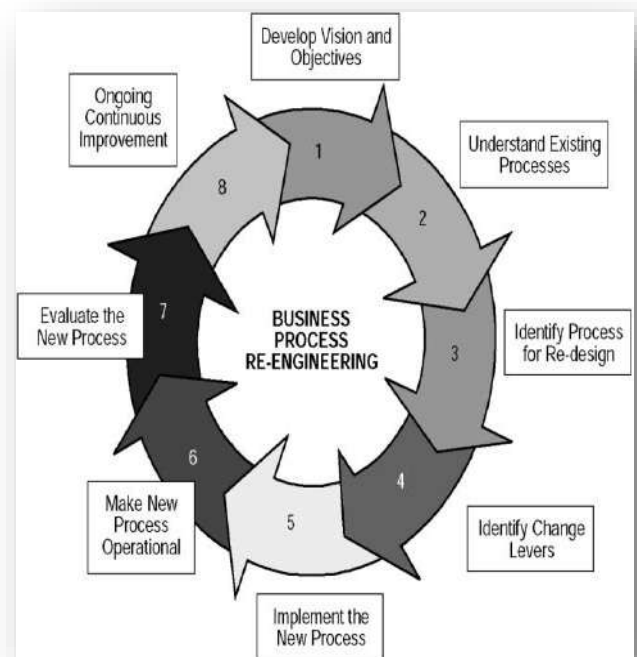
4. BUSINESS PROCESS RE-ENGINEERING:

BPR is a business management strategy, originally pioneered in the early 1990s, focusing on the analysis and design of workflows and processes within an organization. BPR aimed to help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. In the mid-1990s, as many as 60% of the Fortune 500 companies claimed to either have initiated reengineering efforts, or to have plans to do so.

BPR seeks to help companies radically restructure their organizations by focusing on the ground-up design of their business processes. According to Davenport (1990) a business process is a set of logically related tasks performed to achieve a defined business outcome. Re-engineering emphasized a holistic focus on business objectives and how processes related to them, encouraging full-scale recreation of processes rather than iterative optimization of sub-processes.

Business process re-engineering is also known as business process redesign, business transformation, or business process change management.

The globalization of the economy and the liberalization of the trade markets have formulated new conditions in the market place which are characterized by instability and intensive competition in the business environment. Competition is continuously increasing with respect to price, quality and selection, service and promptness of delivery. Removal of barriers, international cooperation, technological innovations cause competition to intensify. All these changes impose the need for organizational



Re-engineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed.

Process is a structured, measured set of activities designed to produce a specified output for a particular customer or market. It implies a strong emphasis on how work is done within an organization. —(Davenport 1993).

Each process is composed of related steps or activities that use people, information, and other resources to create value for customers as it is illustrated in the following example.

Principle of BPR: BPR is achieving dramatic performance improvements through radical change in organizational processes, re-architecting of business and management processes.

Redesign, retooling and re-orchestrating form the key components of BPR that are essential for an organization to focus on the outcome that it needs to achieve.

5. BENEFITS OF CONTINGENCY PLANNING:

- It will make the future through their proactive planning and advanced preparation.
- It will introduce original action by removing present difficulties.
- It enables to anticipate future problems.
- It will change the goals to suit internal and external changes.
- It experiments with creative ideas and take initiative.
- It will attempt to shape the future and create a more desirable environment.
- It permits quick response to change,
- It prevents panic in crisis situations.
- It makes managers more adaptable to unforeseen changes.

6. CORPORATE LEVEL MANAGEMENT:

The corporate level of management consists of the chief executive officer (CEO), other senior executives, the board of directors, and corporate staff. These individuals occupy the top-committee of decision making within the organisation. The CEO is the principal general manager. In consultation with other senior executives, the role of corporate-level managers is to oversee the development of strategies for the whole organisation. This role includes defining the mission and goals of the organisation, determining what businesses it should be in, allocating resources among the different businesses, formulating and implementing strategies that span individual businesses, and providing leadership for the organisation. For example, strategies formed for Unilever Limited would be at corporate level. is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed.

7. SWOT ANALYSIS:

Gathering data about the general, operating, and internal environments provides the raw material from which to develop a picture of the organizational environment.

SWOT analysis refines this body of information by applying a general framework for understanding and managing the environment in which an organisation operates. (The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.) In many respects, the sophisticated analytical techniques discussed throughout the text are further refinements of basic SWOT analysis. In addition, students have repeatedly told us that SWOT is an excellent way to begin a case analysis. SWOT analysis attempts to assess the internal strengths and weaknesses of an organisation and the opportunities and threats that it's external environment presents. SWOT seeks to isolate the major issues facing an organization through careful analysis of each of these four elements. Managers can then formulate strategies to address key issues.

8. BOSTON CONSULTING GROUP (BCG) MATRIX:

The Boston Consulting Group (BCG)'s matrix analyses „products and businesses by market share and market growth. “

This growth/share matrix for the classification of products into cash cows, dogs, rising stars and question marks is known as the Boston classification for product-market strategy.



- Stars are products with a high share of a high growth market. In the short term, these require capital expenditure, in excess of the cash they generate, in order to maintain their market position, but promise high returns in the future.
- In due course, however, stars will become cash cows, with a high share of a low- growth market. Cash cows need very little capital expenditure and generate high levels of cash income. The important strategic feature of cash cows is that they are already generating high cash returns, which can be used to finance the stars.
- Question marks are products in a high-growth market, but where they have a low market share. A decision needs to be taken about whether the products justify considerable capital expenditure in the hope of increasing their market share, or whether they should be allowed to „die“ quietly as they are squeezed out of the expanding market by rival products. Because considerable expenditure would be needed to turn a question mark into a star by building up market share, question marks will usually be poor cash generators and show a negative cash flow.
- Dogs are products with a low share of a low growth market. They may be ex-cash cows that have now fallen on hard times. Dogs should be allowed to die, or should be killed off. Although they will show only a modest net cash outflow, or even a modest net cash inflow, they are „cash traps“ which tie up funds and provide a poor return, on investment, and not enough to achieve the organisation’s target rate of return.

9. STRATEGIC MANAGEMENT FRAMEWORK:

The basic framework of strategic management involves five stages:

Stage 1: In this stage, organisation analyse about their present situation in terms of their Strengths, Weaknesses, Opportunities and Threats.

Stage 2: In this stage, organisations setup their missions, goals and objectives by analysing where they want to go in future.

Stage 3: In this stage organisation analyses various strategic alternatives to achieve their goals and objectives. The alternatives are analyzed in terms of what business portfolio/product mix to adopt, expansion, merger, acquisition and divestment options etc are analysed to achieve the goals.

Stage 4: In this organisation select the best suitable alternatives in line with their SWOT analysis

Stage 5: This is implementation stage in which organisation implement and execute the selected alternatives to achieve their strategic goals and objectives.

Strategic Management Framework

Stage 1: Where are we now? Analysis of present situation
Stage 2: Where we want to go? Setting goals and objectives for future
Stage 3: Analyses of various alternatives to achieve the goals and objectives
Stage 4: Selecting best alternatives in line with strengths of organisation
Stage 5: Implementing and executing the selected alternatives and monitoring of the same overtimes

10. MARKET PENETRATION STRATEGY

		Products	
		Existing	New
Markets	Existing	Market penetration	Product development
	New	Market development	Diversification ➤ Related ➤ unrelated

Firm increases its sales in its present line of business. This can be accomplished by:

1. Price reductions;
2. Increases in promotional and distribution support;
3. Acquisition of a rival in the same market;
4. Modest product refinements.

These strategies involve increasing the firm's investment in a product/market and so are generally only used in markets which are growing, and hence the investment may be recouped. In this respect the strategy is similar to invest to build and holding strategy as described by the Boston Consulting Group.

11. FUNCTIONAL ORGANIZATION STRUCTURE:

The functional structure is characterized by the simultaneous combination of similar activities and the separation of dissimilar activities on the basis of function. All Cost Accountants are located in the Cost Accounting Department, and the HOD of Cost Accounting is responsible for all cost related activities. The same is true in marketing, research and development, and manufacturing.

The functional organization form is one of the most common organizational structures found in firms pursuing strategy of concentration or very high relatedness. A functional structure is most appropriate when the organization is small to medium size and relatively stable.

12. RELATED DIVERSIFICATION

Here there is some relationship, and therefore potential synergy, between the firms existing business and the new product/market space:

1. Concentric diversification means that there is a technological similarity between the industries which means that the firm is able to leverage its technical know-how to gain some advantage.
2. Vertical integration means that the firm is moving along the value system of its existing industry towards its customers (forward vertical integration) or towards its suppliers (backward vertical integration). The benefits of this are assumed to be:
 - Taking over the profit margin presently enjoyed by suppliers or distributors;
 - Securing a demand for the product or a supply of key inputs;
 - Better synchronization of the value system;

13. TYPES OF FIRMS / ORGANISATIONS FOR WHICH BPR CAN BE APPLIED:

BPR could be implemented to all firms (manufacturing firms, retailers, services, etc.) and public organizations that satisfy the following criteria:

- Minimum Number of employees: 20 (at least 4 in management positions).
- Strong management commitment to new ways of working and innovation.
- Well-formed IT infrastructure.

Business Process Reengineering could be applied to companies that confront problems such as the following:

- High operational costs
- Low quality offered to customers
- High level of "bottleneck" processes at peak seasons
- Poor performance of middle level managers
- Inappropriate distribution of resources and jobs in order to achieve maximum performance, etc.

14. PEST FRAMEWORK.

PEST analysis refers to Political, Economical, Social, and Technological factors which manipulate the business environment. SWOT analysis refers to Strengths, Weaknesses, Opportunity and Threats.

These factors are prime determinants of strategic planning. Without SWOT and PEST analysis companies might fail to achieve desired goals. PEST Analysis looks at external factors and is primarily used for market research. It is used as an alternative to SWOT Analysis:

- **Political** – These are the external factors that influence the business environment. Government decisions and policies affect a firm's position and structure, Tax laws, monetary and fiscal policies as well as reforms of labor and workforce, all influence companies in future. These factors are important and need to be managed in order to overcome uncertainty.
- **Economical** – Economical factors are the most important since it impacts business in the long run. Inflation, interest rates, economic growth and demand/supply trends are to be considered and analyzed effectively before planning and implementing. Economic factors affect both consumers and enterprises.
- **Social** – Social factors involve the trends of population, domestic markets, cultural trends and demographics. These factors help businesses assess the market and improve their products/service accordingly.
- **Technological** – These analyses the technology trends and advancements in business environment, innovations and advancements lowers barriers to entry plus decreased production levels as it results in unemployment. This includes research and development activity, automation and incentives.
 - (A) It presents a business' standing and position, i.e., whether it is weak or strong
 - (B) It informs about both internal and external factors that affect a firm's success and/or failure
 - (C) It helps firms assess the report and take counter measures for improvement and analyzing threats
 - (D) It forecasts the future and sheds light on the current situation
 - (E) Evaluates business environment and allows firms to make strategic decisions
 - (F) Prevents future failure and creates a system of continuous success
 - (G) Provides companies with a reality check on their performance and shortcoming
 - (H) Enables firms to understand the economy and market and expand
 - (I) Provides a mechanism to identify threats and opportunities
 - (J) Enables companies to learn about markets and enter new markets nationally or globally.

15. LIMITATIONS OF THE BCG MODEL:

The BCG model analyses products in the light of two variables: the growth in the market as a whole, and the growth of the product's share of the market in relation to other products. It suggests that there is a relationship between these variables and the product's propensity to generate cash or consume it. It rests on the assumption that the firm with the highest market share can be the lowest cost producer. The model suggests that cash cows should be used to fund stars. There are a number of limitations to the model.

- How do you define your market? Segmentation strategies can provide a niche. A niche is inevitably a low or restricted share of the market, yet it is the heart of a focus strategy. Firms can profit servicing small low -growth niches.
- Market growth and market share are assumed to be reliable pointers for cash flow. This is often not true. High market share does not necessarily mean high profits, especially if a firm has high costs, or has bought market share by low pricing.
- Relative market share amongst competitors is not necessarily an indication of their competitive strengths at any particular time. After all, market leaders are vulnerable.
- The BCG model might become a self -fulfilling prophecy: Dogs which could be made profitable might simply be left to the rather than be resuscitated.
- It does not suggest any response to declining markets other than withdrawal: many firms can make money in 'sunset industries'.
- It ignores the extent to which a firm which serves a number of markets can exploit production synergies.
- It ignores the threat of substitute products.

16. IMPORTANCE OF STRATEGIC MANAGEMENT:

- Discover organisation strengths and weaknesses
- Identify the available opportunities and possible threats
- Discover the objectives and goals in line with organisations strengths and available opportunities
- Implement changes to overcome weaknesses and manage the threats.
- Provide vision/mission or direction to future of organisations
- Build a dynamic and strong organisation
- Help to achieve growing and stable organisation.

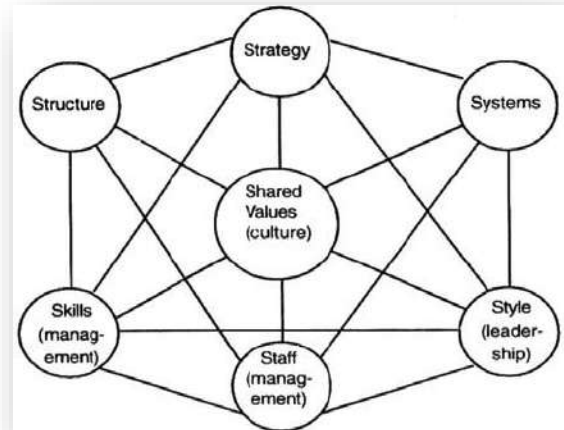
17. THEORY X AND THEORY Y:

Another motivation strategy involves manager's assumptions about the nature of people. Douglas McGregor identified two sets of assumptions. According to him, Theory X involves negative assumptions that managers often use as the basis for dealing with people. Theory Y represents positive assumptions which managers strive to use. The basic rationale for using Theory Y rather than Theory X in most situations is that managerial activities reflect Theory X assumptions. As such, the activities based on Theory Y assumptions generally are more successful in motivating organisation people than those based on Theory X assumptions.

18. MC KINSEY'S 7 – S FRAME WORK;

Strategy is dependent on many variables – Internal as well as external. All factors are interrelated.

The McKinney Company, a well-known management consultancy firm in the United States, towards the end of 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills and superordinate goals. A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.



- **Strategy:** A set of decisions and actions aimed at gaining a sustainable competitive advantage.
- **Structure:** The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- **Systems:** The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- **Style:** How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- **Staff:** How companies develop employees and shape basic values.

19. PLANT LOCATION:

Plant location is essentially an investment decision having long-term significance and implied economic effects. A good decision plays off; a bad decision can cause grim financial difficulties. Once a plant is acquired, it is a permanent site that cannot readily be sold. The management may also contemplate relocation of the plant when business expansion and advanced technology require additional facilities to serve new market areas, to produce new products, or simply to replace the old, obsolete plants to increase the company's production capacity.

Before a location for a plant is sought, long range forecasts should be made anticipating the future needs of the company. These should be based on the company's expansion policy, the anticipated diversification of products, the trends in market demand, geographical distribution, material and labour supply, and any other foreseeable influences. Thus, plant location decisions require intensive study of economic and socio-political circumstances.

The accuracy of forecasting is essential regarding rising demand and anticipated sales increases. Miscalculation in this respect may post serious problems before the company can occupy the new facilities once built and expand the new facilities subsequently due to land and environmental constraints.

The selection of an appropriate plant site calls for location study of the region in which the factory is to be situated, the community in which it should be placed and finally, the exact site in the city or countryside.

20. STRUCTURAL DRIVERS OF CHANGE:

Structural Drivers of Change are forces likely to affect the structure of an industry, sector or market. The following are some of the factors

- **Increasing convergence of markets**
In some markets the customers' needs and preferences are becoming more similar. As some markets globalise, those operating in such markets become global customers and may search for suppliers. Moreover, marketing policies need to be developed all over again.
- **Cost advantage of global operations**
This benefit might accrue to industries that operate in large volume, standardised production and enjoy economies of scale. In order to realise location economies businesses, search globally for low-cost operations and enjoying competitive edge.
- **Activities and policies of the governments**
The government policies and activities have also resulted in influencing the globalisation of industry. The moves towards free trade and technical standardisation of many products between countries have resulted in increasing competition.
- **Global competition**
It is the global competition that acts as a driver to globalisation. It may be mentioned that high level of import and export between countries increases interaction between competitors on a more global scale. The interdependence of companies across the world promotes global trade.

21. ORGANISATIONAL ENVIRONMENTAL FACTORS:

1. identify changes in the environment,
2. identify present and future threats and opportunities, and
3. assess critically its own strengths and weaknesses.

Organisational environment encompasses all factors both inside and outside the organisation that can influence the organisation positively and negatively. Environmental factors may help in building a sustainable competitive advantage.

22. MATRIX ORGANIZATION STRUCTURE:

Another way to achieve focus on multiple outcomes is with the matrix structure. The matrix structure creates a dual chain of command; two lines of budget authority and two sources of performance and reward. The key feature of the matrix is that product (or business) and functional lines of authority are overlaid to form a matrix or grid, between the product manager and functional manager.

23. PARTICIPATIVE MANAGEMENT:

Another strategic approach to employee's motivation is to adopt the system of involving employees in decision making. This will elicit employee's commitment in executing decisions. Further, the successful process of making a decision, executing it and then seeing the positive consequences can help satisfy one's need for achievement, provides recognition and responsibility and enhance self-esteem.

Maintenance aspect of human resources is concerned with creation and maintenance of such working conditions in the organisation as are necessary to attract the most talented people, retain them and motivate them to give their best.

For this purpose, existing system of grade salary structure, fixed annual increments and automatic adjustments to inflation has to be replaced by performance linked reward system. Under the new system, employee's reward will be linked to the corporate objectives by pegging it to the employees' contribution towards achieving them. Time has come to develop a comprehensive reward system that splits employees' compensation between company standards, individual merit and team performance. Individual reward system based on attainment of functional specific targets bearing no relationship to corporate performance should give way to team-based reward system which pegs rewards of entire manpower of the business division to the achievement of its goals.

24. FORMULATION OF MISSION STATEMENT

- It should be based on existing business capabilities "Who we are and what we do?"
- It should follow the long-term strategy principles.
- Profit making should not be the only mission of organisation.
- It should contain logical extension of business capabilities.
- It should present the future orientation of business clearly.
- It should include achievable missions.
- It should be clear, motivating, precise.
- It should indicate major components of strategy.
- Formation of Mission statement should be communicated to every member of organisations.
- It should include interest of customers and society.

25. ELEMENTS OF STRATEGIC INTENT

Element	Description
Vision	It indicates where the Firm wants to be in the future i.e., its aspirations
Mission	It explains the reasons for the Firm's existence and represents the purpose of the Firm
Business Definition	It explains the Business of the Firm, i.e. (a) products and services, (b) its target customers, (c) the ways the Firm satisfies those needs, (d) the methods processes and techniques used, etc
Business Model	It represents the operational explanation to the Business Definition stated above, i.e. (a) what are the sources of Revenue (b) what are the costs (c) what are the Assets and Other Resources used etc.
Goals and Objectives	(a) Generally, Goals are the end-results that a Firm seeks to accomplish, whereas Objectives are the Goals & measurable targets which help in the accomplishment of Goals. (b) However, the two terms Goals and Objectives are used interchangeably in many situations

26. THREE GOALS OF A COMPANY:

1. SURVIVAL:

All company has a long-term objective to fulfil. A company has to survive to achieve that long-term objective.

2. PROFITABILITY:

No company exists without the objective of earning profit, except government companies. Profitability should be a long-term objective. If it is set as a short-term objective, it would be difficult for the company to stay in the market in the long run. (Jio did not make Rs.1 of profit for the first 6 months of its inception)

3. GROWTH:

Growth can be of many types. It could be based on profitability growth, sales growth, market coverage growth, etc. To be successful in the long run, a company has to continually grow, and keep it as one of the main objectives.

27. STRATEGIC VISION:

A STRATEGIC VISION IS —

- a) a road map of a Company's future,
- b) providing specifics about technology and customer focus, the geographic and product markets to be pursued
- c) the capabilities it plans to develop, and the kind of Company that the Management is trying to create.

EXAMPLES:

- Nike: 'To bring innovation and inspiration to every athlete in the world.'
- Scotland Yard: 'to make London the safest major city in the world.'
- Dabur: 'Dedicated to the health and well-being of every household.'

28. ADVANTAGES OF BCG MATRIX:

- It is simple to implement and easy to understand.
- Larger companies can use it for the seeking volume and experience effects. It predicts the future actions of a company. Hence, the company can decide its proper management strategy.
- Helpful for managers to evaluate balance in the firm's current portfolio of Stars, Cash Cows, Question Marks, and Dogs.
- The matrix indicates that the profit of the company is directly related to its market share. Therefore, a company can increase market share if it seems profitable.
- It has only four categories that make it in simple form to operate efficiently.

29. DIFFERENCE B/W STRATEGIC MANAGEMENT & STRATEGIC PLANNING

STRATEGIC MANAGEMENT	STRATEGIC PLANNING
It is focused on producing strategic results; new markets; new products; new technologies etc.	It is focused on making optimal strategic decisions.
It is management by results.	It is management by plans
It is an organizational action process.	It is an analytical process.
It broadens focus to include psychological, sociological and political variables.	It is focused on business, economic and technological variables.
It is about choosing things to do and also about the people who will do them.	It is about choosing things to do.

30. TYPES OF ORGANISATIONAL STRUCTURE

1. Functional Structure:

The functional structure is characterized by the combination of similar activities and the separation of dissimilar activities on the basis of function. All Cost Accountants are located in the Cost Accounting Department, and the HOD of Cost Accounting is responsible for all cost related activities. The same is true in marketing, research and development, and manufacturing.

2. Geographic Structure:

Another basic form structural grouping is geographic structure, in which activities and personnel are grouped by specific geographic locations. Each geographic unit includes all functions required to produce and market products in that region.

3. Matrix Structure:

Another way to achieve focus on multiple outcomes is with the matrix structure. The matrix structure creates a dual chain of command; two lines of budget authority and two sources of performance and reward.

4. Hybrid Structure:

Hybrid structure is a form of departmentalization that adopts parts of both functional and divisional structures at the same level of management.



PAPER - 9

OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT



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Behind every successful business decision, there is always a **CMA**

MISSION STATEMENT

“The CMA Professionals would ethically drive enterprises globally by creating value to stakeholders in the socio-economic context through competencies drawn from the integration of strategy, management and accounting.”

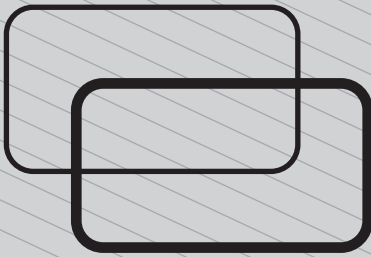
VISION STATEMENT

“The Institute of Cost Accountants of India would be the preferred source of resources and professionals for the financial leadership of enterprises globally.”

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PAPER - 9

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PAPER – 9

Operations Management & Strategic Management

Bit Questions

OPERATIONS MANAGEMENT

(I) Choose the most appropriate one from given four alternatives.

1. Out of the following trends in production/operations management, which one is sometimes called as agile manufacturing?
(A) Re-engineering
(B) Supply-Chain Management
(C) Lean Production
(D) Flexibility
2. Out of the following factors that are affecting Capacity Planning, which one is Less Controllable one?
(A) Machine break-downs
(B) Amount of labour employed
(C) Facilities installed
(D) Shifts of work per day
3. Which of the following stages of Product Life Cycle does attribute beginning of substantial increase in Sales and Profits?
(A) Introduction
(B) Growth
(C) Maturity
(D) Decline
4. Which one is NOT an index of Productivity?
(A) Man-hour output
(B) Productivity ratio
(C) TQM
(D) Use of Financial Ratios
5. The time by which an activity can be rescheduled without affecting the other activities - preceding or succeeding is called as
(A) Slack
(B) Independent Float
(C) Free Float
(D) Total Float
6. Reliability and per unit cost of which of the following spares are less?
(A) Regular spares
(B) Insurance spares
(C) Capital spares
(D) Rotable spares
7. The lead-time is the time:
(A) To place orders for materials
(B) Time of receiving materials
(C) Time between receipt of material and using materials,
(D) Time between placing the order and receiving the materials
8. The method used in scheduling a project is:
(A) A schedule of break-down of orders
(B) Outline master programme
(C) PERT & CPM
(D) Schedule for large and integrated work

9. MRP stands for:
 - (A) Material requirement planning
 - (B) Material reordering planning
 - (C) Material requisition procedure
 - (D) Material recording procedure

10. One of the important charts used in programme control is:
 - (A) Material chart
 - (B) Gantt chart
 - (C) Route chart
 - (D) Inspection chart

11. Variety reduction is generally known as:
 - (A) Less varieties
 - (B) Simplification
 - (C) Reduced varieties
 - (D) None of the above

12. Conversion of inputs into outputs is known as:
 - (A) Application of technology
 - (B) operations management
 - (C) Manufacturing products
 - (D) product

13. Number of product varieties that can be manufactured in Mass production is:
 - (A) One only
 - (B) Two only
 - (C) Few varieties in large volumes
 - (D) Large varieties in small volumes

14. Routing and Scheduling becomes relatively complicated in
 - (A) Job production
 - (B) Batch production
 - (C) Flow production
 - (D) Mass production

15. JIT stands for
 - (A) Just in time purchase
 - (B) Just in time production
 - (C) Just in time use of materials
 - (D) Just in time order the material

16. The first stage in production planning is:
 - (A) Process planning
 - (B) Factory planning
 - (C) Operation planning
 - (D) Layout planning

17. Scheduling deals with:
 - (A) Number of jobs to be done on a machine
 - (B) Number of machine tools used to do a job
 - (C) Different materials used in the product
 - (D) Fixing up starting and finishing times of each operation in doing a job

18. Example of production by disintegration is:
 - (A) Automobile

- (B) Locomotive
 - (C) Crude oil
 - (D) Mineral water.
19. Fixing Flow lines in production is known as :
- (A) Scheduling
 - (B) Loading
 - (C) Planning
 - (D) Routing
20. The material handling cost per unit of product in continuous production is:
- (A) Highest compared to other systems
 - (B) Lower than other systems
 - (C) Negligible
 - (D) Cannot say.
21. $(\text{Total station time}/\text{Cycle time} \times \text{Number of work stations}) \times 100$ is known as:
- (A) Line Efficiency
 - (B) Line smoothness
 - (C) Balance delay of line
 - (D) Station efficiency
22. Tempering is a process of:
- (A) Joining
 - (B) Heat Treatment
 - (C) Surface Treatment
 - (D) Forming
23. For production planning:
- (A) Short term forecasting is useful
 - (B) Medium term forecasting is useful
 - (C) Long term forecasting is useful
 - (D) Forecasting is not useful.
24. Scheduling shows:
- (A) Total cost of production
 - (B) Total material cost
 - (C) Which resource should do which job and when
 - (D) The flow line of materials
25. Linear Programming is a technique used for determining:
- (A) Production Programme
 - (B) Plant Layout
 - (C) Product Mix
 - (D) Manufacturing Sequence.
26. The effective capacity is NOT influenced by which of the following factors:
- (A) Forecasts of demand
 - (B) Plant and labour efficiency
 - (C) Subcontracting
 - (D) None of the above
27. Key aspects in process strategy does NOT include which of the following:
- (A) Make or buy decisions
 - (B) Capital intensity
 - (C) Process flexibility
 - (D) Packaging

28. The example of worker involvement, as a recent trend in production/operations management is
- (A) SCM
 - (B) Just-in-Time
 - (C) Quality Circle
 - (D) MRP
29. Production planning in the intermediate range of time is termed as
- (A) Production planning.
 - (B) Long range production planning.
 - (C) Scheduling.
 - (D) Aggregate planning.
30. Preventive maintenance is useful in reducing
- (A) Inspection Cost
 - (B) Cost of premature replacement
 - (C) Shutdown Cost
 - (D) Set-up Cost of machine
31. Which one of the following standards is associated with the "Quality Assurance in Production and Installation"?
- (A) ISO 9001
 - (B) ISO 9002
 - (C) ISO 9003
 - (D) ISO 9004
32. Number of product varieties that can be manufactured in Job production is:
- (A) Limited to one or two
 - (B) Large varieties of products
 - (C) One only
 - (D) None of the above.
33. In general number of product varieties that can be manufactured in Flow production is:
- (A) One only
 - (B) Ten to twenty varieties
 - (C) Large varieties
 - (D) Five only.
34. Generally the size of the order for production in Job production is:
- (A) Small
 - (B) Large
 - (C) Medium
 - (D) Very large.
35. Generally in continuous production the production is carried out to:
- (A) Customer's order,
 - (B) Government orders only
 - (C) For stock and supply
 - (D) Few rich customers.
36. Inventory cost per product in intermittent production is:
- (A) Higher,
 - (B) Lowest,
 - (C) Medium,
 - (D) Abnormal.

37. The starting point of Production cycle is:
(A) Product design
(B) Production Planning,
(C) Routing
(D) Market research.
38. Preferred numbers are used to:
(A) To determine the number of varieties that are to be manufactured
(B) To the test the design of the product
(C) To ascertain the quality level of the product
(D) To evaluate the production cost.
39. The act of assessing the future and make provisions for it is known as
(A) Planning
(B) Forecasting
(C) Assessment
(D) Scheduling.
40. For a marketing manager, the sales forecast is:
(A) Estimate of the amount of unit sales or a specified future period
(B) Arranging the sales men to different segments of the market
(C) To distribute the goods through transport to satisfy the market demand
(D) To plan the sales methods.
41. The time horizon selected for forecasting depends on:
(A) The salability of the product
(B) The selling capacity of Salesman
(C) Purpose for which forecast is made
(D) Time required for production cycle
42. In general, medium range forecasting period will be approximately:
(A) 5 to 10 Years
(B) 2 to 3 days
(C) 3 to 6 months
(D) 10 to 20 years
43. The range of Long range forecasting period may be approximately:
(A) 1 to 2 weeks
(B) 2 to 3 months
(C) 1 year
(D) above 5 years
44. To plan for future man power requirement:
(A) Short term forecasting is used
(B) Long range forecasting is used
(C) Medium range forecasting is used
(D) There is no need to use forecasting, as future is uncertain.
45. Long range forecasting is useful in:
(A) Plan for Research and Development
(B) To Schedule jobs in Job production
(C) In purchasing the material to meet the present production demand
(D) To assess manpower required in the coming month.
46. Medium range forecasting is useful in:
(A) To assess the loading capacity of the machine

- (B) To purchase a materials for next month
 - (C) To plan for-capacity adjustments
 - (D) To decide whether to receive production orders or not.
47. To decide work load for men and machines:
- (A) Medium range forecasting is used
 - (B) Short term forecasting is used
 - (C) Long range forecasting is used
 - (D) A combination of long range and medium range forecasting is used.
48. Important factor in forecasting production is:
- (A) Environmental changes
 - (B) Available capacity of machines
 - (C) Disposable income of the consumer
 - (D) Changes in the preference of the consumer.
49. Application of technology or process to the raw material to add use value is known as:
- (A) Product
 - (B) Production
 - (C) Application of technology
 - (D) Combination of technology and process.
50. In Production by disintegration the material undergoes:
- (A) Change in economic value only
 - (B) Change in physical and chemical characteristics
 - (C) Change in technology only
 - (D) None of the above.
51. In Production by service, the product undergoes the changes in:
- (A) Shape and size of the surface
 - (B) Shape of the surface only
 - (C) Size of the surface only
 - (D) Chemical and Mechanical properties.
52. Use of any process or procedure designed to transform a set of input elements into a set of output elements is known as:
- (A) Transformation process
 - (B) Transformation of input to output
 - (C) Production
 - (D) Technology change
53. Conversion of inputs into outputs is known as:
- (A) Application of technology
 - (B) Operations management
 - (C) Manufacturing products
 - (D) Product
54. The desired objective of Production and Operations Management is:
- (A) Use cheap machinery to produce
 - (B) To train unskilled workers to manufacture goods perfectly
 - (C) Optimal utilisation of available resources
 - (D) To earn good profits.
55. The scope of Production Planning and Control is:
- (A) Limited to Production of products only

- (B) Limited to production of services only
 - (C) Limited to production of services and products only
 - (D) Unlimited, can be applied to any type of activity.
56. Manufacturing system often produces:
- (A) Standardised products
 - (B) Standardised products in large volumes
 - (C) Substandard products in large volumes
 - (D) Products and services in limited volume.
57. The difference between product system and project system is:
- (A) Project system the equipment and machinery are fixed where as in product system they are movable
 - (B) In Product system the machinery and equipment are fixed and in project system they are not fixed
 - (C) Project system produces only standardized products and product system produces only unstandardised products
 - (D) Products cannot be stocked whereas projects can be stocked.
58. Most important benefit to the consumer from efficient production system is:
- (A) He can save money
 - (B) He will have product of his choice easily available
 - (C) He gets increased use value in the product
 - (D) He can get the product on credit.
59. Two important functions that are to be done by Production department are:
- (A) Forecasting
 - (B) Costing
 - (C) Scheduling and loading
 - (D) Inspecting.
60. The act of releasing the production documents to the production department is known as:
- (A) Planning
 - (B) Routing
 - (C) Dispatching
 - (D) Releasing
61. The activity of specifying when to start the job and when to end the job is known as:
- (A) Planning
 - (B) Scheduling
 - (C) Timing
 - (D) Follow-up.
62. In an organisation the production planning and control department comes under:
- (A) Planning department
 - (B) Manufacturing department
 - (C) Personal department
 - (D) R & D department.
63. In Job production system, we need:
- (A) More unskilled labours
 - (B) Skilled labours
 - (C) Semi-skilled labours
 - (D) Old people

64. In Continuous manufacturing system, we need:
(A) General purpose machines and Skilled labours
(B) Special machine tools and highly skilled labours
(C) Semi automatic machines and unskilled labours
(D) General purpose machines and unskilled labours.
65. Most suitable layout for Job production is:
(A) Line layout
(B) Matrix layout
(C) Process layout
(D) Product layout.
66. Most suitable layout for Continuous production is:
(A) Line layout
(B) Process Layout
(C) Group technology
(D) Matrix layout.
67. One of the product examples for Line layout is:
(A) Repair workshop
(B) Welding shop
(C) Engineering College
(D) Cement.
68. The act of going round the production shop to note down the progress of work and feedback the information is known as:
(A) Follow up
(B) Dispatching
(C) Routing
(D) Trip card
69. Line of Best fit is another name given to:
(A) Method of Least Squares
(B) Moving average method
(C) Semi average method
(D) Trend line method
70. One of the important basic objectives of Inventory management is:
(A) To calculate EOQ for all materials in the organisation
(B) To go in person to the market and purchase the materials
(C) To employ the available capital efficiently so as to yield maximum results
(D) Once materials are issued to the departments, personally check how they are used.
71. The best way of improving the productivity of capital is:
(A) Purchase automatic machines
(B) Effective Labour control
(C) To use good financial management
(D) Productivity of capital is to be increased through effective materials management.
72. MRP stands for:
(A) Material Requirement Planning
(B) Material Reordering Planning
(C) Material Requisition Procedure
(D) Material Recording Procedure

73. The cycle time, selected in balancing a line must be:
- (A) Must be greater than the smallest time element given in the problem
 - (B) Must be less than the highest time element given in the problem
 - (C) Must be slightly greater than the highest time element given in the problem
 - (D) Left to the choice of the problem solver.
74. Production planning deals with:
- (A) What production facilities is required and how these facilities should be laid out in space available
 - (B) What to produce and when to produce and where to sell
 - (C) What should be the demand for the product in future?
 - (D) What is the life of the product?
75. In Process Planning we plan:
- (A) Different machines required
 - (B) Different operations required
 - (C) We plan the flow of material in each department
 - (D) We design the product.
76. In Operation Planning:
- (A) The planner plans each operation to be done at work centers and the sequence of operations
 - (B) Decide the tools to be used to perform the operations
 - (C) Decide the machine to be used to perform the operation,
 - (D) Decide the materials to be used to produce the product.
77. Before thinking of routing, the production planner has to:
- (A) Decide the optimal allocation of available resources
 - (B) To decide what type of labour to be used
 - (C) To decide how much of material is required
 - (D) To count how many orders he has on his hand.
78. The quantities for which the planner has to prepare production plan are known as:
- (A) Optimal quantity of products
 - (B) Material planning
 - (C) Quantity planning
 - (D) Planning quantity standards.
79. The document, which is used to show planning quantity standards and production plan, is known as:
- (A) Planning specifications
 - (B) Route sheet
 - (C) Bill of materials
 - (D) Operation sheet
80. In solving a problem on LOB, the number of workstations required is given by:
- (A) $\text{Cycle time/Total time}$
 - (B) $\text{Cycle time/Element time}$
 - (C) $\text{Total time/Element time}$
 - (D) $\text{Total time/ Cycle time}$.
81. Final stage of production planning, where production activities are coordinated and projected on a time scale is known as:
- (A) Scheduling
 - (B) Loading
 - (C) Expediting
 - (D) Routing

82. The study of relationship between the load on hand and capacity of the work centers is known as:
(A) Scheduling
(B) Loading
(C) Routing
(D) Controlling
83. One of the aims of loading is:
(A) To finish the job as early as possible
(B) To minimise the material utilization
(C) To improve the quality of product
(D) To keep operator idle time, material waiting time and ancillary machine time at minimum.
84. One of the principles of Scheduling is:
(A) Principle of optimal product design
(B) Principle of selection of best material
(C) Principle of optimal operation sequence
(D) Principle of optimal cost.
85. One of the requirements of Aggregate Planning is:
(A) Both output and sales should be expressed in a logical overall unit of measuring
(B) Appropriate time period
(C) List of all resources available
(D) List of operations required.
86. In aggregate planning, one of the methods in modification of demand is:
(A) Differential Pricing
(B) Lay off of employees
(C) Over time working
(D) Sub contracting.
87. In aggregate planning one of the methods used to modification of supply is:
(A) Advertising and sales promotion
(B) Development of complimentary products
(C) Backlogging
(D) Hiring and lay off of employees depending on the situation.
88. The first stage of Production control is:
(A) Dispatching
(B) Scheduling
(C) Routing
(D) Triggering of production operations and observing the progress and record the deviation.
89. One of the important production documents is:
(A) Design sheet of the product
(B) List of materials
(C) Route card
(D) Control chart
90. The way in which we can assess the efficiency of the production plant is by:
(A) Efficient dispatching
(B) By manufacturing a good product
(C) By comparing the actual performance with targets specified in the specified programme
(D) By efficient production planning.

91. Production control concerned with:
(A) Passive assessment of plant performance
(B) Strict control on labours
(C) Good materials management
(D) Good product design
92. When work centers are used in optimal sequence to do the jobs, we can:
(A) Minimise the set up time
(B) Minimise operation time
(C) Minimise the breakdown of machines
(D) Minimise the utility of facility.
93. One of the activities of expediting is:
(A) To file the orders in sequence
(B) To decide the sequence of operation
(C) To record the actual production against the scheduled production
(D) To examine the tools used in production
94. 'Z' chart is a chart used in:
(A) Programme control
(B) Job control
(C) Cost control
(D) Quality control
95. Z-chart can be used to show:
(A) Process used in production
(B) Quality level of the product
(C) Both the plan and the performance, and deviation from the plan
(D) To show cost structure of the product.
96. Computers are used in Production control in this area:
(A) Follow-up activity
(B) To control labour
(C) To disseminate information
(D) Loading, Scheduling and Assignment works.
97. The following establishes time sequence of operations:
(A) Routing
(B) Sequencing
(C) Scheduling
(D) Dispatching
98. Arrangement of machines depending on sequence of operations happens in:
(A) Process Layout
(B) Product Layout
(C) Hybrid Layout
(D) Group Technology Layout.
99. Issuing necessary orders, and taking necessary steps to ensure that the time targets set in the schedules are effectively achieved is known as:
(A) Routing
(B) Dispatching
(C) Scheduling
(D) Inspection.

100. The card which is prepared by the dispatching department to book the labour involved in each operation is:
- (A) Labour card
 - (B) Wage card
 - (C) Credit card
 - (D) Job card.
101. Cost reduction can be achieved through:
- (A) Work sampling
 - (B) Value analysis
 - (C) Quality assurance
 - (D) Supply chain management.
102. Addition of value to raw materials through application of technology is:
- (A) Product
 - (B) Production
 - (D) Advancement
 - (D) Transformation.
103. The most powerful and popular method for solving linear programming problem is
- (A) Simplex method
 - (B) Graphical method
 - (C) Transportation method
 - (D) Assignment method
104. The recent trend in the Production/Operations management which suggests the use of minimal amount of resources to produce a high volume of high quality goods with some variety is referred to as:
- (A) SCM
 - (B) TQM
 - (C) Lean Production
 - (D) Just-In-Time
105. Effective capacity can NOT be determined by which of the following factors?
- (A) Product design and product-mix
 - (B) Quantity and quality capabilities
 - (C) Facilities
 - (D) None of the above
106. In which of the following stages the management should try to change its approach by changing its strategy from "buy my product" to "try my product"?
- (A) Introduction
 - (B) Growth
 - (C) Maturity
 - (D) Decline
107. Conducting occasional check-ups of the products manufactured or assembled to ensure high quality of the production is known as:
- (A) Planning
 - (B) Scheduling
 - (C) Inspection
 - (D) Routing
108. Which one of the following standards is associated with the "Quality Assurance in Final Inspection Test"?
- (A) ISO 9001

- (B) ISO 9002
- (C) ISO 9003
- (D) ISO 9004

109. With reference to project management, identify which of the following statement is NOT correct?
- (A) Gantt chart is a principal tool used in scheduling and also in some methods of loading.
 - (B) Routing is the first step in the production planning.
 - (C) The cost of any activity is proportional to its time of completion.
 - (D) The free float can be calculated by subtracting EFT from EST.
110. Identify which one of the following statement is NOT correct?
- (A) Preventing maintenance includes lubrication, cleaning, periodic overhaul, etc.
 - (B) The two types of cost-cost of premature replacement and cost of breakdown-need to be balanced.
 - (C) Wear and obsolescence are the two main causes of replacement of machinery in every aspect of life.
 - (D) A machine is technically obsolete when another machine can do the same job more efficiently with reduced time and also at a lower cost.
111. To determine where the plant should be located for maximum operating economy and effectiveness, refers to which one of the following?
- (A) Plant layout
 - (B) Facility location
 - (C) Capacity planning
 - (D) Capacity requirement
112. Which of the following models deals with the physical movement of goods from different supply origins to a number of different demand destinations?
- (A) Simulation
 - (B) Transportation
 - (C) Lean operations
 - (D) Line balancing
113. One of the objectives of maintenance is:
- (A) to prevent obsolescence.
 - (B) to ensure spare parts management.
 - (C) to satisfy customers.
 - (D) to extend the useful life of Plant & Machinery without sacrificing the level of performance
114. Which one of the following recent trends in Production/Operations management involves drastic measures or break through improvements to improve the performance of a firm?
- (A) Corporate Downsizing
 - (B) Re-Engineering
 - (C) Technology
 - (D) TQM
115. Which of the following process types is used when a very highly standardized product is desired in high volumes?
- (A) Repetitive Process
 - (B) Batch Process
 - (C) Project Process
 - (D) Continuous Process

116. Which of the following aims at finding the best and most efficient way of using the available resources—men, materials, money and machinery?
(A) Method Study
(B) Work Study
(C) Time Study
(D) Motion Study
117. Which one of the following statements is NOT correct?
(A) LFT is calculated from the LFT of the head event.
(B) Slack can be calculated by adding EFT and LFT of any job.
(C) EFT is the sum of the EST and the time of duration for any event.
(D) The Total Project time is the shortest possible time required in completing the project.
118. Which one of the following is NOT the advantage of Preventive Maintenance?
(A) Better product quality
(B) Greater safety to workers
(C) Increased breakdowns and downtime
(D) Fewer large-scale repairs
119. Which one of the following establishes time sequence of operations?
(A) Routing
(B) Sequencing
(C) Scheduling
(D) Dispatching
120. With reference to Aggregate Planning, identify which of the following statements is NOT correct?
(A) It is an Intermediate-term planning.
(B) It is made operational through a master schedule, which gives the manufacturing schedule.
(C) Facility planning and scheduling are closely related with the aggregate planning.
(D) It deals with the strategic decisions, such as purchase of facilities, introduction of new products, processes, etc.
121. In route sheet or operation layout, one has to show
(A) A list of materials to be used.
(B) A list of machine tools to be used.
(C) Every work center and the operation to be done at that work center.
(D) The cost of product.
122. Conversion of inputs into outputs is known as
(A) Application of technology
(B) Manufacturing products
(C) Product
(D) Operation management
123. Which of the following is NOT the Plant Layout Principle?
(A) Principle of sequence
(B) Principle of usage
(C) Principle of maximum travel
(D) Principle of minimum investment
124. Which one of the following standards is associated with the “Quality Management and Quality System Elements-Guidelines”?
(A) ISO 9001

- (B) ISO 9002
- (C) ISO 9003
- (D) ISO 9004

125. In a network diagram, the activity that must be completed prior to the start of an activity is called as
- (A) Successor activity
 - (B) Predecessor activity
 - (C) Concurrent activity
 - (D) Dummy activity
126. Identify which one of the following is NOT the objective of the maintenance:
- (A) To keep all production facilities and allied facilities in an optimum working condition.
 - (B) To ensure specified accuracy to products and time schedule of delivery to customers.
 - (C) To keep the down time of the machine at the maximum.
 - (D) To keep the production cycle within the stipulated range.
127. With reference to the characteristics of a good product design, which one of the following is referred to “the ease of manufacture with minimum cost”?
- (A) Reliability
 - (B) Productibility
 - (C) Specification
 - (D) Simplification

Answer Key:

- (1) (d) Flexibility
- (2) (a) Machine break-downs
- (3) (b) Growth
- (4) (c) TQM
- (5) (b) Independent Float
- (6) (a) Regular spares
- (7) (d) Time between placing the order and receiving the materials
- (8) (c) PERT & CPM
- (9) (a) Material requirement planning
- (10) (b) Gantt chart
- (11) (b) Simplification
- (12) (c) Manufacturing products
- (13) (c) Few varieties in large volumes
- (14) (b) Batch production
- (15) (b) Just in time production
- (16) (b) Factory planning
- (17) (d) Fixing up starting and finishing times of each operation in doing a job
- (18) (c) Crude oil
- (19) (d) Routing
- (20) (b) Lower than other systems
- (21) (a) Line Efficiency
- (22) (b) Heat Treatment
- (23) (a) Short term forecasting is useful
- (24) (c) Which resource should do which job and when
- (25) (c) Product Mix
- (26) (d) None of the above
- (27) (d) Packaging
- (28) (c) Quality Circle

- (29)(d) Aggregate planning
- (30)(c) Shutdown Cost
- (31)(b) ISO 9002
- (32)(b) Large varieties of products
- (33)(a) One only
- (34)(a) Small
- (35)(c) For stock and supply
- (36)(a) Higher
- (37)(d) Market research
- (38)(a) To determine the number of varieties that are to be manufactured
- (39)(b) Forecasting
- (40)(a) Estimate of the amount of unit sales or a specified future period
- (41)(c) Purpose for which forecast is made
- (42)(c) 3 to 6 months
- (43)(d) above 5 years
- (44)(b) Long range forecasting is used
- (45)(a) Plan for Research and Development
- (46)(c) To plan for-capacity adjustments
- (47)(b) Short term forecasting is used
- (48)(b) Available capacity of machines
- (49)(b) Production
- (50)(b) Change in physical and chemical characteristics
- (51)(d) Chemical and Mechanical properties
- (52)(c) Production
- (53)(b) Operations management
- (54)(c) Optimal utilisation of available resources
- (55)(d) Unlimited, can be applied to any type of activity
- (56)(a) Standardised products
- (57)(b) In Product system the machinery and equipment are fixed and in project system they are not fixed
- (58)(c) He gets increased use value in the product
- (59)(c) Scheduling and loading
- (60)(c) Dispatching
- (61)(b) Scheduling
- (62)(b) Manufacturing department
- (63)(b) Skilled labours
- (64)(b) Special machine tools and highly skilled labours
- (65)(c) Process layout
- (66)(a) Line layout
- (67)(d) Cement
- (68)(a) Follow up
- (69)(a) Method of Least Squares
- (70)(c) To employ the available capital efficiently so as to yield maximum results
- (71)(d) Productivity of capital is to be increased through effective materials management
- (72)(a) Material Requirement Planning
- (73)(c) Must be slightly greater than the highest time element given in the problem
- (74)(a) What production facilities is required and how these facilities should be laid out in space available
- (75)(c) We plan the flow of material in each department
- (76)(a) The planner plans each operation to be done at work centers and the sequence of operations
- (77)(a) Decide the optimal allocation of available resources
- (78)(d) Planning quantity standards
- (79)(a) Planning specifications
- (80)(d) Total time/ Cycle time
- (81)(a) Scheduling

- (82) (b) Loading
- (83) (d) To keep operator idle time, material waiting time and ancillary machine time at minimum
- (84) (c) Principle of optimal operation sequence
- (85) (a) Both output and sales should be expressed in a logical overall unit of measuring
- (86) (a) Differential Pricing
- (87) (d) Hiring and lay off of employees depending on the situation
- (88) (d) Triggering of production operations and observing the progress and record the deviation
- (89) (c) Route card
- (90) (c) By comparing the actual performance with targets specified in the specified programme
- (91) (a) Passive assessment of plant performance
- (92) (a) Minimise the set up time
- (93) (c) To record the actual production against the scheduled production
- (94) (a) Programme control
- (95) (c) Both the plan and the performance, and deviation from the plan
- (96) (d) Loading, Scheduling and Assignment works
- (97) (c) Scheduling
- (98) (b) Product Layout
- (99) (b) Dispatching
- (100) (d) Job card
- (101) (b) Value analysis
- (102) (b) Production
- (103) (a) Simplex method
- (104) (c) Lean Production
- (105) (d) None of the above
- (106) (b) Growth
- (107) (c) Inspection
- (108) (c) ISO 9003
- (109) (d) The free float can be calculated by subtracting EFT from EST
- (110) (a) Preventing maintenance includes lubrication, cleaning, periodic overhaul, etc
- (111) (b) Facility location
- (112) (b) Transportation
- (113) (d) to extend the useful life of Plant & Machinery without sacrificing the level of performance
- (114) (b) Re-Engineering
- (115) (d) Continuous Process
- (116) (b) Work Study
- (117) (b) Slack can be calculated by adding EFT and LFT of any job
- (118) (c) Increased breakdowns and downtime
- (119) (c) Scheduling
- (120) (d) It deals with the strategic decisions, such as purchase of facilities, introduction of new products, processes, etc
- (121) (c) Every work center and the operation to be done at that work center
- (122) (d) Operation management
- (123) (c) Principle of maximum travel
- (124) (d) ISO 9004
- (125) (b) Predecessor activity
- (126) (c) To keep the down time of the machine at the maximum
- (127) (b) Productibility

(II) Match the following in Column I with the appropriate in Column II

1. Match the following:

	Column I		Column II
1.	Aviation Fuel	A	Value Analysis
2.	Brainstorming	B	Machine Shop
3.	Forgings	C	Turbo – Alternator
4.	Tools	D	Refinery
5.	Hydro-Electricity	E	Job Evaluation
6.	Ranking Method	F	Smithy

2. Match the following:

	Column I		Column II
1.	KANBAN	A	Transportation Application
2.	VAM	B	Metal Cutting
3.	Broaching	C	Scheduling
4.	Tools	D	Job Evaluation
5.	Ranking Method	E	Machine Shop

3. Match the following:

	Column I		Column II
1.	Linear Programming	A	Quality Control
2.	Average Outgoing Quality	B	Cost Control
3.	Value Analysis	C	Crashing
4.	Programme Evaluation and Review Technique	D	Product Mix Determination
5.	Network Analysis	E	Project Planning

4. Match the following:

	Column I		Column II
1.	Fixture	A	Conversion of inputs into outputs
2.	Process Layout	B	Network analysis
3.	Capital Intensity	C	General Purpose Machines
4.	Operations Management	D	Mix of equipment and labour which will be used by the firm
5.	Crashing	E	Appliance for holding the work
6.	Less prone to Obsolescence	F	Grouping together of similar machines in one department

5. Match the following:

	Column I		Column II
1.	Furniture	A	Assembly Line
2.	Hydro Electricity	B	Refinery
3.	Television Set	C	Carpentry
4.	Cement	D	Turbo-Alternator
5.	Aviation Fuel	E	Rotary Kiln
6.	Tools	F	Machine Shop

6. Match the following:

	Column I		Column II
1.	Ranking Method	A	Method Study
2.	Motion Economy	B	Plant Layout
3.	Work Sampling	C	Job Evaluation
4.	Normal Curve	D	Inventory Control
5.	Use of Templates	E	Statistical Quality Control
6.	Crashing	F	Network Analysis
7.	Replacement	G	Value Analysis
8.	Brain Storming	H	Work Measurement
9.	Stock Level	I	Maintenance

7. Match the following:

	Column I		Column II
1.	Electricity	A	Blast Furnace
2.	Petrol	B	Generator
3.	Iron	C	Refinery
4.	Cloth	D	Assembly Line
5.	Car	E	Smithy
6.	Cotton Yarn	F	Spinning Loom
7.	Forgings	G	Power Loom

8. Match the following:

	Column I		Column II
1.	LP	A	Capacity Planning
2.	PERT	B	Quality control
3.	MTM	C	Project funding
4.	VA	D	Project viability checking
5.	SRAC	E	Inventory management
6.	MRP	F	Product design
7.	CBA	G	Cost Control
8.	CAD	H	Product mix determination
9.	IFCI	I	Project Planning
10.	AOQ	J	Work measurement

9. Match the following:

	Column I		Column II
1.	Inventory Control	A	Turbo-Alternator
2.	Network Analysis	B	Crashing
3.	Aviation Fuel	C	Value Analysis
4.	Hydro-Electricity	D	Stock Level
5.	Improvement in productivity	E	Refinery

10. Match the following:

	Column I		Column II
1.	The ability to adopt quickly to changes in volume of demand, in the product mix demanded and in product design or in delivery schedules.	A	Method study
2.	To address the planning and controlling of a manufacturing process and all of its related support	B	Maintenance Stores

	functions.		
3.	Degree to which the system can be adjusted to changes in processing requirements.	C	Flexibility
4.	Eliminating unnecessary motions or by changing the sequence of operation or the process itself.	D	Network Analysis
5.	Certain specific techniques which can be used for planning, management and control of project.	E	MRP – II
6.	Availability of vital spare parts needs to be ascertained to meet an emergency like breakdown	F	Process Flexibility

11. Match the following:

	Column I		Column II
1.	Any place in a production process where materials tend to pile up or produced at rates of speed less rapid than the previous or subsequent operations.	A	Assignment
2.	It is used when a low volume of high variety goods are needed	B	Globalisation
3.	A special Linear Programming Problem	C	Bottleneck
4.	Steep increase in the level of competition among manufacturing firms throughout the world.	D	Maintenance Request
5.	Systematic Quantitative Structural approach to the problem of managing a project through to successful competition.	E	Job – Shop Process
6.	This must be made in writing to a central point in the organization.	F	Net work Analysis

12. Match the following:

	Column I		Column II
1.	Cost Benefit Analysis	A	Crashing
2.	Network Analysis	B	Product Design
3.	Television Set	C	Plant Layout
4.	Use of Templates	D	Method Study
5.	Computer Aided Design	E	Project Viability Checking
6.	Motion Economy	F	Assembly Line

13. Match the following:

	Column I		Column II
1.	Use of minimal amounts of resources to produce a high volume of high quality goods with some variety.	A	KAIZEN
2.	Arranging and grouping of machines which are meant to produce goods.	B	Network
3.	The extent to which a firm will produce goods or provide services in – house or go for outsourcing	C	Monte Carlo Method
4.	A given problem is solved by simulating the original data with random number generators	D	Lean Production
5.	The Principle of continuous improvement	E	Make or Buy Decisions
6.	A graphical representation of all the activities and events arranged in a logical and sequential order.	F	Layout

Answer Key:

Ans: 1

- (i) D
- (ii) A
- (iii) F
- (iv) B
- (v) C
- (vi) E

Ans: 2

- (i) C
- (ii) A
- (iii) B
- (iv) E
- (v) D

Ans: 3

- (i) D
- (ii) A
- (iii) B
- (iv) E
- (v) C

Ans: 4

- (i) E
- (ii) F
- (iii) D
- (iv) A
- (v) B
- (vi) C

Ans: 5

- (i) C
- (ii) D
- (iii) A
- (iv) E
- (v) B
- (vi) F

Ans: 6

- (i) C
- (ii) A
- (iii) H
- (iv) E
- (v) B
- (vi) F
- (vii) I
- (viii) G
- (ix) D

Ans: 7

- (i) B
- (ii) C
- (iii) A
- (iv) G
- (v) D
- (vi) F
- (vii) E

Ans: 8

- (i) H
- (ii) I
- (iii) J
- (iv) G
- (v) A
- (vi) E
- (vii) D
- (viii) F
- (ix) C
- (x) B

Ans: 9

- (i) D
- (ii) B
- (iii) E
- (iv) A
- (v) C

Ans: 10

- (i) C
- (ii) E
- (iii) F
- (iv) A
- (v) D
- (vi) B

Ans: 11

- (i) C
- (ii) E
- (iii) A
- (iv) B
- (v) F
- (vi) D

Ans: 12

- (i) E
- (ii) A
- (iii) F
- (iv) C

- (v) B
- (vi) D

Ans: 13

- (i) D
- (ii) F
- (iii) E
- (iv) C
- (v) A
- (vi) B

(III) State whether the following are 'True' or 'False':

1. Merit Rating is used to determine the cost of a product.
2. Project costs increase as the duration of the project increases.
3. In carrying out Job Evaluation studies, point system is the best method.
4. Production planning and control is essentially concerned with the control of Finished goods.
5. A Productivity Index is a device of expressing the ratio between outputs and the inputs of the resources numerically.
6. If the total float value is zero, it means the resources are just sufficient to complete the activity without delay.
7. Method study should precede work measurement.
8. Increased productivity leads to cost reduction.
9. A good materials handling system always consists of conveyors.
10. It is desirable to conduct work measurement after method study.
11. Material handling is an integral part of sales process.
12. The time horizon selected for forecasting depends on time required for production cycle.
13. Rucker plan is a group incentive plan.
14. Assignment problem is solved by Johnson and Bellman method.
15. Preventive maintenance is useful in reducing inspection cost.
16. Customer service is a key objective of operations management.
17. In general short term forecasting will be more useful in production planning.
18. Job Evaluation is a systematic approach to ascertain the labour worth of a job.
19. Load control is typically found wherever a particular bottleneck machine does not exist in the process of manufacturing.
20. The term "aesthetics" which appeals to the human sense does not add value to the product.
21. Production planning is an essential function in a factory.
22. Training boosts employee morale.
23. When demand does not exist in the market, we should start Production Incentives.
24. A work stoppage generally reduces the cost of production.
25. No handling is the best handling.
26. Job Evaluation is used to measure absolute job worth.
27. Incentive scheme is introduced by Management with a view to reduce direct labour cost.
28. The increase in productivity can be attributed to the application of Industrial Engineering/Techniques, particularly the work study.
29. Operation process chart incorporates all five symbols.
30. Multiple Activity chart deals with layout problems.
31. Standard performance is the natural rate of working of an average operator when he works under proper supervision but without any financial motivation.
32. Allowances for non-availability of materials power failure and breakdown of machines are provided for in the standard time for an operation/job.
33. It is justified to consider the effect of working condition both in Work Measurement and Job-Evaluation.
34. Increase in productivity leads to retrenchment of work force.
35. In view of rapid technological advancement we would not concentrate on labour productivity.
36. Piece wage system is a substitute for proper supervision.
37. Personnel Manager has nothing to do with productivity. It is the job of Technical Personnel.
38. Ranking is one of the Job Evaluation Techniques.
39. Results available from work sampling study is not 100% accurate.
40. Since breakdown of Plant and machineries is a random phenomenon, it is impossible to do any work measurement in Maintenance Area.

41. Job Evaluation does not help in performance Rating. There is no difference between Method study and Value Engineering.
42. Two-handed process chart is the most suitable Recording Technique in Electronics Assembly Industry.
43. Do standard Times allow for relaxation of the Operators?
44. Is a lift same as an elevator?
45. Is the use of metric system of weights and measures compulsory in India?
46. Can the shaping machine be considered a versatile machine tool?
47. Does the Factories Act in India allow the employment of women in all industries?
48. Is Break-even analysis a management tool?
49. With increase in lot size the setup cost per unit decreases, whereas the inventory carrying cost increases.
50. A special purpose Machine Tool performs only a limited number of specialised operations with great speed and precision.
51. Strikes and lock-out are controllable factors affecting Capacity Planning.
52. Incentives are substitute for lower wages.
53. Linear Programming does not consider uncertainties.
54. Depending on the need, the maintenance activity may be centralized or decentralized.
55. In general, long-range forecasting is more useful in production planning.
56. There is a limit beyond which labour productivity cannot be improved.
57. Breakdown maintenance doesn't require use of standby machines.
58. Activity Sampling is not a technique of Job Evaluation.
59. A good plant layout is one of the factors in effective utilization of labour.
60. The primary concern of production planning and control is the delivery of products to customers or to inventory stocks according to some predetermined schedule.
61. Capacity refers to the minimum load an operating unit can handle.
62. Job-shop process is used when a very highly standardized product is desired in high volumes.
63. The productivity is a measure of how much input is required to achieve a given output.
64. One of the limitations of Gantt Chart is that it does not clearly indicate the details regarding progress of activities.
65. Preventive maintenance ensures greater safety to workers.
66. Short-term forecasting is useful to serve the purpose of estimating the inventory requirement.
67. The life cycle of a product has many points of similarity with the human life cycle.
68. The Linear Programming problem has two basic parts: the objective function and the constraint set.
69. The most widely used index of productivity is to work out the output per machine-hour.
70. PERT is designed for repetitive projects, whereas CPM is suitable for non-repetitive projects.
71. Wear and obsolescence are two main causes for replacement of machinery in every aspect of life.
72. A work stoppage generally reduces the cost of production.
73. Depending on the need, the maintenance activity may be centralized or decentralized.
74. Most suitable layout for continuous production is Matrix Layout.
75. Addition of value to raw materials through application of technology is production.
76. Breakdown maintenance doesn't require use of standby machines.
77. The full form of the word MRP in the term "MRP II" is Material Requirements Planning.
78. Queue Discipline refers to the order in which customers are processed.

- 79. ISO Standards are reviewed every four years and revised if needed.
- 80. The CPM has the advantage of decreasing completion times by probably spending more money.
- 81. The rotatable spares are spare parts which are required regularly and in substantial number.

Answer Key:

- 1. False
- 2. True
- 3. True
- 4. False
- 5. True
- 6. True
- 7. True
- 8. True
- 9. False
- 10. True
- 11. False
- 12. False
- 13. True
- 14. True
- 15. False
- 16. True
- 17. True
- 18. True
- 19. False
- 20. False
- 21. True
- 22. True
- 23. False
- 24. False
- 25. True
- 26. False
- 27. False
- 28. True
- 29. True
- 30. False
- 31. False
- 32. False
- 33. True
- 34. False
- 35. False
- 36. False
- 37. False
- 38. True
- 39. True
- 40. False
- 41. False
- 42. False
- 43. True
- 44. True
- 45. True
- 46. False
- 47. False
- 48. True

- 49. True
- 50. True
- 51. False
- 52. False
- 53. True
- 54. True
- 55. False
- 56. True
- 57. False
- 58. True
- 59. True
- 60. True
- 61. False
- 62. False
- 63. True
- 64. True
- 65. True
- 66. True
- 67. True
- 68. True
- 69. False
- 70. False
- 71. True
- 72. False
- 73. True
- 74. False
- 75. True
- 76. False
- 77. False
- 78. True
- 79. False
- 80. True
- 81. False

STRATEGIC MANAGEMENT

(I) Choose the most appropriate one from given four alternatives.

1. Benchmarking is

- (A) the analytical tool to identify high cost activities based on the 'Pareto Analysis'.
- (B) the search for industries best practices that lead to superior performance.
- (C) the simulation of cost reduction schemes that helps to build commitment and improvement of actions.
- (D) the process of marketing and redesigning the way a typical company works.
- (E) the framework that earmarks a linkage with suppliers and customers.

2. Successful differentiation strategy allows the company to

- (A) gain buyer loyalty to its brands.
- (B) charge too high a price premium.
- (C) depend only on intrinsic product attributes.
- (D) have product quality that exceeds buyers' needs.
- (E) segment a market into distinct group of buyers.

3. The essential ingredients of Business Process Re-engineering (BPR) are

- (A) continuous improvements of products, processes and technologies.
- (B) planning for the technologies, processes and strategic partnerships etc.
- (C) fundamental re-thinking and radical redesign of business process to achieve dramatic results.
- (D) generation, comparison and evolution of many ideas to find one worthy of development.
- (E) identification and selection of lay-outs most suited for products and processes.

4. Organisation culture is

- (A) appreciation for the arts in the organisation.
- (B) ability of the organization to act in a responsible manner to its employees.
- (C) combination of (A) and (B) above
- (D) deeper level of basic assumptions and beliefs that are shared by the members of the firm.
- (E) None of the above

5. Innovation strategy is

- (A) defensive strategy
- (B) offensive strategy
- (C) responding to anticipating customers and market demands
- (D) guerrilla strategy
- (E) harvesting strategy

6. A corporate strategy can be defined as:

- (A) A list of actions about operational planning and statement of organization structure and control system:
- (B) A statement of how to compete, directions of growth and method o assessing environment;
- (C) Abatement of organization's activities and allocation of resources;
- (D) A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives;
- (E) A statement or where and how the company will prefer to operate.

7. A strategic business unit (SUB) is defined as a division of an organization:

- (A) That help in the marketing operations.
- (B) That enable managers to have better control over the resources.

- (C) The help in the choice of technology.
 - (D) that help in the allocation of scarce resources.
 - (E) That help in identifying talents and potentials of people.
8. Indian Airlines decreasing the airfare on the Delhi – Mumbai sector following the introduction of the no frills airlines would be an example of
- (A) Cost leadership
 - (B) Price leadership
 - (C) Product differentiate
 - (D) Focus
 - (E) Market retention
9. Question mark in BCG Matrix is an investment, which
- (A) Yields low current income but has bright growth prospects.
 - (B) Yields high current income and has bright growth prospects.
 - (C) Yields high current income and has bleak growth prospects.
 - (D) Yields low current income and has bleak growth prospects.
10. For an entrepreneur
- (A) Vision is before the mission
 - (B) Mission is before the vision
 - (C) Both are developed simultaneously
 - (D) Vision or mission are un-important issue
 - (E) Profitability is most crucial
11. Typically profits are highest in which stage of the industry life-cycle?
- (A) Introduction
 - (B) Growth
 - (C) Maturity
 - (D) Decline
12. The BCG growth matrix is based on two dimensions:
- (A) market size and competitive intensity
 - (B) relative market share and market/industry growth rate
 - (C) profit margins and market size
 - (D) market size and market share
13. The strategy of the Reliance Group in India would be a good example of
- (A) Conglomerate diversification
 - (B) Market development
 - (C) Price Transfers
 - (D) Concentric Diversification
14. For an actor in Bollywood, his outstanding performance would be a/an
- (A) Asset
 - (B) Strategic asset
 - (C) Core competency
 - (D) Capability
15. In product life cycle, 'cash cows' indicates
- (A) High share
 - (B) Low growth and negative cash flow
 - (C) High share, low growth and large positive cash flow
 - (D) Low share, high growth and large positive cash flow

16. If an organisation acquires its supplier, it is an example of:
- (A) Horizontal integration
 - (B) Forwards vertical integration
 - (C) Backwards vertical integration
 - (D) Downstream vertical integration
17. Delphi Technique:
- (A) is an attempt to describe a sequence of events that demonstrates how a particular goal might be reached
 - (B) is a method of obtaining a systematic refined consensus from a group of experts
 - (C) is assessing the desirability of future goals and thereafter selecting those areas of development that are necessary to achieve the desired goals
 - (D) is concentrating on the impact which various forecasted technological developments might have on particular industries
18. Board of directors has certain basic tasks as follows:
- (A) To monitor plans and programs of production.
 - (B) To design the course of strategic options and appointment of top management.
 - (C) To control utilization of resources.
 - (D) To monitor courses of actions for marketing management.
19. Mckinsey's 7-s framework consists of:
- (A) Structure, Strategy, Software, Skills, Styles, Staff and Supervision
 - (B) Structure, Strategy, Systems, Skills, Styles, Syndication and Shared values
 - (C) Structure, Strategy, Systems, Skills, Steering power, Styles and Shared values
 - (D) Structure, Strategy, Staff, Skills, Systems, Shared values, Style
 - (e) None of the above
20. What are enduring statements of purpose that distinguish one business from other similar Firms?
- (A) Policies
 - (B) Mission statements
 - (C) Objectives
 - (D) Rules
 - (E) Nature of ownership
21. Outsourcing is the
- (A) spinning off of a value-creating activity to create a new firm.
 - (B) selling of a value-creating activity to other firms.
 - (C) purchase of a value-creating activity from an external supplier.
 - (D) use of computers to obtain value-creating data from the Internet.
22. For an actress in Bollywood, her pretty face would be a/an
- (A) Asset
 - (B) Strategic asset
 - (C) Core competency
 - (D) Capability
 - (E) All of the above
23. Strategic analysis is concerned with stating the position of the organisation in terms of:
- (A) Mission, choice of market segments, product selection, financial targets, external appraisal;
 - (B) Mission, goals, corporate appraisal, position audit and gap analysis;
 - (C) Mission goals, identification of key competitors, SWOT and environmental appraisal;
 - (D) Mission, targeted ROI, manpower planning, position audit;
 - (E) Mission, SWOT, competitive strategies, stakeholders position and institutional goal.

24. Strategic choice makes a statement about the corporate strategy as well as business strategy:
- (A) They are one and the same
 - (B) One is an external planning and another resource planning statement
 - (C) Corporate strategy is a general statement and business strategy defines how a SBU shall operate
 - (D) Both states certain course of action - one for the total unit and another for a particular business
 - (E) One refers to the whole business and another helps in the formulation of marketing decisions
25. Degree of involvement of Board of Directors may vary from passive to active level. It may participate in one or more of the following activities (state which ones are more appropriate as a judicious mix) :
- (A) It constantly oversees the company's mission, objectives and policies
 - (B) It approves issues like R&D, foreign collaborations, linkages with financial institutions
 - (C) Capital budgeting, new product launch and competitive strategy building
 - (D) It tries to ensure that the company remains aligned with changing social, political and economic.
 - (E) Oversees only the financial performance of the company.
26. Offensive strategy is a strategy:
- (A) For small companies that consider offensive attacks in the market.
 - (B) For those companies that search for new inventory opportunities to create competitive advantage.
 - (C) For the market leader who should attack the competitor by introducing new products that make existing ones obsolete.
 - (D) For those companies who are strong in the market but not leaders and might capture a market share from the leader.
 - (E) None of the above.
27. SAIL's famous advertising campaign of "there is a bit of steel in everyone's life was meant to:
- (A) gain buyers awareness about its versatile product range
 - (B) create an image of superior performance
 - (C) inform new buyers about its special products
 - (D) enhance product quality perception
 - (E) achieve its mission
28. Marketing Research studies are undertaken :
- (A) to measure brand loyalty of a class of consumers
 - (B) to predict market potential of a product on a future date
 - (C) to understand product-price relationships
 - (D) to make out a case for revision of an existing strategy
 - (E) all of the above
29. Intensity of competition is ____ in low return industries.
- (A) low
 - (B) non-existent
 - (C) high
 - (D) not important
 - (E) dependant on industry nature

30. Ansoff proposed that for filling the corporate planning gap, one follows four strategies namely-
- (A) market penetration, product differentiation, market identification and diversification
 - (B) market penetration, product development, marketing research and diversification
 - (C) market penetration, product development, market development and diversification
 - (D) market identification, product development, positioning and diversification
 - (E) differentiation, product innovation, market opportunity and diversification
31. Directional Policy Matrix is the same as
- (A) the BCG model
 - (B) the 9-cell GE matrix
 - (C) the Life cycle portfolio analysis
 - (D) the PIMS matrix
 - (E) the 3 X 3 competitive positioning matrix
32. Which of the following market structures would be commonly identified with FMCG products?
- (A) Monopoly
 - (B) Monopolistic competition
 - (C) Oligopoly
 - (D) Perfect competition
 - (E) None of the above
33. A Product line is a group of products that
- (A) are closely related
 - (B) are marketed through the same channel
 - (C) Perform a similar function for being sold to the same customers
 - (D) All of the above
34. New entrants to an industry are more likely when.
- (A) It is difficult to gain access to distribution channels
 - (B) Economies of scale in the industry are high
 - (C) Product differentiation in the industry is low
 - (4) Capital requirement in the industry are high
35. The managerial task of implementing strategy primarily falls upon the shoulders of:
- (A) The Chief Executive Officer (CEO)
 - (B) First line supervisors, who have day-to-day responsibility for seeing that key activities are done properly
 - (C) All managers, each attending to what needs to be done in their respective areas of authority and responsibility
 - (D) All of the above
36. The strategy which concentrates around a production market is:
- (A) Vertical Integration
 - (B) Niche
 - (C) Horizontal Expansion
 - (D) Diversification
37. 'Corporation vision' is the same as
- (A) Corporate dream
 - (B) Corporate mission
 - (C) Corporate goal
 - (D) Corporate strategy

38. 'Niche' is similar to the
(A) Growth strategy
(B) Milking strategy
(C) Flanking strategy
(D) Survival strategy
39. A supplier group is powerful if
(A) It is not concentrated
(B) Offers unique products
(C) Its customers can backward integrate
(D) There are no switching costs
40. A company's actual strategy is
(A) mostly hidden to outside view and is known only to top-level managers
(B) typically planned well in advance and usually deviates little from the planned set of actions and business approaches because of the risks of making on-the-spot changes
(C) partly proactive and partly reactive to changing circumstances
(D) mostly a function of the strategies being used by rival companies(particularly those companies that are industry leaders)
41. The reason for failure of Strategic Management may be described to
(A) Over-estimation of resource competence
(B) Failure to obtain senior management commitment
(C) Failure to obtain employee commitment
(D) All of the above
42. Blue Ocean Strategy is concerned with
(A) moving into new market with new products
(B) creating a new market places where there is no competition
(C) developments of products and markets in order to ensure survival
(D) making the product unique in terms of attributes
43. The strategy of the TATA group in India could be viewed as a good example of
(A) Conglomerate diversification
(B) Market development
(C) Cost Leadership
(D) Concentric diversification.
44. Risk Management Strategies are
(A) Avoid Risk, Reduce Risk, Retain Risk, Combine Risk
(B) Transfer Risk, Share Risk and Hedge Risk
(C) Both (A) and (B)
(D) None of the above.
45. The best test of a successful strategy implementation is
(A) Whether the structure is well matched to strategy
(B) Whether the strategies and procedures are observed in a strategy supportive fashion
(C) Whether actual organizational performance matches or exceeds the targets spell out in the strategic plan
(D) Whether it is made after the strategy is formulated, so that it is supportive to the strategy

46. Which one of the following does NOT seem to be an advantage of the strategic management?
- (A) Discharges board responsibility
 - (B) Provides a framework for decision-making
 - (C) Forces an objective assessment
 - (D) It can be expensive
47. Which of the following analyses 'products and businesses by market share and market growth'?
- (A) SWOT Analysis
 - (B) BCG Matrix
 - (C) PEST Analysis
 - (D) Portfolio Analysis
48. Which one of the following is NOT part of the McKinsey's 7-S framework?
- (A) Skills
 - (B) Staff
 - (C) Systems
 - (D) Supervision
49. Which one of the following statement is NOT correct?
- (A) Vision is the statement of the future.
 - (B) The corporate mission is the purpose or reason for its existence.
 - (C) Targets are formed from vision and mission statement of organizations.
 - (D) Goals are objectives that are scheduled for attainment during planned period.
50. Which of the following can NOT be called as a strength of an organization?
- (A) Good Industrial relations
 - (B) Incentives from State Government
 - (C) Financially very sound
 - (D) Raw materials source at a distance
51. Strategic Business Unit (SBU) structure does NOT experience one of the following as an advantage:
- (A) Higher career development opportunities
 - (B) Better control of categories of products manufacturing, marketing and distributions
 - (C) High cost approach
 - (D) Help in expanding in different related and unrelated businesses
52. The existence of price-wars in the airline industry in India indicates that
- (A) customers are relatively weak because of the high switching costs created by frequent flyer programmes.
 - (B) the industry is moving towards differentiation of services.
 - (C) the competitive rivalry in the industry is severe.
 - (D) the economic segment of the external environment has shifted, but the airline strategies have not changed.
53. Business Process Re-engineering is
- (A) eliminating loss-making process.
 - (B) redesigning operational processes.
 - (C) redesigning the product and services.
 - (D) recruiting the process engineers.
54. Which one or more of the following are appropriate as a judicious mix for a Product line, which is a group of products?
- (A) That are closely related.

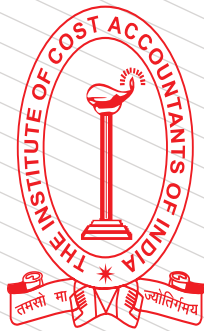
- (B) That are marketed through the same channel.
 - (C) That perform a similar function for being sold to the same customers.
 - (D) All of the above
55. The Product Market matrix comprising of Strategies of Market Penetration, Market Development, Product Development, and Diversification was first formulated by
- (A) Ansoff
 - (B) Drucker
 - (C) Porter
 - (D) Prahlad
56. Price fixation for the first time takes place when
- (A) a company develops or acquires a new product.
 - (B) introducing existing product into a new geographic area or a new distribution channel.
 - (C) a service, the company bids for a new contract work.
 - (D) All of the above
57. Intensity of competition is in low return industries.
- (A) low
 - (B) non-existent
 - (C) high
 - (D) not important
58. Which of the following statements can be closely related with the Mission?
- (A) It includes definition of products & services the organization provides.
 - (B) It specifies management policies towards customers and societies.
 - (C) It provides a roadmap to company's future.
 - (D) It indicates the kind that company management is trying to create for future.
59. Portfolio Analysis is a term used
- (A) to identify what strategy is needed to maintain a strong position or improve a weak one.
 - (B) to find out a best alternative out of various alternatives available.
 - (C) to analyse products and business by market share and market growth.
 - (D) to make managers more adaptable to unforeseen changes.
60. Which one of the following is NOT a role of Marketing?
- (A) It helps in sustaining and improving the existing levels of employment.
 - (B) It helps in the economic growth of a country.
 - (C) It helps in the discovery of entrepreneurial talent.
 - (D) It diminishes potential aggregate demand and thus reduces the size of the market
61. Which one of the following is NOT the benefit of a Vision?
- (A) It helps in the creation of common identity and a shared sense of purpose.
 - (B) It fosters risk taking and experimentation.
 - (C) It fosters short-term thinking.
 - (D) It represents integrity.
62. The competitive position of a company's SBU or product line can NOT be classified as one of the following:
- (A) Dominant
 - (B) Strong
 - (C) Favourable
 - (D) Volatile

Answer Key:

- (1) (b) the search for industries best practices that lead to superior performance
- (2) (a) gain buyer loyalty to its brands
- (3) (c) fundamental re-thinking and radical redesign of business process to achieve dramatic results
- (4) (d) deeper level of basic assumptions and beliefs that are shared by the members of the firm
- (5) (c) responding to anticipating customers and market demands
- (6) (d) A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives
- (7) (b) That enable managers to have better control over the resources
- (8) (b) Price leadership
- (9) (a) Yields low current income but has bright growth prospects
- (10)(a) Vision is before the mission
- (11)(b) Growth
- (12)(b) relative market share and market/industry growth rate
- (13)(a) Conglomerate diversification
- (14)(c) Core competency
- (15)(c) High share, low growth and large positive cash flow
- (16)(c) Backwards vertical integration
- (17)(b) is a method of obtaining a systematic refined consensus from a group of experts
- (18)(b) To design the course of strategic options and appointment of top management
- (19)(d) Structure, Strategy, Staff, Skills, Systems, Shared values, Style
- (20)(b) Mission statements
- (21)(c) purchase of a value-creating activity from an external supplier
- (22)(b) Strategic asset
- (23)(b) Mission, goals, corporate appraisal, position audit and gap analysis
- (24)(a) They are one and the same
- (25)(b)It approves issues like R&D, foreign collaborations, linkages with financial institutions
- (26)(d) For those companies who are strong in the market but not leaders and might capture a market share from the leader
- (27)(e) achieve its mission
- (28)(e) all of the above
- (29)(c) high
- (30)(d) market identification, product development, positioning and diversification
- (31)(b) the 9-cell GE matrix
- (32)(b) Monopolistic competition
- (33)(d) All of the above
- (34)(c) Product differentiation in the industry is low
- (35)(c) All managers, each attending to what needs to be done in their respective areas of authority and responsibility
- (36)(b) Niche
- (37)(a) Corporate dream
- (38)(c) Flanking strategy
- (39)(b) Offers unique products
- (40)(c) partly proactive and partly reactive to changing circumstances
- (41)(d) All of the above
- (42)(b) creating a new market places where there is no competition
- (43)(a) Conglomerate diversification
- (44)(c) Both (A) and (B)
- (45)(c) Whether actual organizational performance matches or exceeds the targets spelt out in the strategic plan
- (46)(d) It can be expensive
- (47)(b) BCG Matrix
- (48)(d) Supervision

- (49)(c) Targets are formed from vision and mission statement of organizations
- (50)(d) Raw materials source at a distance
- (51)(c) High cost approach
- (52)(c) the competitive rivalry in the industry is severe
- (53)(b) redesigning operational processes
- (54)(d) All of the above
- (55)(a) Ansoff
- (56)(d) All of the above
- (57)(c) high
- (58)(a) It includes definition of products & services the organization provides
- (59)(a) to identify what strategy is needed to maintain a strong position or improve a weak one
- (60)(d) It diminishes potential aggregate demand and thus reduces the size of the market
- (61)(c) It fosters short-term thinking
- (62)(d) Volatile

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Behind every successful business decision, there is always a **CMA**

CMA-INTER

SUGGESTED ANSWERS
(JUNE-2017 to DEC-2023)

ON

Paper-9 OMSM

BY CMA SUMIT RASTOGI

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**INTERMEDIATE EXAMINATION
GROUP - III
(SYLLABUS 2016)**

SUGGESTED ANSWERS TO QUESTIONS

JUNE - 2017

Paper-9 : OPERATIONS MANAGEMENT AND STRATEGIC MANAGEMENTINDIRECT

Time Allowed : 3 Hours

Full Marks : 100

This paper contains two Sections.

Both Sections are compulsory, subject to instructions provided against each.

This figures in the margin on the right side indicate full marks.

All working must form part of your answer.

Assumptions, if any, must be clearly indicated.

**Section - A
(Operations Management)**

1. (a) Choose the correct answer: 1x10=10
- (i) Out of the following trends in production/operations management, which one is sometimes called as agile manufacturing?
 - (A) Re-engineering
 - (B) Supply-Chain Management
 - (C) Lean Production
 - (D) Flexibility
 - (ii) Out of the following factors that are affecting Capacity Planning, which one is Less Controllable one?
 - (A) Machine break-downs
 - (B) Amount of labour employed
 - (C) Facilities installed
 - (D) Shifts of work per day
 - (iii) Which of the following stages of Product Life Cycle does attribute beginning of substantial increase in Sales and Profits?
 - (A) Introduction
 - (B) Growth
 - (C) Maturity
 - (D) Decline
 - (iv) This aims at finding the best and most efficient way of using the available resources - men, materials, money and machinery:
 - (A) Time Study
 - (B) Work Study
 - (C) Method Study
 - (D) Job Evaluation
 - (v) Which one is NOT an index of Productivity?
 - (A) Man-hour output
 - (B) Productivity ratio
 - (C) TQM
 - (D) Use of Financial Ratios

Suggested Answer_ Syllabus 2016_June2017_Paper 9

- (vi) The time by which an activity can be rescheduled without affecting the other activities - preceding or succeeding is called as
- Slack
 - Independent Float
 - Free Float
 - Total Float
- (vii) Reliability and per unit cost of which of the following spares are less?
- Regular spares
 - Insurance spares
 - Capital spares
 - Rotable spares
- (viii) For a marketing manager, the sales forecast is
- estimate of the amount of unit sales for a specified future period.
 - arranging the salesmen to different segments of the market.
 - to distribute the goods through transport to satisfy the market demand.
 - to plan the sales methods.
- (ix) The activity of specifying when to start the job and when to end the job is known as
- Planning
 - Scheduling
 - Timing
 - Follow-up
- (x) The lead time is
- Time for placeholders for materials
 - Time of receiving materials
 - Time between receipt of material and using materials
 - Time between placing the order and receiving the materials

(b) Match Column-I with Column-II:

1×6=6

I		II
(A) Aviation Fuel	(i)	Value Analysis
(B) Brainstorming	(ii)	Machine Shop
(C) Forgings	(iii)	Turbo-Alternator
(D) Tools	(iv)	Refinery
(E) Hydro-electricity	(v)	Job Evaluation
(F) Ranking Method	(vi)	Smithy

(c) State whether the following statements are 'True' or 'False':

1×6=6

- Merit Rating is used to determine the cost of a product.
- Project costs increase as the duration of the project increases.
- In carrying out Job Evaluation studies, point system is the best method.
- Production planning and control is essentially concerned with the control of Finished goods.
- A Productivity Index is a device of expressing the ratio between outputs and the inputs of the resources numerically.
- If the total float value is zero, it means the resources are just sufficient to complete the activity without delay.

Answer:

1. (a) (i) (d) Flexibility
 (ii) (a) Machine break-downs
 (iii) (b) Growth
 (iv) (b) Work Study
 (v) (c) TQM

Suggested Answer_ Syllabus 2016_June2017_Paper 9

- (vi) (b) Independent Float.
- (vii) (a) Regular Spares.
- (viii) (a) Estimate of the amount of unit sales for a specified future period.
- (ix) (b) Scheduling.
- (x) (d) Time between placing the order and receiving the materials.

(b)

I		II
(A) Aviation Fuel	(iv)	Refinery
(B) Brainstorming	(i)	Value Analysis
(C) Forgings	(vi)	Smithy
(D) Tools	(ii)	Machine Shop
(E) Hydro-electricity	(iii)	Turbo-Alternator
(F) Ranking Method	(v)	Job Evaluation

- (c) (i) False
- (ii) True
- (iii) True
- (iv) False
- (v) True
- (vi) True

2. Answer any three questions from the following:

16×3=48

(a) 'An important objective of Operations Management is Resource Utilization.' Enumerate. Also list the scope of Operations Management. 3+3=6

(b) Briefly explain various methods of sales forecasting.

10

Answer:

2. (a) A major objective of Operations Management is to utilize resources for the satisfaction of customer wants effectively, i.e., customer service must be provided with the achievement of effective operations through efficient use of resources. Inefficient use of resources or inadequate customer service leads to commercial failure of an operating system. Operations management is concerned essentially with the utilization of resources, i.e., obtaining maximum effect from resources or minimizing their loss, underutilization or waste. The extent of the utilization of the resources' potential might be expressed in terms of the proportion of available time used or occupied, space utilization, levels of activity, etc. Each measure indicates the extent to which the potential or capacity of such resources is utilized. This is referred to as the objective of resource utilization.

The following are the scope of Operation Management:

1. Location of facilities.
2. Plant layouts and Material Handling.
3. Product Design.
4. Process Design.
5. Production and Planning Control.
6. Quality Control.
7. Materials Management.
8. Maintenance Management

- (b) (1) Survey of buyer's inventions or the user's expectation method:
(2) Collective opinion or sales force composite method:
(3) Group executive judgment or executive judgment method:
(4) Experts' opinions:

Suggested Answer_ Syllabus 2016_June2017_Paper 9

- (5) Market test method:
- (6) Trend projection method:

3. (a) Discuss the term 'Process Strategy'. What does it involve? 3+3=6
- (b) Calculate the standard time per article produced from the following data obtained by a work sampling study: 10
- Total no. of observations = 2,600
 No. of working observations = 2,000
 No. of units produced in 100 hours duration = 5,000 numbers
 Proportion of manual labour = $\frac{3}{4}$
 Proportion of machine time = $\frac{1}{4}$
 Observed rating factor = 120%
 Total allowances = 15% of normal time

Answer:

3. (a) A process strategy is an organisation's approach to process selection for the purpose of transforming resource inputs into goods and services (outputs). The objective of a process strategy is to find a way to produce goods and services that meet customer requirement and product specification (i.e., design specifications) within the constraints of cost and other managerial limitations. The process selected will have a long-term effect on efficiency and production as well as flexibility, cost, and quality of the goods produced. Hence it is necessary that a firm has a sound process strategy at the time of selecting the process.

Key aspects in process strategy include:

- (i) **Make or buy decisions** - It refers to the extent to which a firm will produce goods or provide services in-house or go for outsourcing (buying or subcontracting).
- (ii) **Capital intensity** - It refers to the mix of equipment and labour which will be used by the firm.
- (iii) **Process flexibility** - This refers to the degree to which the system can be adjusted to changes in processing requirements due to such factors as changes in product or service design, changes in volume of products produced and changes in technology.

- (b) (1) Actual working time in the duration of 100 hours = $100 \times (2,000/2,600) = 76.923$ hours
 (2) Time taken per article = $(76.923 \times 60)/5,000 = 0.923$ minute
 (3) Observed manual labour time per article = $0.923 \times (3/4) = 0.6922$ minute
 (4) Observed machine time per article = $0.923 \times (1/4) = 0.230$ minute
 (5) Normal labour time per unit = Observed time/unit \times Rating factor = $0.6922 \times 1.20 = 0.8306$ minute
 (6) Standard labour time per unit = $0.8306 + (15/100) \times 0.8306 = 0.9552$ minute
 (7) Standard time per unit of article produced = $0.9552 + 0.230 = 1.185$ minutes.

4. (a) A Bakery shop sells bakery items. Past data of demand per week in hundred kilograms with frequency is given below:

Demand/Week	0	6	12	18	24	30
Frequency	1	12	19	8	6	4

Using the following sequence of random numbers, generate the demand for the next 10 weeks. Also find out the average demand per week. 10

Random numbers	12	27	18	58	43	75	31
	62	47	35	53	42	68	71

- (b) An incentive scheme allows proportionate production bonus beyond 100% performance level.
 Calculate the amount of

Suggested Answer_ Syllabus 2016_June2017_Paper 9

- (i) Incentive bonus and
 (ii) Total payment received by an operator on a particular day during which the following particulars apply:
 Operation : Assembling a table clock set
 Work Content : 40 Standard minutes per assembled set
 Attended Time: 8 Hours
 Time spent on unmeasured work : 3 Hours
 Number of sets assembled during the day : 10
 Wage rate : ₹ 5 per hour
 (iii) What is the net labour productivity achieved by the operator during the day?

2×3=6

Answer:

4. (a)

Random No. Range Table for Demand				
Demand per week	Frequency	Probability	Cumulative Probability	Range
0	1	0.02	0.02	0-1
6	12	0.24	0.26	2-25
12	19	0.38	0.64	26-63
18	8	0.16	0.80	64-79
24	6	0.12	0.92	80-91
30	4	0.08	1.00	92-99
	Σf = 50	1.00		

Simulated values for next 10 weeks		
Weeks	R. Nos.	Demand
1	12	6
2	27	12
3	18	6
4	58	12
5	43	12
6	75	18
7	31	12
8	62	12
9	47	12
10	35	12
		Total: 114

Average Weekly demand = 114/10 = 11.4

- (b) Total standard minutes worked during the day = 40×10 = 400, working time = 8-3 = 5 hours = 300 minutes.
 Performance = (400×100)/300 = 133.34% or 0.3333

- (i) Incentive bonus = 0.3333×5×5 = ₹ 8.33 for five hours on measured work
 (ii) Guaranteed wage for 8 hours = 8×5 = ₹ 40;
 Total earnings for the day = ₹ (8.33+40) = ₹ 48.33
 (iii) Net labour productivity = Output in units/Net person hours = 10/5 = 2 sets per hour.

5. (a) A project consists of eleven activities A, B, C, D, E, F, G, H, I, J and K. The relationship among various activities is as follows:

Activity	Preceding Activity
A	—
B	A
C	A

Suggested Answer_ Syllabus 2016_June2017_Paper 9

D	B
E	C
F	D,E
G	F
H	F
I	G
J	I,H
K	J

Draw the network diagram.

6

(b) Product A has a Mean Time Between Failures (MTBF) of 35 hours and a Mean Time to Repairs (MTTR) of 6 hours. Product B has a MTBF of 45 hours, and has a MTTR of 3 hours.

- (i) Which product has higher reliability?
- (ii) Which product has greater maintainability?
- (iii) Which product has greater availability?

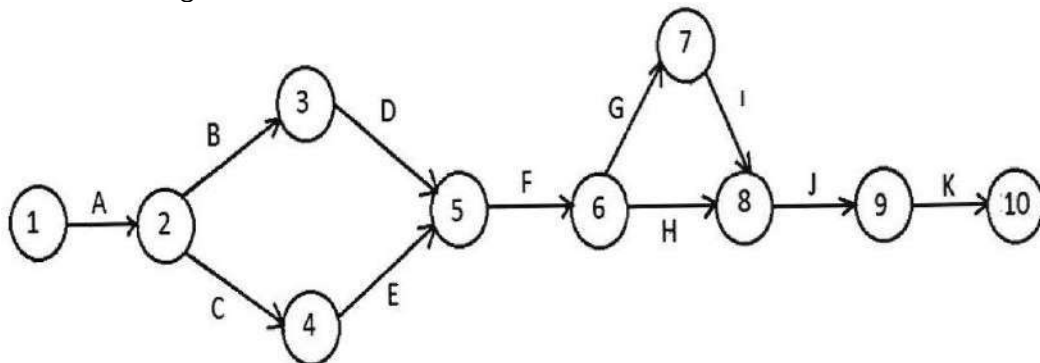
3+3+4=10

Answer:

5. (a) The relationships among various activities is as follows:

Activity	Preceding Activity
A	-
B	A
C	A
D	B
E	C
F	D,E
G	F
H	F
I	G
J	I,H
K	J

The network diagram:



- (b) (i) Product B, with the higher MTBF (i.e. 45 hours) than product A (i.e. 35 hours), is more reliable since it has lesser chances for failure during servicing.
- (ii) The MTTR means time taken to repair a machine. Thus lesser MTTR (of 3 hours) pertaining to Product B vis-a-vis of 6 hrs of Product A makes Product B to have greater maintainability.
- (iii) Availability of a machine/product = $MTBF / (MTBF + MTTR)$

Thus Availability of Product A = $35 / (35 + 6) = 35 / 41 = 85.366\%$

Availability of Product B = $45 / (45 + 3) = 45 / 48 = 93.75\%$

Hence, Product B has more availability.

Suggested Answer_ Syllabus 2016_June2017_Paper 9

Section - B (Strategic Management)

6. Choose the correct answer:

1×6=6

- (i) Benchmarking is
- (A) the analytical tool to identify high cost activities based on the 'Pareto Analysis'.
 - (B) the search for industries best practices that lead to superior performance.
 - (C) the simulation of cost reduction schemes that helps to build commitment and improvement of actions.
 - (D) the process of marketing and redesigning the way a typical company works.
 - (E) the framework that earmarks a linkage with suppliers and customers.
- (ii) Successful differentiation strategy allows the company to
- (A) gain buyer loyalty to its brands.
 - (B) charge too high a price premium.
 - (C) depend only on intrinsic product attributes.
 - (D) have product quality that exceeds buyers' needs.
 - (E) segment a market into distinct group of buyers.
- (iii) The essential ingredients of Business Process Re-engineering (BPR) are
- (A) continuous improvements of products, processes and technologies.
 - (B) planning for the technologies, processes and strategic partnerships etc.
 - (C) fundamental re-thinking and radical redesign of business process to achieve dramatic results.
 - (D) generation, comparison and evolution of many ideas to find one worthy of development.
 - (E) identification and selection of lay-outs most suited for products and processes.
- (iv) Marketing Research Studies are undertaken
- (A) to measure brand loyalty of a class of consumers.
 - (B) to predict market potential of a product on a future date.
 - (C) to understand product-price relationship.
 - (D) to make out a case for revision of an existing strategy.
 - (E) All of the above
- (v) Organisation culture is
- (A) appreciation for the arts in the organisation.
 - (B) ability of the organization to act in a responsible manner to its employees.
 - (C) combination of (A) and (B) above
 - (D) deeper level of basic assumptions and beliefs that are shared by the members of the firm.
 - (E) None of the above
- (vi) Innovation strategy is
- (A) defensive strategy
 - (B) offensive strategy
 - (C) responding to anticipating customers and market demands
 - (D) guerrilla strategy
 - (E) harvesting strategy

Answer:

6. (i) (b)
(ii) (a)
(iii) (c)
(iv) (e)
(v) (d)
(vi) (c)

Suggested Answer_ Syllabus 2016_June2017_Paper 9

Answer any two questions from the following:

12×2=24

7. (a) Enlist the advantages of Strategic Management. 6
- (b) State various limitations of the BCG model. 6

Answer:

7. (a) Advantages of Strategic Management:

- (i) Discharges Board Responsibility
- (ii) Forces an Objective Assessment
- (iii) Provides a Framework for Decision-Making
- (iv) Supports Understanding & Buy-In
- (v) Enables Measurement of Progress
- (vi) Provides an Organizational Perspective

(b) Limitations of BCG model:

- (i) How do you define your market? Segmentation strategies can provide a niche. A niche is inevitably a low or restricted share of the market, yet it is the heart of a focus strategy. Firms can profit servicing small low-growth niches.
- (ii) Market growth and market share are assumed to be reliable pointers for cash flow. This is often not true. High market share does not necessarily mean high profits, especially if a firm has high costs, or has bought market share by low pricing.
- (iii) Relative market share amongst competitors is not necessarily an indication of their competitive strengths at any particular time. After all, market leaders are vulnerable.
- (iv) The BCG model might become a self-fulfilling prophecy: Dogs which could be made profitable might simply be left to the rather than be resuscitated.
- (v) It does not suggest any response to declining markets other than withdrawal: many firms can make money in 'sunset industries'.
- (vi) It ignores the extent to which a firm which serves a number of markets can exploit production synergies.
- (vii) It ignores the threat of substitute products.

8. (a) Briefly discuss important features which Human Resource Strategy may bring to bear on the organization. 6

(b) List down some guidelines for formulation of the "Mission Statement". 6

Answer:

8. (a) Important features of Human Resource Strategy:

- (i) Orientation of the members.
- (ii) Facilitation of organizational changes as and when called for
- (iii) Coping with diversity of workforce.
- (iv) Maintaining competent and committed workforce in a competitive environment.
- (v) Development of core competency.
- (vi) Empowered workforce as an active resource.
- (vii) Appropriate work culture and ethical norms.

(b) Guidelines for formulation of the "Mission Statement":

- It should be based on existing business capabilities "Who we are and what we do?"
- It should follow the long term strategy principles
- Profit making should not be the only mission of organisation
- It should be logical extension of business existing capabilities
- It should clearly and precisely present the future orientation of business
- It should include achievable missions

Suggested Answer_ Syllabus 2016_June2017_Paper 9

- It should be stated in a form that it becomes the motivating force to every member of organisation
- Mission statement once formed shall be communicated to every member of organisations
- It should include interest of customers and society

9. Write short notes on any three of the following:

4×3=12

- (a) Functional organisational structure
- (b) Role of marketing
- (c) Contingency plan
- (d) Managerial Communication

Answer:

9. (a) **Functional organisational structure:** The functional structure is characterized by the simultaneous combination of similar activities and the separation of dissimilar activities on the basis of function. All Cost Accountants are located in the Cost Accounting Department, and the HOD of Cost Accounting is responsible for all cost related activities. The same is true in marketing, research and development, and manufacturing.

The functional organization form is one of the most common organizational structures found in firms pursuing strategy of concentration or very high relatedness. A functional structure is most appropriate when the organization is small to medium size and relatively stable.

(b) **Role of marketing:** The first and foremost role of marketing is that it stimulates potential aggregate demand and thus enlarges the size of the market. It helps in the economic growth of a country. Through stimulation of demand people are motivated to work harder and earn additional money to buy the various ideas, goods and services being marketed. An additional advantage which accrues in the above context that it accelerates the process. (In India, it is believed that about one-fourth of GNP and more than one-third of agricultural output are still non-monetised).

Marketing plays a role in the discovery of entrepreneurial talent. Peter Drucker, a celebrated writer in the field of management, makes this point very succinctly when he observes that marketing is a multiplier of managers and entrepreneurs. It also helps in sustaining and improving the existing levels of employment.

(c) **Contingency plan:** A basic premise of good strategic management is that firms plan ways to deal with unfavourable and favourable events before they occur. Regardless of how carefully strategies are formulated, implemented, and evaluated, unforeseen events, such as strikes, boycotts, natural disasters, arrival of foreign competitors, and government actions, can make a strategy obsolete. To minimize the impact of potential threats, organizations should develop contingency plans as part of their strategy-evaluation process. Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected. Only high-priority areas require the insurance of contingency plans. Strategists cannot and should not try to cover all bases by planning for all possible contingencies. Contingency plans should be as simple as possible.

(d) **Managerial Communication:** The most important and basic strategy for a manager is simply to communicate well with the organisational people. This satisfies such basic human needs as recognition, a sense of belonging, and security. For example, such a simple action as a manager's attempting to become better acquainted with subordinates can contribute substantially to the satisfaction of each of these three needs. As another example, a message from a manager to a subordinate that praises the subordinate for a job well done can help satisfy the subordinate's recognition and security needs.

**INTERMEDIATE EXAMINATION
GROUP - II
(SYLLABUS 2016)**

**SUGGESTED ANSWERS TO QUESTIONS
DECEMBER - 2017**

Paper-9 : OPERATIONS MANAGEMENT AND STRATEGIC MANAGEMENT

Time Allowed : 3 Hours

Full Marks : 100

This figures in the margin on the right side indicate full marks.

This paper contains 2 Sections.

Both Sections are compulsory, subject to instructions provided against each.

All working must form part of your answer.

Assumptions, if any, must be clearly indicated.

**Section - A
(Operations Management)**

1. (a) Choose the correct answer: 1x10=10
- (i) The effective capacity is NOT influenced by which of the following factors:
 - (a) Forecasts of demand
 - (b) Plant and labour efficiency
 - (c) Subcontracting
 - (d) None of the above
 - (ii) Key aspects in process strategy does NOT include which of the following:
 - (a) Make or buy decisions
 - (b) Capital intensity
 - (c) Process flexibility
 - (d) Packaging
 - (iii) The example of worker involvement, as a recent trend in production/operations management is
 - (a) SCM
 - (b) Just-in-Time
 - (c) Quality Circle
 - (d) MRP
 - (iv) In an organization, the Production Planning and Control department comes under
 - (a) Planning department
 - (b) Manufacturing department
 - (c) Personnel department
 - (d) R & D department
 - (v) JIT stands for
 - (a) Just In Time Purchase
 - (b) Just In Time Production
 - (c) Just In Time use of Materials
 - (d) Just In Time Order the Material
 - (vi) In route sheet or operation layout, one has to show
 - (a) a list of materials to be used
 - (b) a list of machine tools to be used
 - (c) every work center and operation to be done at that work center
 - (d) the cost of product

SUGGESTED ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

- (vii) One of the important charts used in Programme control is
- (a) Material chart
 - (b) Gantt chart
 - (c) Route chart
 - (d) Inspection chart
- (viii) Production planning in the intermediate range of time is termed as
- (a) Production planning.
 - (b) Long range production planning.
 - (c) Scheduling.
 - (d) Aggregate planning.
- (ix) Preventive maintenance is useful in reducing
- (a) Inspection Cost
 - (b) Cost of premature replacement
 - (c) Shutdown Cost
 - (d) Set-up Cost of machine
- (x) Which one of the following standards is associated with the "Quality Assurance in Production and Installation"?
- (a) ISO 9001
 - (b) ISO 9002
 - (c) ISO 9003
 - (d) ISO 9004

(b) Match Column A with Column B:

1x6=6

Column A	Column B
(A) Fixture	(i) Conversion of Inputs into outputs
(B) Process layout	(ii) Network Analysis
(C) Capital Intensity	(iii) General purpose machines
(D) Operations Management	(iv) Mix of equipment and labour which will be used by the firm
(E) Crashing	(v) Appliance for holding the work
(F) Less prone to Obsolescence	(vi) Grouping together of similar machines in one department

(c) State whether the following statements are 'True' or 'False':

1x6=6

- (i) Customer service is a key objective of operations management.
- (ii) In general short term forecasting will be more useful in production planning.
- (iii) If the total float value is zero, it means the resources are just sufficient to complete the activity without any delay.
- (iv) Job Evaluation is a systematic approach to ascertain the labour worth of a job.
- (v) Load control is typically found wherever a particular bottleneck machine does not exist in the process of manufacturing.
- (vi) The term "aesthetics" which appeals to the human sense does not add value to the product.

Answer:

1. (a) (i) (d)
(ii) (d)
(iii) (c)
(iv) (b)
(v) (b)
(vi) (c)
(vii) (b)
(viii) (d)
(ix) (c)
(x) (b)

SUGGESTED ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

(b)

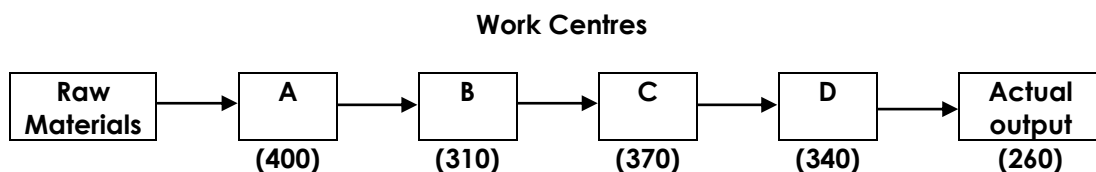
I		II
(A) Fixture	(v)	Appliance for holding the work
(B) Process layout	(vi)	Grouping together of similar machines in one department
(C) Capital Intensity	(iv)	Mix of equipment and labour which will be used by the firm
(D) Operations Management	(i)	Conversion of Inputs into outputs
(E) Crashing	(ii)	Network Analysis
(F) Less prone to Obsolescence	(iii)	General purpose machines

- (c) (i) True
(ii) True
(iii) True
(iv) True
(v) False
(vi) False

2. Answer any three questions from the following: 16×3=48

(a) Briefly explain the characteristics of the modern production system. 7

(b) A firm has four work centres, A, B, C & D, in series with individual capacities in units per day shown in the figure below.



- (i) Identify the bottle neck centre.
(ii) What is the system capacity?
(iii) What is the system efficiency?

9

Answer:

2. (a) 'The production management of today presents certain characteristics which make it look totally different from what it was during the past as follows:

- Manufacturing as Competitive Advantage:** In the past production was considered to be like any other function in the organisation. When the demand was high and production capacities were inadequate, the concern was to somehow muster all inputs and use them to produce goods which would be grabbed by market. But today's scenario is contrasting. Plants have excess capacities, competition is mounting and firms look and gain competitive advantage to survive and succeed. Production system offers vast scope to gain competitive edge and firms intend to exploit the potential. Total Quality Management (TQM), Time-Based Competition, Business Process Re-engineering (BPRE), Just-in-Time (JIT), Focused Factory, Flexible Manufacturing Systems (FMS), Computer Integrated Manufacturing (CIM), and The Virtual Corporation are some techniques which the companies are employing to gain competitive advantage.
- Services Orientation:** Service sector is gaining greater relevance these days. The production system, therefore, needs to be organised keeping in mind the peculiar requirements of the service component. The entire manufacturing needs to be geared to serve (i) intangible and perishable nature of the services, (ii)

SUGGESTED ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

constant interaction with clients or customers, (iii) small volumes of production to serve local markets, and (iv) need to locate facilities to serve local markets. There is increased presence of professionals on the production, instead of technicians and engineers.

3. **Disappearance of Smokestacks:** Protective labour legislation, environmental movement and gradual emergence of knowledge based organisations have brought total transformation in the production system. Today's factories are aesthetically designed and built, environment friendly - in fact, they are homes away from homes. Going to factory every day is no more excruciating experience, it is like holidaying at a scenic spot.
4. **Small has Become Beautiful:** It was E.F. Schumacher who, in his famous book Small is Beautiful, opposed giant organisations and increased specialisation. He advocated instead, intermediate technology based on smaller working units, community ownership, and regional workplaces utilising local labour and resources. For him, small was beautiful. Businessmen, all over the world, did not believe in Schumacher's philosophy. Inspired by economies of scale, industrialists went in for huge organisations and mass production systems.

- (b) (i) The bottle neck centre is the work centre having the minimum capacity. Hence, work centre 'B' is the bottleneck centre.
- (ii) System capacity is the maximum units that are possible to produce in the system as a whole. Hence, system capacity is the capacity of the bottle neck centre i.e., 310 units.
- (iii) System efficiency = Actual output/ System capacity
= (260/310) x 100 (i.e., maximum possible output)
= 83.87%

3. (a) **Discuss about the following process types to be implemented by a Production Manager as a strategy:** **3+4=7**
- (i) **Batch Process,**
 - (ii) **Repetitive Process.**

- (b) **Workers come to a tool store room to enquire about special tools (required by them) for accomplishing a particular project assigned to them. The average time between the two arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time (of the tool room attendant) is 48 seconds.**

- Determine:** **3x3=9**
- (i) **Average Queue Length**
 - (ii) **Average Length of non-empty queues**
 - (iii) **Average number of workers in system including the worker being attended**

Answer:

3. (a) (i) **Batch process:** Batch processing is used when a moderate volume of goods or services is required and also a moderate variety in products or services. A batch process differs from the job process with respect to volume and variety. In batch processing, volumes are higher because same or similar products or services are repeatedly provided, examples of products produced in batches include paint, ice cream, soft drinks, books and magazines.
- (ii) **Repetitive process:** This is used when higher volumes of more standardised goods or services are needed. This type of process is characterised by slight flexibility of equipment (as products are standardised) and generally low labour skills. Products produced include automobiles, home appliances, television sets, computers, toys etc. Repetitive process is also referred to as line process as it includes production lines and assembly lines in mass production. Resources are organised around a product or service and materials move in a line flow from

SUGGESTED ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

one operation to the next according to a fixed sequence with little work-in-progress inventory. This kind of process is suitable to "manufacture-to-stock" strategy with standard products held in finished goods inventory. However, "assemble-to-order" strategy and "mass customisation" are also possible in repetitive process.

- (b) Arrival Rate: $\lambda = 60/60$ per second = 1 per minute
 Service Rate: $\mu = 60/48$ per second = 1.25 per minute

(i) Average Queue Length: $L_q = (\lambda/\mu) \times [\lambda/(\mu - \lambda)]$ $= (1/1.25) \times [(1/(1.25 - 1))]$
 $= 1/(1.25 \times 0.25)$ $= 16/5$
 $= 3.2$ workers

(ii) Average Length of non-empty queues:
 $L_n = [\lambda/(\mu - \lambda)] = 1.25/(1.25 - 1) = 1.25/0.25 = 5$ workers

(iii) Average number of workers in system:
 $L_s = [\lambda/(\mu - \lambda)] = 1/(1.25 - 1) = 1/0.25 = 4$ workers

4. (a) The below Table shows the time remaining (number of days until due date) and the work remaining (number of days' work) for 5 jobs which were assigned the Letters A to E as they arrived to the shop. Sequence these jobs by priority rules viz., 2x5=10
 (i) FCFS (ii) EDD (iii) LS (iv) SPT (v) LPT.

Job	Number of days until due date	Number of days' work remaining
A	9	5
B	4	7
C	5	3
D	6	6
E	8	2

- (b) A department works on 8 hours shift, 285 days a year and has the usage data of a machine, as given below:

Product	Annual Demand (units)	Processing time (Standard time in hours)
A	360	7-0
B	435	5-0
C	570	60

Calculate:

- (i) Processing time needed in hours to produce products A, B and C,
 (ii) Annual production capacity of one machine in standard hours, and
 (iii) Number of machines required. 2x3=6

Answer:

4. (a) Numerical: The below Table shows the time remaining

Job	Number of days until due date	Number of days work remaining
A	9	5
B	4	7
C	5	3
D	6	6
E	8	2

- (i) FCFS (First come first served): Since the jobs are assigned letters A to E as they arrived to the shop, the sequence according to FCFS priority rule is ABCDE.
 (ii) EDD (Early Due Date job first) rule: Taking into account the number of days until due date, the sequence of jobs as per EDD rules is B C D E A (4 5 6 8 9).

SUGGESTED ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

(iii) L.S. (Least slack) rule also called as Minimum slack rule.

Calculation of slack:

Slack = (Number of days until due date) - (Number of days work remaining)

Job	Slack	(Days)
A	9-5	=4
B	4-7	=(-3)
C	5-3	=2
D	6-6	= 0
E	8-2	=6

Sequence = B D C A E
 (-3 0 2 4 6)

(iv) SPT (Shortest Processing Time job first) also referred as SOT (Shortest Operation time job First) rule or MINPRT (Minimum Processing time job first) rule.

Sequence: E C A D B
 (2 3 5 6 7)

(v) LPT (Longest Processing time job first) also referred to as LOT (Longest operation time job first) rule.

Sequence: B D A C E
 (7 6 5 3 2)

(b) (i) The processing time needed in hours to produce products A, B and C in the quantities demanded visiting the standard time data;

Product	Annual Demand (units)	Processing time (Standard time in hours)	Processing time needed (hours)
A	360	7.0	360 x 7 = 2,520
B	435	5.0	435 x 5 = 2,175
C	570	6.0	570 x 6 = 3,420
			Total = 8,115 hrs.

(ii) Annual production capacity of one machine in standard hours = 8 x 285 = 2,280 hours/year

(iii) Number of machines required = Work load per year/Production capacity per machine = 8,115/2,280 = 3.5592 machines = 4 Machines

5. (a) A Public Transport Company is experiencing the following number of breakdowns for months over the past 2 years in their new fleet of vehicles:

Number of breakdowns	0	1	2	3	4
Number of months this occurred	3	6	9	4	2

Each breakdown costs the company an average of ₹ 2,500. For a cost of ₹ 1,700 per month, preventive maintenance can be carried out to limit the breakdowns to an average of one per month. Which policy is suitable for the company? 10

(b) Draw the network for the following activities and find critical path and total duration of the project. 2+2+2=6

Activity	Duration (months)
1-2	2
2-3	3
2-4	1
3-4	2
4-5	3
5-6	2
5-7	4
6-8	1
7-8	3
8-9	4

SUGGESTED ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

Answer:

5. (a) After converting the frequencies to a probability distribution and determining the expected cost/month of breakdowns, we get:

Number of breakdowns	Frequency in months	Frequency in percent	Expected value
0	3	$3/24 = 0.125$	0
1	6	$6/24 = 0.25$	0.25
2	9	$9/24 = 0.375$	0.75
3	4	$4/24 = 0.167$	0.5
4	2	$2/24 = 0.083$	0.334
		Total : 1	Total: 1.834

Breakdown cost per month; Expected cost = $1.834 \times ₹ 2500 = ₹ 4,585$.

Preventive maintenance cost per month: -

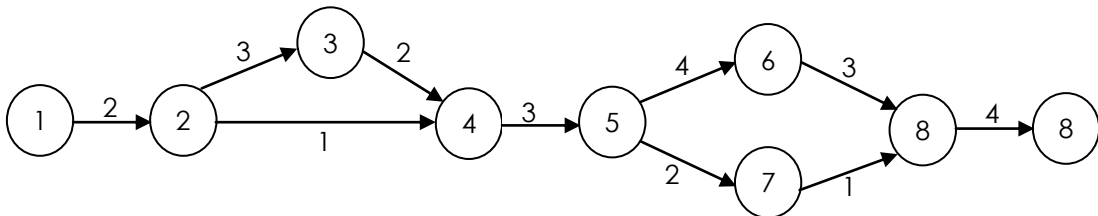
Average cost of one breakdown/month = ₹ 2,500

Maintenance contract cost/month = ₹ 1,700

Total = ₹ 4,200.

Thus, preventive maintenance policy is suitable for the firm.

- (b) Network diagram:



Paths	Duration (months)
1-2-3-4-5-7-8-9	$2+3+2+3+4+3+4=21$ (Critical path)
1-2-3-4-5-6-8-9	$2+3+2+3+2+1+4=17$
1-2-4-5-7-8-9	$2+1+3+4+3+4=17$
1-2-4-5-6-8-9	$2+1+3+2+1+4=13$

Section - B (Strategic Management)

6. Choose the correct answer:

1×6=6

- (i) Board of directors has certain basic tasks as follows:
- To monitor plans and programs of production.
 - To design the course of strategic options and appointment of top management.
 - To control utilization of resources.
 - To monitor courses of actions for marketing management.
- (ii) A Strategic Business Unit (SBU) is defined as a division of an organization:
- That helps in the marketing operation.
 - That helps in the choice of technology.
 - That enables managers to have better control over the resources.
 - That helps in identifying talents and potentials of people.
- (iii) Mckinsey's 7-s framework consists of:
- Structure, Strategy, Software, Skills, Styles, Staff and Supervision
 - Structure, Strategy, Systems, Skills, Styles, Syndication and Shared values
 - Structure, Strategy, Systems, Skills, Steering power, Styles and Shared values
 - Structure, Strategy, Staff, Skills, Systems, Shared values, Style
 - None of the above

SUGGESTED ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

- (iv) What are enduring statements of purpose that distinguish one business from other similar Firms?
- (a) Policies
 - (b) Mission statements
 - (c) Objectives
 - (d) Rules
 - (e) Nature of ownership
- (v) Outsourcing is the
- (a) spinning off of a value-creating activity to create a new firm.
 - (b) selling of a value-creating activity to other firms.
 - (c) purchase of a value-creating activity from an external supplier.
 - (d) use of computers to obtain value-creating data from the Internet.
- (vi) For an actress in Bollywood, her pretty face would be a/an
- (a) Asset
 - (b) Strategic asset
 - (c) Core competency
 - (d) Capability
 - (e) All of the above

Answer:

6. (i) (b)
(ii) (c)
(iii) (d)
(iv) (b)
(v) (c)
(vi) (b)

Answer any two questions from the following:

12×2=24

7. (a) Explain, in one or two statements, a Company mission. State any three major objectives. **3+3=6**
- (b) Define the term 'Portfolio Analysis'. List the factors influencing Portfolio Strategy. **2+4=6**

Answer:

7. (a) A Company mission

The mission is a broadly framed but enduring statement of company intent. It embodies the business philosophy of strategic decision makers; implies the image the company seeks to project; reflects the firm's self-concept; indicates the principal product or service areas and primary customer needs the company will attempt to satisfy. In short, the mission describes the product, market, and technological areas of emphasis for the business in a way that reflects the values and priorities of the strategic decision makers.

Objectives:

1. To ensure unanimity of purpose within the organisation.
2. To provide a basis for motivating the use of the organisation's resources.
3. To develop a basis, or standard, for allocating organisational resources.
4. To establish a general tone or organisational climate, for example, to suggest a businesslike operation.
5. To serve as a focal point for those who can identify with the organisation's purpose and direction, and to deter those who cannot from participating further in the organisation's activities.
6. To facilitate the translation of objectives and goals into a work structure involving the assignment of tasks to responsible elements within the organisation.
7. To specify organisational purposes and the translation of these purposes into goals in such a way that cost, time, and performance parameters can be assessed and controlled.

SUGGESTED ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

- (b) Portfolio analysis is a term used in describing methods of analysing a product -market portfolio with the following aims.
- To identify the current strengths and weaknesses of an organisation's products in its markets, and the state of growth or decline in each of these markets.
 - To identify what strategy is needed to maintain a strong position or improve a weak one.

Factors influencing Portfolio Strategy:

- Mission/Vision.
- Value system.
- Future of Current Business.
- Position on the Portfolio Matrix/PLC.
- Government Policy.
- Competitive Environment.
- Company Resources.
- Supply/Demand Conditions.
- Competitive Moves.
- Portfolio Strategy of Parent.
- Business Environment.

8. **(a) Explain the terms: (i) Marketing Plan and (ii) Social Marketing.** **3+3=6**
- (b) What is meant by a contingency plan? List its benefits.** **2+4=6**

Answer:

8. (a) (i) **Marketing Plan:** Marketing plan is a written document that specifies in detail the firms marketing objectives and how marketing management will use the controllable marketing tools such as product design, channels, promotion and pricing to achieve these objectives.
- Marketing strategy means finding attractive opportunities and developing profitable ways to capture the market.
- A marketing strategy specifies a target market and a related marketing mix. It is a big picture of what a firm will do in some market. The job of planning strategies to guide a whole company is called strategic planning. It is the managerial process of developing and maintaining a match between an organisation's resources and its market opportunities.
- (ii) **Social Marketing:** Societal marketing concept calls for a customer orientation backed by integrated marketing aimed at generating customer satisfaction and long-run consumer welfare as the key to attaining long-run profitable volume.
- (b) **Contingency Plan:** A basic premise of good strategic management is that firms plan ways to deal with unfavorable and favorable events before they occur. Too many organizations prepare contingency plans just for unfavorable events; this is a mistake, because both minimizing threats and capitalizing on opportunities can improve a firm's competitive position.

Regardless of how carefully strategies are formulated, implemented, and evaluated, unforeseen events, such as strikes, boycotts, natural disasters, arrival of foreign competitors, and government actions, can make a strategy obsolete. To minimize the impact of potential threats, organizations should develop contingency plans as part of their strategy-evaluation process. Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected. Only high-priority areas require the insurance of contingency plans. Strategists cannot and should not try to cover all bases by planning for all possible contingencies. But in any case, contingency plans should be as simple as possible.

Benefits of Contingency Planning:

- It will make the future through their proactive planning and advanced preparation.

SUGGESTED ANSWERS TO QUESTIONS_SYL2016_DEC2017_PAPER-9

- (ii) It will introduce original action by removing present difficulties.
- (iii) It enables to anticipate future problems.
- (iv) It will change the goals to suit internal and external changes.
- (v) It experiments with creative ideas and take initiative.
- (vi) It will attempt to shape the future and create a more desirable environment.
- (vii) It permits quick response to change,
- (viii) It prevents panic in crisis situations.
- (ix) It makes managers more adaptable to unforeseen changes.

9. Write short notes on any three of the following:

4×3=12

- (a) Unrelated Diversification**
- (b) Hybrid Organization**
- (c) Strategy**
- (d) Time Frame of Objectives**

Answer:

9. (a) Unrelated Diversification

Unrelated Diversification is also termed conglomerate growth because the resulting corporation is a conglomerate, i.e. a collection of businesses without any relationship to one another. The strategic justifications advanced for this strategy are to:

- take advantage of poorly managed companies which can then be turned around and either run at a gain to the shareholders or sold-on at a profit;
- spread the risks of the firm across a wide range of industries;
- escape a mature or declining industry by using the positive cash flows from it to develop into new and more profitable areas of business.

(b) Hybrid Organization

A single type of structural design is not always sufficient to meet the requirements of strategy. When this occurs, one opinion is to mix and blend the basic organizations forms, matching structure to strategy, requirement by requirement, and unit by unit. Hybrid structure is a form of departmentalization that adopts parts of both functional and divisional structures at the same level of management. The major potential advantage of the hybrid structures is that the combination may allow the firm to gain the advantages offered by the primary structure while at least diminishing the impact of the disadvantages.

(c) Strategy

Strategy is all about integrating organizational activities and utilizing and allocating the scarce resources within the organizational environment so as to meet the present objectives. While planning a strategy it is essential to consider that decisions are not taken in a vacuum and that any act taken by a firm is likely to be met by a reaction from those affected, competitors, customers, employees or suppliers. Strategy can also be defined as knowledge of the goals, the uncertainty of events and the need to take into consideration the likely or actual behaviour of others. Strategy is the outline of decisions in an organization that shows its objectives and goals, reduces the key policies, and plans for achieving these goals, and defines the business the company is to carry on, the type of economic and human organization it wants to be, and the contribution it plans to make to its shareholders, customers and society at large.

(d) Time Frame of Objectives

Objectives are timeless, enduring, and unending; goals are temporal, time-phased, and intended to be superseded by subsequent goals. Because objectives relate to the ongoing activities of an organisation, their achievement tends to be open-ended in the sense of not being bounded by time. For example, the survival objective of a business organisation is never completely attained since failure is always a future possibility.

**INTERMEDIATE EXAMINATION
GROUP - II
(SYLLABUS 2016)**

SUGGESTED ANSWERS TO QUESTIONS

JUNE - 2018

Paper-9 : OPERATIONS MANAGEMENT AND STRATEGIC MANAGEMENT

Time Allowed : 3 Hours

Full Marks : 100

This figures in the margin on the right side indicate full marks.

This paper contains 2 Sections.

Both Sections are compulsory, subject to instructions provided against each.

All working must form part of your answer.

Assumptions, if any, must be clearly indicated.

**Section - A
(Operations Management)**

1. (a) Choose the correct answer: 1x10=10
- (i) The recent trend in the Production/Operations management which suggests the use of minimal amount of resources to produce a high volume of high quality goods with some variety is referred to as:
 - (a) SCM
 - (b) TQM
 - (c) Lean Production
 - (d) Just-In-Time
 - (ii) Effective capacity can NOT be determined by which of the following factors?
 - (a) Product design and product-mix
 - (b) Quantity and quality capabilities
 - (c) Facilities
 - (d) None of the above
 - (iii) In which of the following stages the management should try to change its approach by changing its strategy from "buy my product" to "try my product"?
 - (a) Introduction
 - (b) Growth
 - (c) Maturity
 - (d) Decline
 - (iv) Conducting occasional check-ups of the products manufactured or assembled to ensure high quality of the production is known as:
 - (a) Planning
 - (b) Scheduling
 - (c) Inspection
 - (d) Routing
 - (v) Which one of the following standards is associated with the "Quality Assurance in Final Inspection Test"?
 - (a) ISO 9001
 - (b) ISO 9002
 - (c) ISO 9003
 - (d) ISO 9004

Suggested Answers_Syl2016_June2018_Paper 9

- (vi) With reference to project management, identify which of the following statement is NOT correct?
- Gantt chart is a principal tool used in scheduling and also in some methods of loading.
 - Routing is the first step in the production planning.
 - The cost of any activity is proportional to its time of completion.
 - The free float can be calculated by subtracting EFT from EST.
- (vii) Identify which one of the following statement is NOT correct?
- Preventing maintenance includes lubrication, cleaning, periodic overhaul, etc.
 - The two types of cost-cost of premature replacement and cost of breakdown-need to be balanced.
 - Wear and obsolescence are the two main causes of replacement of machinery in every aspect of life.
 - A machine is technically obsolete when another machine can do the same job more efficiently with reduced time and also at a lower cost.
- (viii) To determine where the plant should be located for maximum operating economy and effectiveness, refers to which one of the following?
- Plant layout
 - Facility location
 - Capacity planning
 - Capacity requirement
- (ix) Which of the following models deals with the physical movement of goods from different supply origins to a number of different demand destinations?
- Simulation
 - Transportation
 - Lean operations
 - Line balancing
- (x) One of the objectives of maintenance is:
- to prevent obsolescence.
 - to ensure spare parts management.
 - to satisfy customers.
 - to extend the useful life of Plant & Machinery without sacrificing the level of performance.

(b) Match Column A with Column B:

1x6=6

Column A	Column B
(A) The ability to adapt quickly to changes in volume of demand, in the product mix demanded and in product design or in delivery schedules	(i) Method Study
(B) To address the planning and controlling of a manufacturing process and all of its related support functions	(ii) Maintenance Stores
(C) Degree to which the system can be adjusted to changes in processing requirements	(iii) Flexibility
(D) Eliminating unnecessary motions or by changing the sequence of operation or the process itself	(iv) Network Analysis
(E) Certain specific techniques which can be used for planning, management and control of project	(v) MRP-II
(F) Availability of vital spare parts needs to be ascertained to meet an emergency like breakdown	(vi) Process Flexibility

Suggested Answers_Syl2016_June2018_Paper 9

- (c) State whether the following statements are 'True' or 'False':** **1x6=6**
- (i) The primary concern of production planning and control is the delivery of products to customers or to inventory stocks according to some predetermined schedule.
 - (ii) Capacity refers to the minimum load an operating unit can handle.
 - (iii) Job-shop process is used when a very highly standardized product is desired in high volumes.
 - (iv) The productivity is a measure of how much input is required to achieve a given output.
 - (v) One of the limitations of Gantt Chart is that it does not clearly indicate the details regarding progress of activities.
 - (vi) Preventive maintenance ensures greater safety to workers.

Answer:

1. (a) (i) (c) Lean Production
 (ii) (d) None of the above
 (iii) (b) Growth
 (iv) (c) Inspection
 (v) (c) ISO 9003
 (vi) (d) The free float can be calculated by subtracting EFT from EST.
 (vii) (a) Preventive maintenance includes lubrication, cleaning, periodic overhaul, etc.
 (viii) (b) Facility location
 (ix) (b) Transportation
 (x) (d) To extend the useful life of Plant & Machinery without sacrificing the level of performance

(b)

Column A	Column B
(A) The ability to adapt quickly to changes in volume of demand, in the product mix demanded and in product design or in delivery schedules	(iii) Flexibility
(B) To address the planning and controlling of a manufacturing process and all of its related support functions	(v) MRP-II
(C) Degree to which the system can be adjusted to changes in processing requirements	(vi) Process Flexibility
(D) Eliminating unnecessary motions or by changing the sequence of operation or the process itself	(i) Method Study
(E) Certain specific techniques which can be used for planning, management and control of project	(iv) Network Analysis
(F) Availability of vital spare parts needs to be ascertained to meet an emergency like breakdown	(ii) Maintenance Stores

- (c)** (i) True
 (ii) False
 (iii) False
 (iv) True
 (v) True
 (vi) True

Answer any three questions from the following:

16x3=48

2. (a) Categorise the objectives of operations management and discuss about each category. **2+4=6**
- (b) The monthly requirement of raw material for a company is 3200 units. The carrying cost is estimated to be 25% of the purchase price per unit, in addition to ₹ 2.5 per unit.

Suggested Answers_Syl2016_June2018_Paper 9

The purchase price of raw material is ₹ 24 per unit.

The ordering cost is ₹ 28 per order.

(i) You are required to find EOQ and Total cost.

(ii) What is the total cost when the company gets a concession of 6% on the purchase price if it orders 3200 units or more but less than 6200 units per month?

(iii) What happens when the company gets a concession of 15% on the purchase price when it orders 6,200 units or more?

(iv) Which of the above three ways of orders the company should adopt?

4+2+2+2=10

Answer:

2. (a) Objectives of operations management can be categorised into:

- (i) Customer service, and
- (ii) Resource utilization

(i) Customer service

The first objective is the customer service for the satisfaction of customer wants. Customer service is therefore a key objective of operations management. The Operations Management must provide something to a specification which can satisfy the customer in terms cost and timing. Thus, primary objective can be satisfied by providing the 'right thing at the right price at the right time'. These three aspects of customer service - specification, cost and timing - are the principal sources of customer satisfaction and must, therefore, be the principal dimension of the customer service objective for operation managers. Generally an organization will aim reliably and consistently to achieve certain standards, or levels, on these dimensions, and operations managers will be influential in attempting to achieve these standards.

Hence, this objective will influence the operations manager's decisions to achieve the required customer service.

(ii) Resource Utilization

Another major objective is to utilize resources for the satisfaction of customer wants effectively, i.e., customer service must be provided with the achievement of effective operations through efficient use of resources. Inefficient use of resources or inadequate customer service leads to commercial failure of an operating system. Operations management is concerned essentially with the utilization of resources, i.e., obtaining maximum effect from resources or minimizing their loss, under-utilization or waste. The extent of the utilization of the resources' potential might be expressed in terms of the proportion of available time used or occupied, space utilization, levels of activity, etc. Each measure indicates the extent to which the potential or capacity of such resources is utilized. This is referred to as the objective of resource utilization.

Operations management is also concerned with the achievement of both satisfactory customer service and resource utilization. An improvement in one will often give rise to deterioration in the other. Often both cannot be maximized, and hence a satisfactory performance must be achieved on both objectives. All the activities of operations management must be tackled with these two objectives in mind, and many of the problems will be faced by operations managers because of this conflict. Hence, operations managers must attempt to balance these basic objectives.

(b) (i) $D=3200 \times 12 = 38,400$ units per annum

$C_0 = 28$

$C_h=2.5 + 25\% \text{ of } 24 = 8.5$

$EOQ = \sqrt{[(2 \times 28 \times 38,400)/8.5]} = 502.97 = 503$ units (approx.)

Suggested Answers_Syl2016_June2018_Paper 9

$$\begin{aligned}\text{Total Cost} &= C_o + C_{rm} + C_h \\ &= [(38,400 \times 28)/503] + (38,400 \times 24) + [(503 \times 8.5)/2] \\ &= 2,137.57 + 9,21,600 + 2,137.75 \\ &= 9,25,875.32\end{aligned}$$

- (ii) When the company has an option to order between 3200 and 6200 units, the EOQ should be calculated with a reduction in price by 6% (due to concession); The purchase price = 94% of 24 = 22.56.
D = 38,400 units per annum;
 $C_o = 28$;
 $C_h = 2.5 + 25\% \text{ of } 22.56 = 8.14$
 $EOQ = \sqrt{[(2 \times 28 \times 38,400)/8.14]} = 513.98 = 514 \text{ units (approx.)}$
Total Cost = $C_o + C_{rm} + C_h$
 $= [(38,400 \times 28)/514] + (38,400 \times 22.56) + [(514 \times 8.14)/2]$
 $= 2091.828 + 8,66,304 + 2,091.98 = 8,70,487.8$
- (iii) When the company orders more than 6,200 units purchase price = 85% of 24 (because 15% concession) = 20.4;
D = 38,400 units per annum;
 $C_o = 28$
 $C_h = 2.5 + 25\% \text{ of } 20.4 = 7.6$
 $EOQ = \sqrt{[(2 \times 28 \times 38,400)/7.6]} = 531.92 = 532 \text{ units (approx.)}$
Total Cost = $C_o + C_{rm} + C_h$
 $= [(38,400 \times 28)/532] + (38,400 \times 20.4) + [(532 \times 7.6)/2]$
 $= 2021.052 + 7,83,360 + 2,021.6 = 7,87,402.65$
- (iv) Comparing these costs, we notice that the cost is minimum (7,87,402.65) for (iii) order. Therefore the company should adopt a policy of ordering 532 units per order.

3. (a) "Virtually all goods or services are made by using some variation of one of three process Strategies". Discuss about each of the three process strategies. Also state the situation during the decline stage of a product life cycle. (2x3)+2=8
- (b) Discuss the principles of scheduling. Explain briefly the relationship between routing and scheduling. 6+2=8

Answer:

3. (a) The process strategies are: (i) process focus (ii) repetitive focus and (iii) product focus. Each of these three strategies are discussed below:
- (i) **Process Focus:** Majority (about 75 per cent) of global production is devoted to low volume, high variety products in manufacturing facilities called job shops. Such facilities are organised around performing processes. For example, the processes might be welding, grinding or painting carried out in departments devoted to these processes. Such facilities are process focussed in terms of equipment, machines, layout and supervision. They provide a high degree of product flexibility as products move intermittently between processes. Each process is designed to perform a wide variety of activities and handle frequent changes. Such processes are called intermittent processes. These facilities have high variable costs and low utilisation of facilities.
- (ii) **Repetitive Focus:** A repetitive process is a product oriented production process that uses modules. It falls between product focus and process focus. It uses modules which are parts or components prepared often in a continuous or mass production process. A good example of repetitive process is the assembly line

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which is used for assembling automobiles and household appliances and is less flexible than process-focused facility. Personal computer is an example of a repetitive process using modules in which the modules are assembled to get a custom product with the desired configuration.

- (iii) **Product Focus:** It is a facility organised around products, a product oriented, high-volume low-variety process. It is also referred to as continuous process because it has very long continuous production run. Examples of product focussed processes are steel, glass, paper, electric bulbs, chemicals and pharmaceutical products, bolts and nuts etc. Product-focussed facilities need standardisation and effective quality control. The specialised nature of the facility requires high fixed cost, but low variable costs requiring high facility utilisation.

Situation during the decline stage of a product life cycle:

At the final stage of decline, profit margins touch a low level, competition becomes severe and customers start using newer and better products. It is here that the story of a product ends - a natural but hard end.

(b) The principles of scheduling are:

- (i) **The principle of optimum task size:** Scheduling tends to achieve its maximum efficiency when the task sizes are small and all tasks are of the same order of magnitude.
- (ii) **The principle of the optimum Production plan:** Scheduling tends to achieve its maximum efficiency when the work is planned, so that it imposes an equal/even load on all the plant.
- (iii) **The principle of the optimum operation sequence:** Scheduling tends to achieve its maximum efficiency when the work is planned so that the work centers are normally used in the same sequence.

The first principle has a tendency when applied, not only give good results but also to be self-correcting if it is ignored. For example, if in a functional batch production machine shop the loads imposed by different operations vary greatly in length it is possible that it will be necessary to break many of the long operations into one or more small batches, in order to get the other orders completed by due date. In effect, this principle only repeats the known advantage of maintaining a high rate of stock turn over, and of single phase ordering. The second principle merely states that the obvious fact that there will be less idle time and waiting time, if all the plant is evenly loaded by the production planners, then if some of the machines are over loaded perhaps because direct labour cost on them are lower and others are idle for part of the time due to shortage of work. The third principle says about principle of flow. Sometimes it is also true if we sequence some jobs, which need the same machine set up, at a time, this avoids machine ancillary time needed, in case, the jobs of the above type are done at different times.

For example, consider drilling a 10 mm hole in five different jobs may be done at a time so that the set up time required for five jobs can be once only.

Relationship between Routing and Scheduling:

Both routing and scheduling are interconnected as scheduling is difficult without routing and routing is also not effective without scheduling. Routing is a prerequisite for scheduling while time to be taken may form the basis of routing and that is fixed by scheduling.

4. (a) **A blacksmith supervisor in his workshop is considering how he should assign the four jobs that are to be performed, to four of the workers under him. He wants to assign the jobs to the workers such that the aggregate time to perform the jobs is the least.**

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Based on previous experience, he has the information on the time taken by the four workers in performing these jobs and the same is given in the table below:

Time Taken (in minutes) by 4 Workers

Worker	Job			
	A	B	C	D
1	46	40	51	68
2	57	42	63	55
3	49	53	48	64
4	41	45	61	55

Solve the assignment problem for optimal solution using Hungarian Method. 8

- (b) At a tool service centre, the arrival rate is 3 per hour and the service potentials 4 per hour. Simple queue conditions exist. The hourly wage paid to the attendant at the service centre is ₹ 2 per hour and the hourly cost of a machinist away from his work is ₹ 5.

Calculate: 2x4=8

- (i) The average number of machinists being served or waiting to be served at any given time.
- (ii) The average time a machinist spends waiting for service.
- (iii) The total cost of operating the system for an eight-hour day.
- (iv) The cost of the system if there were two attendants working together as a team, each paid ₹ 2 per hour and each able to service on average 3 per hour.

Answer:

4. (a) Step - 1 :

The minimum value of each row is subtracted from all elements in the row. It is shown in the reduced cost table, also called opportunity cost table, given below:

Table-1: Reduced Cost Table - 1

Worker	Job			
	A	B	C	D
1	6	0	11	28
2	15	0	21	13
3	1	5	0	16
4	0	4	20	14

Step 2:

For each column of this table, the minimum value is subtracted from all the other values. The columns that contain a zero would remain unaffected by this operation. Hence, only the fourth column values would change. Table-2 shows this.

Table - 2: Reduced Cost Table - 2

Worker	Job			
	A	B	C	D
1	6	0	11	15
2	15	0	21	0
3	1	5	0	3
4	0	4	20	1

Step 3:

Draw the minimum number of lines covering all zeros. As a general rule, we should first cover those rows/columns which contain larger number of zeros. Table 3 shows this.

Worker	Job			
	A	B	C	D
1	6	0	11	15
2	15	0	21	0
3	1	5	0	3
4	0	4	20	1

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1	6	0	11	15
2	15	0	21	0
3	1	5	0	3
4	0	4	20	1

Step 4:

Since the number of lines drawn is equal to 4 (= n), the optimal solution is obtained. The assignments are made after scanning the rows and columns for unit zeros. Assignments made are shown with squares as shown in Table 4.

Table - 4: Assignment of Jobs

Worker	Job			
	A	B	C	D
1	6	0	11	15
2	15	0	21	0
3	1	5	0	3
4	0	4	20	1

Assignments are made in the following order. Rows 1, 3, and 4 contain only one zero each. So assigned 1-B, 3-C, and 4-A. Since worker 1 has been assigned job B, we cross the zero in the second column of the second row. After making these assignments, only worker 2 and job D are left for assignment. The final pattern of assignments is 1-B, 2-D, 3-C, and 4-A, involving a total time of $40 + 55 + 48 + 41 = 184$ minutes. This is the optimal solution to the problem.

- (b)** At a tool service centre, the arrival rate is 3 per hour and the service potentials are 4 per hour.

Arrival Rate: = $\lambda = 3$ per hour

Service Rate: = $\mu = 4$ per hour

- (i) The average number of machinists being served or waiting to be served at any given time:

$$L_n = [\lambda / (\mu - \lambda)] = 3 / (4 - 3) = 3$$

- (ii) The average time a machinist spends waiting for service:

$$W_q = [(\lambda / \mu) \times 1 / (\mu - \lambda)] = (3/4) \times 1 / (4 - 3) = 0.75 \text{ hours} = 45 \text{ minutes.}$$

- (iii) Average time in the system:

$$W_s = [1 / (\mu - \lambda)] = 1 / (4 - 3) = 1 \text{ hr.}$$

Average number of machinists in the system = 3 [As per (i) above]

Cost of three machinists being away from work = $5 \times 3 = 15$ per hour.

Attendant cost = 2 per hour

Total Cost / hour = 17 per hour

The total cost of operating the system for an eight - hour day: $17 \times 8 = 136$

- (iv) It is assumed that there is still a single service point, but the average service rate is now

= 6 per hour.

=> Now $\lambda = 3$ per hour

$\mu = 6$ per hour

=> Average number in the system $L_n = [\lambda / (\mu - \lambda)] = 3 / (6 - 3) = 1$

Average time spent in the system $W_s = 1 / (\mu - \lambda) = 1 / (6 - 3)$

= 1/3 hours.

= $(1/3) \times 60 = 20$ minutes.

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Machinists cost = 1/3 hour x 5 =	1.67
Attendant cost	4.00
Total Cost	5.67

Cost per 8 hour day = 5.67 x 8 = 45.36

5. (a) The following jobs have to be shipped a week from now(week has 5 working days)

Job	A	B	C	D	E	F
Number of day's work remaining	4	5	8	7	6	3

Sequence the jobs according to priority established by:

4x2=8

- (i) Least slack rule
(ii) Critical ratio rule

- (b) A cab operations company is experiencing the following number of breakdowns for months over the past 2 years in their new fleet of cabs:

Number of breakdowns	0	1	2	3	4
Number of months this occurred	3	7	9	4	1

Each breakdown costs the firm an average of 2,500. For a cost of 1,600 per month, preventive maintenance can be carried out to limit the breakdowns to an average of one per month. Which policy is suitable for the firm?

8

Answer:

5. (a) (i) Calculation of slack:
Number of days until due date is 5 days for all jobs:

Job	Slack	(Days)
A	5-4	1
B	5-5	0
C	5-8	(-3)
D	5-7	(-2)
E	5-6	(-1)
F	5-3	2

C	D	E	B	A	F
-3	-2	-1	0	1	2

- (ii) Calculation of Critical ratio:
Critical ratio = Available time / Operation time
Critical Ratio for job A = 5/4 = 1.25
Critical Ratio for job B = 5/5 = 1.00
Critical Ratio for job C = 5/8 = 0.625
Critical Ratio for job D = 5/7 = 0.714
Critical Ratio for job E = 5/6 = 0.833
Critical Ratio for job F = 5/3 = 1.667

Job having least critical ratio is given the first priority and so on.

Sequence	C	D	E	B	A	F
Critical Ratio	0.625	0.714	0.833	1.00	1.25	1.667

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- (b) Converting the frequencies to a probability distribution and determining the expected cost/month of breakdowns we get:

Number of breakdowns	Frequency in months	Frequency in percent	Expected value
0	3	$3/24=0.125$	0
1	7	$7/24=0.292$	0.292
2	9	$9/24=0.375$	0.750
3	4	$4/24=0.167$	0.501
4	1	$1/24=0.042$	0.167
Total:	24	Total = 1	Total: 1.710

Breakdown cost per month; Expected cost = $1.710 * 2500 = 4,275$.

Preventive maintenance cost per month: -

Average cost of one breakdown / month = 2,500

Maintenance contract cost/month = 1,600

Total = 4,100.

Thus, preventive maintenance policy is suitable for the firm.

Section - B (Strategic Management)

6. Choose the correct answer: 1×6=6
- (i) Which one of the following does NOT seem to be an advantage of the strategic management?
- (a) Discharges board responsibility
 - (b) Provides a framework for decision-making
 - (c) Forces an objective assessment
 - (d) It can be expensive
- (ii) Which of the following analyses 'products and businesses by market share and market growth'?
- (a) SWOT Analysis
 - (b) BCG Matrix
 - (c) PEST Analysis
 - (d) Portfolio Analysis
- (iii) Which one of the following is NOT part of the McKinsey's 7-S framework?
- (a) Skills
 - (b) Staff
 - (c) Systems
 - (d) Supervision
- (iv) Which one of the following statement is NOT correct?
- (a) Vision is the statement of the future.
 - (b) The corporate mission is the purpose or reason for its existence.
 - (c) Targets are formed from vision and mission statement of organizations.
 - (d) Goals are objectives that are scheduled for attainment during planned period.
- (v) Which of the following can NOT be called as a strength of an organization?
- (a) Good Industrial relations
 - (b) Incentives from State Government
 - (c) Financially very sound
 - (d) Raw materials source at a distance
- (vi) Strategic Business Unit (SBU) structure does NOT experience one of the following as an advantage:
- (a) Higher career development opportunities

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- (b) Better control of categories of products manufacturing, marketing and distributions
- (c) High cost approach
- (d) Help in expanding in different related and unrelated businesses

Answer:

- 6. (i) (d) It can be expensive
- (ii) (b) BCG Matrix
- (iii) (d) Supervision
- (iv) (c) Targets are formed from vision and mission statement of organizations
- (v) (d) Raw Materials source at a distance
- (vi) (c) High Cost approach

Answer any two questions from the following:

12×2=24

- 7. (a) Identify basic elements of strategic vision and discuss about the important purposes served by such strategic vision. 1½ + 2½ = 4
- (b) Discuss in brief about the areas of attention for SWOT appraisal. State the purpose of such appraisal. 6+2=8

Answer:

- 7. (a) Strategic vision specifies primarily three elements:
 1. Forming a mission statement that defines what business the company presently is in? And "who we are and where we are now?"
 2. Using this mission statement as base to define long term path by indicating choices about "Where we are going?"
 3. Finally, communicating above strategic vision in clear and committed term.

Strategic Vision has important purposes, such as:

1. Clearly provides the direction that company wants to follow.
2. Identify the need of changing from existing direction or products, if stated in vision statement.
3. Create passionate environment in the organisation to steer the company with great excitement in selected direction.
4. Create creativity in every member of company to prepare company for future.
5. Promote entrepreneurship.

(b) SWOT appraisal should give particular attention to the following:

- (i) **A study of past accounts and the use of ratios.** By looking at trends, or by comparing ratios (if possible) with those of other firms in a similar industry, it might be possible to identify strengths and weaknesses in major areas of the business. The assistance of a management accountant should be of great value in this work.
- (ii) **Product position and product-market mix.**
- (iii) **Cash and financial structure.** If a company intends to expand or diversify, it will need cash or sufficient financial standing in order to acquire subsidiaries by issuing shares.
- (iv) **Cost structure.** If a company operates with high fixed costs and relatively low variable costs, it might be in a relatively weak position with regard to production capacity. High volumes of production and sale might be required to break even. In contrast, a company with low fixed costs might be more flexible and adaptable so that it should be able to operate at a lower breakeven point.
- (v) **Managerial ability.** There may be a problem in attempting to assess this and objective measurements should be sought. The danger is that a poor management might overestimate their own ability and incorrectly analyse their weakness as strength.

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The purpose of such appraisal is to express, qualitatively or quantitatively, which areas of the business have strengths to exploit, and which areas have weaknesses which must be improved. Although every area of the business should be investigated, only the areas of significant strength or weakness should warrant further attention.

While finalising the corporate plan together with corporate objectives, growth strategies, it would be necessary to make a review of the corporate strengths and weaknesses in connection with its mission and objectives. This is an important managerial task linked with corporate planning process.

- 8. (a) State the different approaches in Strategic Planning. 4**
(b) Categorise major reasons of SBU approach. 8

Answer:

- 8. (a)** There are three approaches that can be adopted to strategic planning:
- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
 - (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
 - (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.
- (b)** Some of major reasons of using SBU approach are as follow:
- A scientific method of grouping the businesses of a multi-business corporation which helps the firm in strategic planning.
 - An improvement over the geographical grouping of businesses and strategic planning based on locational units.
 - An SBU is a grouping of related businesses that can be taken up for strategic planning distinct from the rest of the businesses.
 - Grouping the businesses on SBU lines helps the firm in strategic planning by removing the ambiguity and confusion generally seen in grouping businesses.
 - Each SBU is a separate business from the strategic planning standpoint. In the basic factors, viz., mission, objectives, competition and strategy-one SBU will be distinct from another.
 - Each SBU will have its own distinct set of competitors and its own distinct strategy.
 - Each SBU will have a CEO. He will be responsible for strategic planning for the SBU.
- 9. Write short notes on any three of the following: 4×3=12**
- (a) Marketing Plan and Strategy**
 - (b) Geographic and Matrix structure for implementation of organisational strategy**
 - (c) Types of firms/organisations for which BPR can be applied**
 - (d) Difference between strategic management and strategic planning**

Answer:

- 9. (a) Marketing Plan and Strategy.**

Marketing plan is a written document that specifies in detail the firm's marketing objectives and how marketing management will use the controllable marketing tools such as product design, channels, promotion and pricing to achieve these objectives. Marketing strategy means finding attractive opportunities and developing profitable ways to capture the market.

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A marketing strategy specifies a target market and a related marketing mix. It is a big picture of what a firm will do in some market. The job of planning strategies to guide a whole company is called strategic planning. It is the managerial process of developing and maintaining a match between an organisation's resources and its market opportunities.

(b) Geographic structure:

In geographic structure, activities and personnel are grouped by specific geographic locations. Each geographic unit includes all functions required to produce and market products in that region. Organization according to geographic areas or territories is rather common structural form for large-scale enterprise whose strategies need to be tailored to fit the particular needs and features of different geographic locations.

Matrix structure:

Another way to achieve focus on multiple outcomes is with the matrix structure. The matrix structure creates a dual chain of command; two lines of budget authority and two sources of performance and reward. The key feature of the matrix is that product (or business) and functional lines of authority are overlaid to form a matrix or grid, between the product manager and functional manager.

(c) Types of firms / organisations for which BPR can be applied.

BPR could be implemented to all firms (manufacturing firms, retailers, services, etc.) and public organizations that satisfy the following criteria:

- Minimum Number of employees: 20 (at least 4 in management positions).
- Strong management commitment to new ways of working and innovation.
- Well formed IT infrastructure.

Business Process Reengineering could be applied to companies that confront problems such as the following:

- High operational costs
- Low quality offered to customers
- High level of "bottleneck" processes at pick seasons
- Poor performance of middle level managers
- Inappropriate distribution of resources and jobs in order to achieve maximum performance, etc.

(d) The basic difference between Strategic management and Strategic planning are as follows

Strategic Management	Strategic Planning
(i) It is focused on producing strategic results; new markets; new products; new technologies etc.	(i) It is focused on making optimal strategic decisions.
(ii) It is management by results.	(ii) It is management by plans
(iii) It is an organizational action process.	(iii) It is an analytical process.
(iv) It broadens focus to include psychological, sociological and political variables	(iv) It is focused on business, economic and technological variables.
(v) It is about choosing things to do and also about the people who will do them.	(v) It is about choosing things to do.

INTERMEDIATE EXAMINATION

GROUP II

(SYLLABUS 2016)

SUGGESTED ANSWERS TO QUESTIONS

DECEMBER 2018

**Paper- 9: OPERATION MANAGEMENT AND STRATEGIC
MANAGEMENT**

Time Allowed: 3 Hours

Full Marks: 100

The figures in the margin on the right side indicate full marks.

This paper contains two Sections.

Both Sections are compulsory, subject to instructions provided against each.

All workings must form part of your answer.

Assumptions, if any, must be clearly indicated.

SECTION – A

Operations Management

1. (a) Choose the correct answer: 1×10 =10
- (i) Which one of the following recent trends in Production/Operations management involves drastic measures or break through improvements to improve the performance of a firm?
- (A) Corporate Downsizing
 - (B) Re-Engineering
 - (C) Technology
 - (D) TQM
- (ii) The starting point of Production cycle is
- (A) Product design
 - (B) Production planning
 - (C) Routing
 - (D) Market research

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- (iii) Which of the following process types is used when a very highly standardized product is desired in high volumes?
- (A) Repetitive Process
 - (B) Batch Process
 - (C) Project Process
 - (D) Continuous Process
- (iv) Which of the following aims at finding the best and most efficient way of using the available resources—men, materials, money and machinery?
- (A) Method Study
 - (B) Work Study
 - (C) Time Study
 - (D) Motion Study
- (v) Generally the size of the order for production in Job production is
- (A) small
 - (B) large
 - (C) medium
 - (D) very large
- (vi) Which one of the following statements is NOT correct?
- (A) LFT is calculated from the LFT of the head event.
 - (B) Slack can be calculated by adding EFT and LFT of any job.
 - (C) EFT is the sum of the EST and the time of duration for any event.
 - (D) The Total Project time is the shortest possible time required in completing the project.
- (vii) Which one of the following is NOT the advantage of Preventive Maintenance?
- (A) Better product quality
 - (B) Greater safety to workers
 - (C) Increased breakdowns and downtime
 - (D) Fewer large-scale repairs
- (viii) Which one of the following establishes time sequence of operations?
- (A) Routing
 - (B) Sequencing
 - (C) Scheduling
 - (D) Dispatching

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- (ix) MRP stands for
- (A) Material Requirement Planning
 - (B) Material Reordering Planning
 - (C) Material Requisition Procedure
 - (D) Material Recording Procedure
- (x) With reference to Aggregate Planning, identify which of the following statements is NOT correct?
- (A) It is an Intermediate-term planning.
 - (B) It is made operational through a master schedule, that gives the manufacturing schedule.
 - (C) Facility planning and scheduling are closely related with the aggregate planning.
 - (D) It deals with the strategic decisions, such as purchase of facilities, introduction of new products, processes, etc.

(b) Match Column A with Column B:

1×6=6

Column A	Column B
(A) Any place in a production process where materials tend to pile up or produced at rates of speed less rapid than the previous or subsequent operations	(i) Assignment
(B) It is used when a low volume of high variety goods are needed	(ii) Globalisation
(C) A special Linear Programming Problem	(iii) Bottleneck
(D) Steep increase in the level of competition among manufacturing firms throughout the world	(iv) Maintenance Request
(E) Systematic Quantitative structural approach to the problem of managing a project through to successful completion	(v) Job-Shop Process
(F) This must be made in writing to a central point in the organization	(vi) Network Analysis

(c) State whether the following statements are 'True' or 'False':

1×6=6

- (i) Short-term forecasting is useful to serve the purpose of estimating the inventory requirement.
- (ii) The life cycle of a product has many points of similarity with the human life cycle.
- (iii) The Linear Programming problem has two basic parts: the objective function and the constraint set.
- (iv) The most widely used index of productivity is to work out the output per machine-hour.
- (v) PERT is designed for repetitive projects, whereas CPM is suitable for non-repetitive projects.
- (vi) Wear and obsolescence are two main causes for replacement of machinery in every aspect of life.

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Answer: 1(a)

- (i) - (B) Re-engineering
- (ii) - (D) Market Research
- (iii) - (D) Continuous Process
- (iv) - (B) Work Study
- (v) - (A) Small
- (vi) - (B) Slack can be calculated by adding EFT and LFT of any job.
- (vii) - (C) Increased breakdowns and downtime
- (viii) - (C) Scheduling
- (ix) - (A) Material Requirement Planning
- (x) - (D) It deals with the strategic decisions, such as purchase of facilities, introduction of new products, processes, etc.

Answer: 1(b)

Column A	Column B
(A) Any place in a production process where materials tend to pile up or produced at rates of speed less rapid than the previous or subsequent operations	(iii) Bottleneck
(B) It is used when a low volume of high variety goods are needed	(v) Job-Shop Process
(C) A special Linear Programming Problem	(i) Assignment
(D) Steep increase in the level of competition among manufacturing firms throughout the world	(ii) Globalisation
(E) Systematic Quantitative structural approach to the problem of managing a project through to successful completion	(vi) Network Analysis
(F) This must be made in writing to a central point in the organization	(iv) Maintenance Request

Answer: 1(c)

- (i) True
- (ii) True
- (iii) True
- (iv) False
- (v) False
- (vi) True

Answer any three questions from the following:

16×3= 48

2. (a) Explain the concept of Operating System in order to have a clear idea of Operations Management.

(b) With the help of following data, project the trend of sales for the next 5 years: 6+10=16

Suggested Answer_Syl2016_Dec2018_Paper 9

Years	2002	2003	2004	2005	2006	2007
Sales in Lakhs of Rupees	120	130	135	140	150	165

Answer: 2(a)

In order to have a clear idea of Operations Management, one must have an idea of 'Operating Systems'.

An Operating System is defined as a configuration of resources combined for the provision of goods or services.

Retail organizations, hospitals, bus and taxi services, tailors, hotels and dentists are all examples of operating systems. Any operating system converts inputs, using physical resources, to create outputs, the function of which is to satisfy customers wants. The creation of goods or services involves transforming or converting inputs into outputs. Various inputs such as capital, labour, and information are used to create goods or services using one or more transformation processes (e.g., storing, transporting, and cutting). To ensure that the desired output are obtained, an organization takes measurements at various points in the transformation process (feedback) and then compares with them with previously established standards to determine whether corrective action is needed (control).

It is important to note that goods and services often occur jointly. For example, having the oil changed in your car is a service, but the oil that is delivered is a good. Similarly, house painting is a service, but the paint is a good.

The goods-service combination is a continuum. It can range from primarily goods, with little service, to primarily service, with few goods. Because there are relatively few pure goods or pure services, companies usually sell product packages, which are a combination of goods and services. There are elements of both goods production and service delivery in these product packages. This makes managing operations more interesting, and also more challenging.

Answer: 2(b)

Computation of trend values of sales:

Year	Time deviations from the middle of 2004 and 2005 assuring 5 years = 1	Sales (in lakhs of Rs.)	Squares of time deviation	Product of time deviation and sales
	X	Y	X ²	XY
2002	-5	120	25	-600
2003	-3	130	9	-390
2004	-1	135	1	-135
2005	+1	140	1	+140
2006	+3	150	9	+450
2007	+5	165	25	+825
n=6	$\sum x = 0$	$\sum x = 840$	$\sum x^2 = 70$	$\sum XY = 290$

Regression equation of Y on X:

$$\sum Y = a + bX$$

To find the values of a and b:

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$$a = \sum Y/n = 840/6 = 140$$

$$b = \frac{\sum XY}{\sum X^2}$$

$$= 290/70 = 4.143 \text{ approx.}$$

Sales forecast for the next five years, i.e., 2008 to 2012:

$$Y_{2008} = 140 + [29/7 \times (+7)] = 169 \text{ lacs}$$

$$Y_{2009} = 140 + [29/7 \times (+9)] = 177.28 \text{ lacs}$$

$$Y_{2010} = 140 + [29/7 \times (+11)] = 185.57 \text{ lacs}$$

$$Y_{2011} = 140 + [29/7 \times (+13)] = 193.85 \text{ lacs}$$

$$Y_{2012} = 140 + [29/7 \times (+15)] = 202.14 \text{ lacs}$$

3. (a) What are the various activities and responsibilities of product design?

(b) Describe the objectives of Production Planning and Control.

6+10=16

Answer: 3(a)

Various activities & responsibilities of Product design:

- (i) Translating customer needs and wants into product and service requirements (marketing).
- (ii) Refining existing products (marketing).
- (iii) Developing new products (marketing, product design and production).
- (iv) Formulating quality goals (quality assurance, production).
- (v) Formulating cost targets (accounting).
- (vi) Constructing and testing prototype (marketing, production).
- (vii) Documenting specifications (product design).

Answer: 3(b)

Objectives of Production Planning and Control:

- (i) Analysing the orders to determine the raw materials and parts that will be required for their completion,
- (ii) Answering questions from customers and salesmen concerning the status of their orders,
- (iii) Assisting the costing department in making cost estimates of orders,
- (iv) Assisting the human resource departments in the manpower planning and assignment of men to particular jobs,
- (v) Controlling the stock of finished parts and products,
- (vi) Determining the necessary tools required for manufacturing,
- (vii) Direction and control of the movement of materials through production process,
- (viii) Initiating changes in orders as requested by customers while orders are in process,

Suggested Answer_Syl2016_Dec2018_Paper 9

- (ix) Issuing requisitions for the purchase of necessary materials,
- (x) Issuing requisitions for the purchase or manufacture of necessary tools and parts,
- (xi) Keeping the up-to-date records scheduled and in process,
- (xii) Maintaining stocks of materials and parts,
- (xiii) Notifying sales and accounting of the acceptance of orders in terms of production feasibility,
- (xiv) Preparing the route sheets and schedules showing the sequence of operation required to produce particular products,
- (xv) Production of work orders to initiate production activities,
- (xvi) Receiving and evaluating reports of progress on particular orders and initiating corrective action, if necessary,
- (xvii) Receiving orders from customers,
- (xviii) Revising plans when production activities cannot conform to original plans and when revisions in scheduled production are necessary because of rush orders.

4. (a) Find initial Feasible Solution by North-West Corner method.

	W1	W2	W3	W4	SUPPLIES
F1	47	59	55	57	150
F2	44	54	52	59	270
F3	49	64	59	61	370
F4	51	63	54	60	230
DEMAND	210	330	260	220	

W_j → Warehouse

F_j → Factory, and

Cell entries are unit costs.

(b) A departmental store is running a snack items selling outlet. Past data of snack items' demand per week in hundred kgs with frequency is given below:

Demand/Week	0	6	12	18	24	30
Frequency	3	10	9	20	6	2

Using the following sequence of random numbers, generate the demand for next 10 weeks. Also find out the average demand per week.

Random Numbers	21	34	48	97	72	31	45	56
	47	37	82	44	67	75	63	

$$6 + (8 + 2) = 16$$

Suggested Answer_Syl2016_Dec2018_Paper 9

Answer: 4(a)

Initial Feasible Solution by North- West Corner method.

	W1	W2	W3	W4	SUPPLIES
F1	150				150
	47	59	55	57	
F2	60	210			270
	44	54	52	59	
F3		120	250		370
	49	64	59	61	
F4			10	220	230
	51	63	54	60	
DEMAND	210	330	260	220	

Answer: 4(b)

Random No. Range Table for demand

Demand per week	Frequency	Probability	Cumulative Probability	Range
0	3	0.06	0.06	0-5
6	10	0.20	0.26	6-25
12	9	0.18	0.44	26-43
18	20	0.40	0.84	44-83
24	6	0.12	0.96	84-95
30	2	0.04	1.00	96-99
	$\Sigma f = 50$	1.00		

Simulated value for next 10 weeks

Weeks	R. Nos.	Demand
1	21	6
2	34	12
3	48	18
4	97	30
5	72	18
6	31	12
7	45	18
8	56	18
9	47	18
10	37	12
	TOTAL	162

Average Weekly Demand: $162/10 = 16.2$

Suggested Answer_Syl2016_Dec2018_Paper 9

5. (a) Draw the network for the following activities and find the critical path and total duration of the project.

Activity	Duration(months)
1-2	3
2-3	4
2-4	5
2-5	6
3-4	3
3-6	5
4-6	7
5-6	4
6-7	5

- (b) An automotive firm is using a machine whose purchase price is Rs. 18,000.

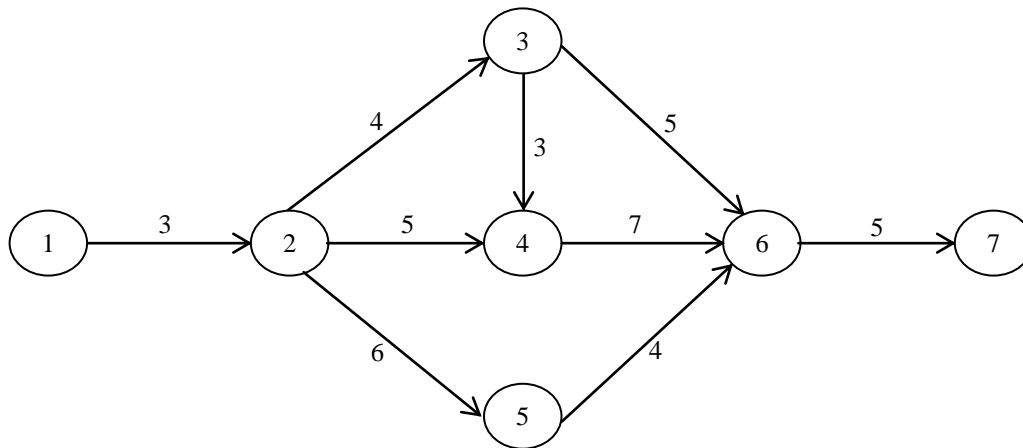
The Installation charges amount to Rs.3,800 and the machine has a scrap value of only Rs.1,800 because the firm has a monopoly of this type of work. The maintenance cost in various years is given in the following table:

Year	1	2	3	4	5	6	7	8	9
Maintenance cost (Rs.)	250	720	1200	1700	2300	3200	4300	4800	6300

The firm wants to determine after how many years should the machine be replaced on economic considerations, assuming that the machine replacement can be done only at the year end.
 $(2 \times 3) + 10 = 16$

Answer: 5(a)

Network diagram:



Paths and their durations: -

1-2-3-6-7 → 3+4+5+5 = 17 months

1-2-3-4-6-7 → 3+4+3+7+5 = 22 months → **Critical Path**

Suggested Answer_Syl2016_Dec2018_Paper 9

1-2-4-6-7 → 3+5+7+5 =20 months

1-2-5-6-7 → 3+6+4+5 =18 months

Answer: 5(b)

An automotive firm is using a machine...

Cost of machine, C = Rs. 18,000 + 3,800 = 21,800

Scrap Value, S = Rs. 1,800

Year	Maintenance Cost, M_j (Rs.)	Cumulative Maintenance Cost, $\sum M_j$ (Rs.)	C - S (Rs.)	Total Cost $T_{(n)}$ (Rs.)	Annual Cost $A_{(n)}$ (Rs.)
(i)	(ii)	(iii)	(iv)	(v)=(iii)+(iv)	(vi)=(v)/n
1	250	250	21,800 - 1,800 = 20,000	20,250	20,250
2	720	970	20,000	20,970	10,485
3	1,200	2,170	20,000	22,170	7,390
4	1,700	3,870	20,000	23,870	5,967.5
5	2,300	6,170	20,000	26,170	5,234
6	3,200	9,370	20,000	29,370	4,895
7	4,300	13,670	20,000	33,670	4,810
8	4,800	18,470	20,000	38,470	4,808.8
9	6,300	24,770	20,000	44,770	4,974.4

Lowest average cost is Rs. 4808.8 approx., which corresponds to $n = 8$ in above table. Thus machine needs to be replaced every 8th year.

SECTION – B

Strategic Management

6. Choose the correct answer:

1×6=6

(i) A corporate strategy can be defined as

- (A) A list of actions about operational planning and statement of organisation structure and control system.
- (B) A statement of how to compete, direction of growth and method of assessing environment.
- (C) Abatement of organisation's activities and allocation of resources.
- (D) A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives.

(ii) The existence of price-wars in the airline industry in India indicates that

- (A) customers are relatively weak because of the high switching costs created by frequent flyer programmes.
- (B) the industry is moving towards differentiation of services.
- (C) the competitive rivalry in the industry is severe.
- (D) the economic segment of the external environment has shifted, but the airline strategies have not changed.

Suggested Answer_Syl2016_Dec2018_Paper 9

- (iii) Business Process Re-engineering is
- (A) eliminating loss-making process.
 - (B) redesigning operational processes.
 - (C) redesigning the product and services.
 - (D) recruiting the process engineers.
- (iv) Which one or more of the following are appropriate as a judicious mix for a Product line, which is a group of products?
- (A) That are closely related.
 - (B) That are marketed through the same channel.
 - (C) That perform a similar function for being sold to the same customers.
 - (D) All of the above
- (v) The Product Market matrix comprising of Strategies of Market Penetration, Market Development, Product Development, and Diversification was first formulated by
- (A) Ansoff
 - (B) Drucker
 - (C) Porter
 - (D) Prahlad
- (vi) Price fixation for the first time takes place when
- (A) a company develops or acquires a new product.
 - (B) introducing existing product into a new geographic area or a new distribution channel.
 - (C) a service, the company bids for a new contract work.
 - (D) All of the above

Answer: 6

- (i) - (D) A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives.
- (ii) - (C) The competitive rivalry in the industry is severe.
- (iii) - (B) Redesigning operational processes.
- (iv) - (D) All of the above.
- (v) - (A) Ansoff.
- (vi) - (D) All of the above.

Answer any two questions from the following:

12×2=24

7. (a) 'There are primarily three levels of strategies in the organisation'. List the three levels. Build up one or two meaningful sentences to clarify the role of each level.

(b) What is meant by SWOT analysis?

8+4=12

Answer: 7(a)

Suggested Answer_Syl2016_Dec2018_Paper 9

There are primarily three levels of strategies in the organisation.

- i) Corporate Level
- ii) Business Level
- iii) Functional Level

i) Corporate Level:

The corporate level of management consisting of the chief executive officer (CEO), other senior executives, the board of directors, and corporate staff, empowered in decision-making within the organisation, is to oversee the development of strategies for the whole organisation. This role includes defining the mission and goals of the organisation, determining what businesses it should be in, allocating resources among the different businesses, formulating and implementing strategies that span individual businesses, and providing leadership for the organisation.

ii) Business Level:

A business unit is a self-contained division (with its own functions-for example, finance, purchasing, production, and marketing departments) that provides a product or service for a particular market. The strategic role of these managers is to translate the general statements of direction and intent that come from the corporate level into concrete strategies for individual businesses..

iii) Functional Level:

Functional-level managers are responsible for the specific business functions or operations (human resources, purchasing, product development, customer service, and so on) that constitute a company or one of its divisions. Thus, a functional manager's sphere of responsibility is generally confined to one organizational activity, whereas general managers oversee the operation of a whole company or division.

Answer: 7(b)

SWOT Analysis: Gathering data about the general, operating, and internal environments provides the raw material from which to develop a picture of the organizational environment.

SWOT analysis refines this body of information by applying a general framework for understanding and managing the environment in which an organisation operates. The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.. In many respects, the sophisticated analytical techniques discussed throughout the text are further refinements of basic SWOT analysis. In addition, SWOT is an excellent way to begin a case analysis. SWOT analysis attempts to assess the internal strengths and weaknesses of an organisation and the opportunities and threats that its external environment presents. SWOT seeks to isolate the major issues facing an organisation through careful analysis of each of these four elements. Managers can then formulate strategies to address key issues.

The purpose of such appraisal is to express, qualitatively or quantitatively, which areas of the business have strengths to exploit, and which areas have weaknesses which must be improved. Although every area of the business should be investigated, only the areas of significant strength or weakness should warrant further attention

8. (a) Categorise seven-steps process of Contingency Planning.

- (b) How does Matrix Organisation Structure differ from SBU Structure? Analyse related advantages and disadvantages of Matrix Organisation Structure. 6+6=12**

Suggested Answer_Syl2016_Dec2018_Paper 9

Answer: 8(a)

Steps in Contingency Planning

Step 1 - Identify the beneficial and unfavourable events that could possibly derail the strategy or strategies.

Step 2 - Specify trigger points. Calculate about when contingent events are likely to occur.
Step 3 - Assess the impact of each contingent event. Estimate the potential benefit or harm, of each contingent event.

Step 4 - Develop contingency plans. Be sure that contingency plans are compatible with current strategy and are economically feasible.

Step 5 - Assess the counter impact of each contingency plan. That is, estimate how much each contingency plan will capitalize on or cancel out its associated contingent event. Doing this will quantify the potential value of each contingency plan.

Step 6 - Determine early warning signals for key contingency event. Monitor the early warning signals.

Step 7 - For contingent event with reliable early warning signals, develop advance action plans to take advantage of the available lead time.

Answer: 8(b)

SBU Organisation Structure consist of flow of authority from top to bottom i.e. vertical flow whereas Matrix Organisation Structure contains both vertical and horizontal flow of communications or authority. This type of structure is frequently used in IT organization for managing different projects. Each individual project is managed by a project manager and projects manager will have his team arranged under him.

Advantages:

- (i) Useful for some specific industries like Information Technology, Healthcare etc.
- (ii) Employee can see visible results of their efforts
- (iii) Remove barrier to communications
- (iv) Managing projects are easy
- (v) Effective structures when environment is very dynamic

Disadvantages:

- (i) Complex structure as this contains both vertical and horizontal flow of information
- (ii) High cost approach due to more management positions
- (iii) Dual lines of authority
- (iv) Conflicts arises in the allocation of resources

9. Write short notes on any three of the following:

4×3=12

(a) Corporate Planning

(b) Definition of the terms 'Re-engineering' and 'Process' in Business Process Re-engineering

(c) Stages of Strategic Management Framework

(d) Steps involved in the formulation of production strategy

Answer: 9(a)

Suggested Answer_Syl2016_Dec2018_Paper 9

Corporate Planning is concerned with determination of objectives treating the company as a whole. It develops means to achieve the company's overall objectives. The corporate plans may relate to achieve corporate objectives for short-run and/or long-run. It is an integrated systems approach considering different functions, divisions and units of the organization. Such corporate plans are framed at the corporate level by the top management.

Answer: 9(b)

Re-engineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed.

Process is a structured, measured set of activities designed to produce a specified output for a particular customer or market. It implies a strong emphasis on how work is done within an organization. Each process is composed of related steps or activities that use people, information, and other resources to create value for customers.

Answer: 9(c)

The basic framework of strategic management involves five stages:

Stage 1: In this stage, organisation analyse about their present situation in terms of their Strengths, Weaknesses, Opportunities and Threats.

Stage 2: In this stage, organisations setup their missions, goals and objectives by analysing where they want to go in future.

Stage 3: In this stage organisation analyses various strategic alternatives to achieve their - goals and objectives. The alternatives are analysed in terms of what business portfolio/product mix to adopt, expansion, merger, acquisition and divestment options etc. are analysed to achieve the goals.

Stage 4: In this organisations select the best suitable alternatives in line with their SWOT analysis

Stage 5: This is implementation stage in which organisation implement and execute the selected alternatives to achieve their strategic goals and objectives.

Answer: 9(d)

The following steps are involved in the formulation of production strategy:

- (i) Study the overall corporate plan and define the objectives.
- (ii) Analyse the present production operations and the present and future environment.
- (iii) Review sales- forecast and marketing.
- (iv) Make strategic decisions for production.

INTERMEDIATE EXAMINATION

GROUP II

(SYLLABUS 2016)

SUGGESTED ANSWERS TO QUESTIONS

JUNE 2019

**Paper- 9: OPERATIONS MANAGEMENT AND STRATEGIC
MANAGEMENT**

Time Allowed: 3 Hours

Full Marks: 100

The figures in the margin on the right side indicate the full marks.

This paper contains two Sections.

Both Sections are compulsory, subject to instructions provided against each.

All working must form part of your answer.

Assumptions, if any, must be clearly indicated.

Section A

Operations Management

1. (a) Choose the correct answer:

1x10=10

(i) Inventory cost per product in intermittent production is

- (A) Higher**
- (B) Lowest**
- (C) Medium**
- (D) Abnormal**

(ii) The act of assessing the future and make provisions for it is known as

- (A) Planning**
- (B) Forecasting**
- (C) Assessment**
- (D) Scheduling**

Suggested Answer_Syl16_June2019_Paper_9

- (iii) One of the important charts used in Programme control is
- (A) Material chart
 - (B) Gantt chart
 - (C) Route chart
 - (D) Inspection chart
- (iv) Cost reduction can be achieved through
- (A) Work sampling
 - (B) Value analysis
 - (C) Quality assurance
 - (D) Supply chain management
- (v) Linear Programming is a technique used for determining
- (A) Production Programme
 - (B) Plant Layout
 - (C) Product Mix
 - (D) Manufacturing Sequence
- (vi) $(\text{Total station time/cycle time} \times \text{Number of work stations}) \times 100$ is known as
- (A) Line efficiency
 - (B) Line smoothness
 - (C) Balance delay of line
 - (D) Station efficiency
- (vii) Arrangement of machines depending on sequence of operations happens in
- (A) Process Layout
 - (B) Product Layout
 - (C) Hybrid Layout
 - (D) Group Technology Layout
- (viii) Line of Best fit is another name given to
- (A) Method of Least Squares
 - (B) Moving Average Method
 - (C) Semi Average Method
 - (D) Trend Line Method
- (ix) In route sheet or operation layout, one has to show
- (A) A list of materials to be used.
 - (B) A list of machine tools to be used.

Suggested Answer_Syl16_June2019_Paper_9

- (C) Every work center and the operation to be done at that work center.
(D) The cost of product.
- (x) Computers are used in Production control in this area
(A) follow-up activity.
(B) to control labour.
(C) to disseminate information.
(D) Loading, Scheduling and Assignment works.

(b) Match Column A with Column B:

1x6=6

Column A	Column B
(A) Cost Benefit Analysis	(i) Crashing
(B) Network Analysis	(ii) Product Design
(C) Television Set	(iii) Plant Layout
(D) Use of Templates	(iv) Method Study
(E) Computer Aided Design	(v) Project Viability Checking
(F) Motion Economy	(vi) Assembly Line

(c) State whether the following statements are 'True' or 'False':

1x6=6

- (i) A work stoppage generally reduces the cost of production.
(ii) Depending on the need, the maintenance activity may be centralized or decentralized.
(iii) Piece wage system is a substitute for proper supervision.
(iv) Most suitable layout for continuous production is Matrix Layout.
(v) Addition of value to raw materials through application of technology is production.
(vi) Breakdown maintenance doesn't require use of standby machines.

Answer:

1. (a)

- (i) (A) Higher
(ii) (B) Forecasting
(iii) (B) Gantt Chart
(iv) (B) Value analysis
(v) (C) Product Mix

Suggested Answer_Syl16_June2019_Paper_9

- (vi) (A) Line efficiency
- (vii) (B) Product Layout
- (viii) (A) Method of Least Squares
- (ix) (C) Every work center and the operation to be done at that work center
- (x) (D) Loading, Scheduling and Assignment works.

1. (b)

- A - (v) Project viability checking
- B - (i) Crashing
- C - (vi) Assembly Line
- D - (iii) Plan Layout
- E - (ii) Product design
- F - (iv) Method Study

1. (c)

- (i) False
- (ii) True
- (iii) False
- (iv) False
- (v) True
- (vi) False

Answer any three questions from the following:

16x3=48

2. (a) List down various activities lying under Production and Operations Management function.

(b) The present layout is shown in the figure. The manager of the department is intending to interchange the departments C and F in the present layout. The handling frequencies between the departments is given. All the departments are of the same size and configuration. The material handling cost per unit length travel between departments is same. What will be the effect of interchange of departments C and F in the layout?

6+10=16

A	C	E
B	D	F

Suggested Answer_Syl16_June2019_Paper_9

From / To	A	B	c	D	E	F
A	—	0	80	150	60	10
B	—	-	90	0	90	110
C	-	-	-	40	0	5
D	--	-	-	-	160	20
E	—	-	—	—	—	60
F	-	-	-	-	-	-

Answer:

2. (a) Various activities lying under Production and Operations Management functions:

- (i) Location of facilities.
- (ii) Plant layouts and Material Handling.
- (iii) Product Design.
- (iv) Process Design.
- (v) Production Planning and Control.
- (vi) Quality Control.
- (vii) Materials Management.
- (viii) Maintenance Management.

(b) (i) The distance matrix of the present layout:

From / To	A	B	c	D	E	F
A		1	1	2	2	3
B			2	1	3	2
C				1	1	2
D					2	1
E						1
F						-

- (ii) Computation of total cost matrix (combining the inter-departmental material handling frequencies and distance matrix).

Suggested Answer_Syl16_June2019_Paper_9

From / To	A	B	c	D	E	F	Total
A		0	80	300	120	30	530
B			180	0	270	220	670
C				40	0	10	50
D					320	20	340
E						60	60
F							-
Total							1,650

If the departments are interchanged, the layout will be represented as shown below.

A	F	E
B	D	C

(iii) The distance matrix and the cost matrix of the new layout are shown:

From / To	A	B	c	D	E	F
A		1	3	2	2	1
B			2	1	3	2
C				1	1	2
D					2	1
E						1
F						-

(iv) Total cost matrix for the modified layout.

From / To	A	B	c	D	E	F	Total
A		0	240	300	120	10	670
B			180	0	270	220	670
C				40	0	10	50
D					320	20	340
E						60	60
F							-
Total							1,790

(v) Interpretation and conclusion: The interchange of departments C and F increases the total material handling cost. Thus, it is not a desirable modification.

Suggested Answer_Syl16_June2019_Paper_9

3. (a) Examine the following types of Process decisions:

(i) Job Shop Process

(ii) Project Process

(b) Describe the different types of Production Control.

(3x2)+10=16

Answer:

3. (a) Examination of the following types of Process decisions:

(i) **Job shop process:** It is used in job shops when a low volume of high-variety goods are needed. Processing is intermittent, each job requires somewhat different processing requirements. A job shop is characterised by high customisation (made to order), high flexibility of equipment and skilled labour and low volume. A tool and die shop is an example of job shop, where **job process** is carried out to produce one-of-a kind of tools. Firms having job shops often carry out job works for other firms. A job shop uses a flexible flow strategy, with resources organised around the process.

(ii) **Project process:** It is characterised by high degree of job customisation, the large scope for each project and need for substantial resources to complete the project. Examples of projects are building a shopping centre, a dam, a bridge, construction of a factory, hospital, developing a new product, publishing a new book etc. Projects tend to be complex, take a long time and consist of a large number of complex activities. Equipment flexibility and labour skills can range from low to high depending on the type of projects.

(b) Production control can be of six types:

(i) **Block control**

This type of control is most prominent in textiles and book and magazine printing. In these industries it is necessary to keep things separated and this is the fundamental reason why industries resort to block control.

(ii) **Flow control**

This type of control is commonly applied in industries like chemicals, petroleum, glass, and some areas of food manufacturing and processing. Once the production system is thoroughly designed, the production planning and control department controls the rate of flow of work into the system and checks it as it comes out of the system. But, under this method, routing and scheduling are done when the plant is laid out. That is to say, the production line which is established is well balanced and sequenced before production operations begin; this type of control is more prevalent in continuous production systems.

(iii) **Load control**

Load control is typically found wherever a particular bottleneck machine exists in the process of manufacturing.

Suggested Answer_Syl16_June2019_Paper_9

(iv) Order control

The most, common type of production control is called order control. This type of control is commonly employed in companies with intermittent production systems, the so-called job-lot shops. Under this method, orders come into the shop for different quantities for different products. Therefore, production planning and control must be based, on the individual orders.

(v) Special project control

Special production control is necessary in certain projects like the construction of bridges, office buildings, schools, colleges, universities, hospitals and any other construction industries. Under this type of control, instead of having sets of elaborate forms for tooling and scheduling, a man or a group of men keeps in close contact with the work.

(vi) Batch control

Batch control is another important, type of production control which is frequently found in the food processing industries.

4. (a) A Project consists of four major jobs, for which four contractors have submitted tenders. The tender amounts, in thousands of Rupees, are given below:

Contractor	Jobs			
	A	B	C	D
1	110	98	75	95
2	85	95	115	65
3	105	135	125	98
4	95	95	75	95

Find the assignment, which minimizes the total cost of the Project. Each contractor has to be assigned one job.

- (b) A Taxi operator is planning to open a computerised ticket counter in the center of the city, staffed by one ticket agent. It is estimated that requests for tickets and information will average 18 per hour, and requests will have a Poisson distribution.

Service time is assumed to be exponentially distributed. Previous experience with similar computerised operations suggests that mean service time should average about 2-5 minutes per request.

Determine each of the following:

- (i) System utilization
- (ii) Percentage of time the server (agent) will be idle.

Suggested Answer_Syl16_June2019_Paper_9

(iii) The expected number of customers waiting to be served

(iv) The average time customers will spend in the system.

8+(2x4)=16

Answer:

4. (a)

The given problem is a standard minimization problem. Subtracting the minimum element of each row from all its elements in turn, the given problem reduces to:

Contractor	Jobs			
	A	B	C	D
1	35	23	0	20
2	20	30	50	0
3	7	37	27	0
4	20	20	0	20

Now subtract the minimum element of each column from all of its elements in turn. Draw the minimum number of lines, horizontal or vertical, so as to cover all zeros:

Contractor	Jobs			
	A	B	C	D
1	28	3	0	20
2	13	10	50	0
3	0	17	27	0
4	13	0	0	20

Since the minimum number of lines to cover all zeroes is equal to 4 (= order of the matrix), this matrix will give optimal solution. The optimal assignment is made in the matrix below:

Contractor	Jobs			
	A	B	C	D
1	28	3	0	20
2	13	10	50	0
3	0	17	27	0
4	13	0	0	20

Suggested Answer_Syl16_June2019_Paper_9

The optimal assignment is:

Contractors	Job	Cost (in thousands of Rupees)
1	C	75
2	D	65
3	A	105
4	B	95

Hence, total minimum cost of Project will be ₹ 3,40,000.

Answer:

4. (b)

Arrival Rate = $\lambda = 18$ customers per hour

Service Rate = $\mu = 1 / \text{service time} = (1 \text{ customer} / 2.5 \text{ minutes}) \times 60 \text{ minutes per hour} = 24$ customers per hour

- (i) System Utilisation = $\rho = \lambda / \mu = 18 / (1 \times 24) = 0.75$
- (ii) Percentage idle time = $1 - \rho = 1 - 0.75 = 0.25$, or 25 percent
- (iii) Expected no. of customers waiting to be served = $L_q = \lambda^2 / \mu(\mu - \lambda)$
 $= (18)^2 / [24 \times (24 - 18)] = 2.25$ customers
- (iv) Average time customers will spend in the system =
 $W_s = (L_q / \lambda) + (1/\mu) = (2.25/18) + (1/24) = 0.1667 \text{ hrs} = 10 \text{ minutes.}$

5. (a) Table shows the time remaining (number of days until due date) and the work remaining (number of days still required to finish the work) for 5 jobs which were assigned the letters A to E as they arrived to the shop. Sequence these jobs by priority rules viz., (i) FCFS, (ii) EDD, (iii) LS, (iv) SPT and (v) LPT.

Job	Number of days until due date	Number of days of work remaining
A	10	8
B	4	5
C	8	7
D	11	4
E	5	9

Suggested Answer_Syl16_June2019_Paper_9

- (b) An electronic device components manufacturing company carries out the 'A' components testing for 2500 hours. A sample of 100 'A' components was put through this quality test during which two components failed. If the average usage of the electronic device by the customer is 5 hours/day and if 12,000 such devices were sold, then in one year how many 'A' components were expected to fail and what is the mean time between failures for these components? (2x5)+6=16

Answer:

5. (a)

Job	Number days until due date	Number of days of work remaining
A	10	8
B	4	5
C	8	7
D	11	4
E	5	9

- (i) FCFS (First come first served) : Since the jobs are assigned letters A to E as they arrived /to the shop, the sequence according to FCFS priority rule is A B C D E
- (ii) EDD (Early due date job first) rule : Taking into account the number of days until due date, the sequence of jobs as per EDD rules is

Job	B	E	C	A	D
No. of days until due date	4	5	8	10	11

- (iii) L.S. (Least slack) rule also called as Minimum slack rule.

Calculation of slack:

Slack = (Number of days until due date) - (Number of cays of work remaining)

Job	No. of days until/due date	No. of days of work remaining	Slack (Days)
A	10	8	10 - 8 = 2
B	4	5	4 - 5 = -1
C	8	7	8 - 7 = 1
D	11	4	11 - 4 = 7
E	5	9	5 - 9 = -4

Suggested Answer_Syl16_June2019_Paper_9

Sequence :

Job	E	B	C	A	D
Slack	-4	-1	1	2	7

Here the jobs are sequenced in ascending order of magnitude of their respective slacks.

- (iv) SPT (Shortest Processing Time job first) also referred as SOT (Shortest Operation time job First) rule or MINPRT (Minimum Processing time job first) rule. As per this rule, jobs are sequenced in ascending order of magnitude of their respective processing time.

Sequence :

Job	D	B	C	A	E
Processing Time (Days)	4	5	7	8	9

- (v) LPT (Longest Processing time job first) also referred to as LOT (Longest operation time job first) rule.

As per this rule jobs are sequenced in descending order of magnitude of their respective processing times.

Sequence:

Job	E	A	C	B	D
Processing Time (Days)	9	8	7	5	4

- (b)** The total test time = (100 components) × 2500 hours = 250,000 component-hours.

There are two components which have failed and hence the total time is to be adjusted for the number of hours lost due to the failures during the testing.

The lost hours are computed as = $(2 \times 2500) / 2 = 2500$ hours.

The assumption is made here is that each of the failed tubes have lasted an average of half of the test period.

Therefore, the test shows that there are two failures during $(2,50,000 - 2500) = 2,47,500$ component hours of testing.

During 365 days a year (four hours a day) for 12,000 components the number of expected failures = $(2 \times 12,000 \times 365 \times 5) / 2,47,500 = 176.97 = 177$ components approximately.

Mean time between failures = $2,47,500$ components hrs. of testing / 2 failures = $1,23,750$ components hours per failure = $1,23,750 / (5/365) = 67.8$ components year per failure.

Suggested Answer_Syl16_June2019_Paper_9

Section B

Strategic Management

6. Choose the correct answer:

1x6=6

- (i) Offensive strategy is a strategy
- (A) for small companies that consider offensive attacks in the market.
 - (B) for those companies that search for new inventory opportunities to create competitive advantage.
 - (C) for the market leader who should attack the competitor by introducing new products that make existing ones obsolete.
 - (D) for those companies who are strong in the market but not leaders and might capture a market share from the leader.
- (ii) The BCG growth matrix is based on the two dimensions:
- (A) Market Size and Market Share
 - (B) Market Size and Profit Margins
 - (C) Market Size and Competitive Intensity
 - (D) None of the above
- (iii) For an entrepreneur
- (A) Vision is before the mission.
 - (B) Mission is before the vision.
 - (C) Both are developed simultaneously.
 - (D) Vision or mission are un-important issues.
- (iv) Benchmarking is
- (A) the analytical tool to identify high cost activities based on the 'Pareto Analysis'.
 - (A) the search for industries best practices that lead to superior performance.
 - (B) the simulation of cost reduction schemes that help to build commitment and improvement of actions.
 - (B) the process of marketing and redesigning the way a typical company works.
- (v) Strategic analysis is concerned with stating the position of the organisation in terms of
- (A) Mission, choice of market segments, product selection, financial targets and external appraisal.
 - (B) Mission, goals, corporate appraisal, position audit and gap analysis.

Suggested Answer_Syl16_June2019_Paper_9

(C) Mission, goals, identification of key competitors, SWOT and environmental appraisal.

(D) Mission, targeted ROI, manpower planning and position audit.

(vi) Intensity of competition is in low return industries.

(A) low

(B) non-existent

(C) high

(D) not important

Answer:

6. Choose the correct answer:

(i) - (D) For those companies who are strong in the market but not leaders and might capture a market share from the leader.

(ii) - (D) None of the above

(iii) - (A) Vision is before the mission

(iv) - (B) The search for industries best practices that lead to superior performance.

(v) - (B) Mission, goals, corporate appraisal, position audit and gap analysis.

(vi) - (C) high.

Answer any two questions from the following:

12x2=24

7. (a) What is a Company Mission? List the guidelines for formulation of 'mission' statement.

(b) Briefly describe the limitations of the BCG model.

8+4=12

Answer:

7. (a) The mission is a broadly framed but enduring statement of company intent. It embodies the business philosophy of strategic decision makers; implies the image the company seeks to project; reflects the firm's self-concept; indicates the principal product or service areas and primary customer needs the company will attempt to satisfy. In short, the mission describes the product, market, and technological areas of emphasis for the business. And it does so in a way that reflects the values and priorities of strategic decision makers.

Guidelines for formulation of "mission" statement

- It should be based on existing business capabilities "Who we are and what we do?"
- It should follow the long term strategy principles

Suggested Answer_Syl16_June2019_Paper_9

- Profit making should not be the only mission of organisation
- It should be logical extension of business existing capabilities
- It should clearly and precisely present the future orientation of business
- It should include achievable missions
- It should be stated in a form that it becomes the motivating force to every member of organisation
- Mission statement once formed shall be communicated to every member of organisations
- It should include interest of customers and society

(b) Limitations of the BCG Model:

- (i) How do you define your market? Segmentation strategies can provide a niche. A niche is inevitably a low or restricted share of the market, yet it is the heart of a focus strategy.

Firms can profit servicing small low-growth niches.
- (ii) Market growth and market share are assumed to be reliable pointers for cash flow. This is often not true. High market share does not necessarily mean high profits, especially if a firm has high costs, or has bought market share by low pricing.
- (iii) Relative market share amongst competitors is not necessarily an indication of their competitive strengths at any particular time. After all, market leaders are vulnerable.
- (iv) The BCG model might become a self-fulfilling prophecy: Dogs which could be made profitable might simply be left to the rather than be resuscitated.
- (v) It does not suggest any response to declining markets other than withdrawal: many firms can make money in 'sunset industries'.
- (vi) It ignores the extent to which a firm which serves a number of markets can exploit production synergies.
- (vii) It ignores the threat of substitute products.

Suggested Answer_Syl16_June2019_Paper_9

8. (a) State the basic distinctions between Strategic Management and Strategic Planning.

(b) State the various advantages and disadvantages of SBU structure.

6+6=12

Answer:

8. (a) The basic differences between Strategic management and Strategic planning are as follows:

Strategic Management	Strategic Planning
1. It is focused on producing strategic results; new markets; new products; new technologies etc.	1. It is focused on making optimal strategic decisions.
2. It is management by results.	2. It is management by plans.
3. It is an organizational action process.	3. It is an analytical process.
4. It broadens focus to include psychological, sociological and political variables.	4. It is focused on business, economic and technological variables.
5. It is about choosing things to do and also about the people who will do them.	5. It is about choosing things to do.

(b) Various advantages and disadvantages of SBU structure:

Advantages:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses.

Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc., because each unit may work in it's own way to handle situations
- (ii) High cost approach.

9. Write short notes on any three of the following:

4x3=12

(a) Features of Human Resources Strategy

(b) McKinsey's 7-S Framework

(c) Principle of BPR

Suggested Answer_Syl16_June2019_Paper_9

(d) Stages involved in Strategic Planning

Answer:

9. (a) Features of Human Resources Strategy

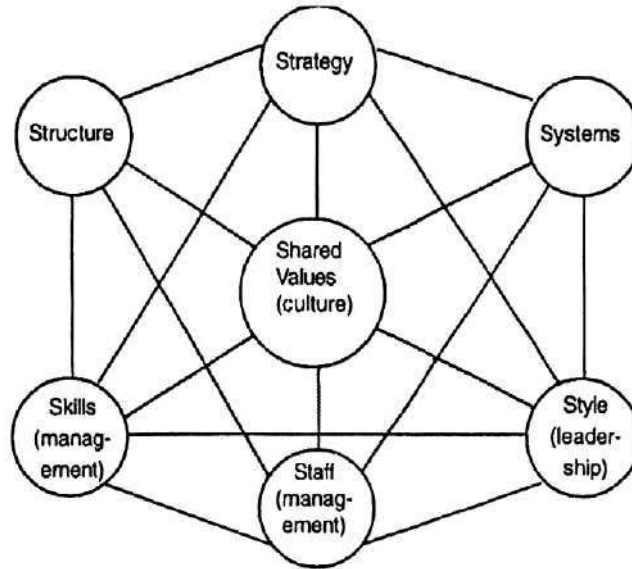
The more important features which human resource strategy may bring to bear on the organisation are as follows:

- (i) **Orientation of the members.** HRM strategy has to ensure that individuals employed in the organisation have necessary orientation so that the mission and objectives of the organisation are internalised by the members and they have a sense of identification with the values and culture of the organisation.
- (ii) **Facilitation of organisational changes as and when called for.** The practices and procedures are required to be in conformity with the changing internal and external conditions. This is a vital role of HR strategy management.
- (iii) **Coping with diversity of workforce.** Modern organisations with highly complex nature of jobs and processes generally have a highly diversified workforce differentiated in terms of age, sex, religion, professional and technical skills and educational background. To maintain a balanced workforce with harmonious relations and providing equitable incentives and rewards are aspects of HRM functions which can sustain an effective workforce. This is a responsibility of HR strategy managers.
- (iv) **Maintaining competent and committed workforce in a competitive environment.** The intensity of market competition for enterprises has been growing fast with globalisation and liberalisation of economic policies. There are competitive strategies of low cost production and differentiation of products which may enable companies to secure a competitive edge. HRM has the responsibility of managing workforce so as to make it competent in ability as well as committed to organisational success.
- (v) **Development of core competency.** An enterprise succeeds in achieving its strategic objectives mainly on the basis of capabilities in the technical, marketing or human skills in areas of crucial importance. These are known as core competencies of the organisation which are unique internal strengths not possessed by competitors. HRM is required to undertake building up of core competency by the organisation as to secure dynamic leadership in the product market.
- (vi) **Empowered workforce as an active resource.** HR strategy is best managed when the members of an organisation are individually in control of their work and are able to realise their potentials with empowerment to take relevant decisions on their own. This is likely to secure enduring performance based achievements.
- (vii) **Appropriate work culture and ethical norms.** No organisation can get the best contribution from its members unless individuals develop a liking for challenging jobs and follow the ethical norms of the organisation functionally. This may require redesigning of jobs and work processes as well as developing trust and confidence among individuals and work groups, as also emphasizing intrinsic

Suggested Answer_Syl16_June2019_Paper_9

motivation for improving performance. HRM encompasses creation of an appropriate work culture on the above lines.

(b) McKinsey's 7-S Framework



Strategy is dependent on many variables - Internal as well as external. All factors are interrelated.

- *Strategy*: A set of decisions and actions aimed at gaining a sustainable competitive advantage.
- *Structure*: The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- *Systems*: The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- *Style*: How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- *Staff*: How companies develop employees and shape basic values.
- *Shared Values*: Commonly held beliefs, mindsets and assumptions that shape how an organisation behaves— its corporate culture.
- *Skills*: An organisation's dominant capabilities and competencies.

(c) Principle of BPR

Suggested Answer_Syl16_June2019_Paper_9

BPR is achieving dramatic performance improvements through radical change in organizational processes, re-architecting) of business and management processes. It involves the redrawing of organizational boundaries, the reconsideration of jobs, tasks, and skills. This occurs with the creation and the use of models. Whether those be physical models, mathematical, computer or structural models, engineers build and analyze models to predict the performance of designs or to understand the behavior of devices. More specifically, BPR is defined as the use of scientific methods, models and tools to bring about the radical restructuring of an enterprise that result in significant improvements in performance.

Re-design, re-tooling and re-orchestrating form the key components of BPR that are essential for an organization to focus on the outcome that it needs to achieve. The outcome pursued should be an ambitious outcome (as for instance, are a 24 hour delivery to any customer anywhere in the world, approval of mortgage loans within 60 minutes of application, or ability to have on-line access to a patient's medical records no matter where they are in any major city in the world). These types of visionary goals require rethinking the way most organizations do business, careful redesign. They will additionally need very sophisticated supporting information systems and a transformation from a traditional organizational structure to a network type organization.

(d) Stages involved in Strategic Planning:

Stage I: Strategic Option Generations

At this stage, a variety of alternatives are considered, relating to the firm's product and markets, its competitors and so forth. Examples of strategies might be:

- (i) increase market share
- (ii) penetration into international market
- (iii) concentration on core competencies
- (iv) acquisition or expansion etc.

Stage II - Strategic Options Evaluation

Each option is then examined on its merits.

- (i) does it increase existing strengths?
- (ii) does it alleviate existing weaknesses?
- (iii) is it suitable for the firm's existing position?
- (iv) is it acceptable to stakeholders?

Stage III - Strategic Selection

It involves choosing between the alternative strategies. This process is strongly influenced by the values of the managers in selecting the strategies.

INTERMEDIATE EXAMINATION
GROUP - II
(SYLLABUS 2016)
SUGGESTED ANSWERS TO QUESTIONS
DECEMBER - 2019

Paper - 9 : OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Time Allowed : 3 Hours

Full Marks : 100

The figures in the margin on the right side indicate full marks.

This paper contains two Sections.

Both Sections are compulsory, subject to instructions provided against each.

All workings must form part of your answer.

Assumptions, if any, must be clearly indicated.

Section – A

Operations Management

1. (a) Choose the correct answer: 1×10=10
- (i) Conversion of inputs into outputs is known as
 - (A) Application of technology
 - (B) Manufacturing products
 - (C) Product
 - (D) Operation management

 - (ii) Which of the following is NOT the Plant Layout Principle?
 - (A) Principle of sequence
 - (B) Principle of usage
 - (C) Principle of maximum travel
 - (D) Principle of minimum investment

 - (iii) Number of product varieties that can be manufactured in Mass production is
 - (A) one only.
 - (B) few varieties in large volume.
 - (C) two only.
 - (D) large varieties in small volumes.

Suggested Answers_Syl16_December 2019_Paper 9

- (iv) Scheduling shows.
- (A) which resource should do which job and when.
 - (B) total cost of production.
 - (C) total material cost.
 - (D) the flow line of materials.
- (v) Which one of the following standards is associated with the "Quality Management and Quality System Elements-Guidelines"?
- (A) ISO 9001
 - (B) ISO 9002
 - (C) ISO 9003
 - (D) ISO 9004
- (vi) In a network diagram, the activity that must be completed prior to the start of an activity is called as
- (A) Successor activity
 - (B) Predecessor activity
 - (C) Concurrent activity
 - (D) Dummy activity
- (vii) Identify which one of the following is NOT the objective of the maintenance:
- (A) To keep all production facilities and allied facilities in an optimum working condition.
 - (B) To ensure specified accuracy to products and time schedule of delivery to customers.
 - (C) To keep the down time of the machine at the maximum.
 - (D) To keep the production cycle within the stipulated range.
- (viii) One of the important charts used in Programme control is
- (A) Gantt chart
 - (B) Material chart
 - (C) Distribution chart
 - (D) Maintenance chart
- (ix) The act of going round the production shop to note down the progress of work and feedback the information is known as
- (A) Dispatching
 - (B) Routing
 - (C) Follow up
 - (D) Trip card

Suggested Answers_Syl16_December 2019_Paper 9

- (x) With reference to the characteristics of a good product design, which one of the following is referred to "the ease of manufacture with minimum cost"?
- (A) Reliability
 - (B) Productibility
 - (C) Specification
 - (D) Simplification

(b) Match Column A with Column B:

1x6=6

Column A	Column B
(A) Use of minimal amounts of resources to produce a high volume of high quality goods with some variety	(i) KAIZEN
(B) Arranging and grouping of machines which are meant to produce goods	(ii) Network
(C) The extent to which a firm will produce goods or provide services in-house or go for outsourcing	(iii) Monte Carlo Method
(D) A given problem is solved by simulating the original data with random number generators	(iv) Lean Production
(E) The principle of continuous improvement	(v) Make or Buy Decisions
(F) A graphical representation of all the activities and events arranged in a logical and sequential order	(vi) Layout

(c) State whether the following statements are 'True' or 'False':

1×6=6

- (i) The full form of the word MRP in the term "MRP II" is Material Requirements Planning.
- (ii) Strikes and lock-out are controllable factors affecting Capacity Planning.
- (iii) Queue Discipline refers to the order in which customers are processed.
- (iv) ISO Standards are reviewed every four years and revised if needed.
- (v) The CPM has the advantage of decreasing completion times by probably spending more money.
- (vi) The rotatable spares are spare parts which are required regularly and in substantial number.

Answer:

1. (a)

- (i) (D) Operation management
- (ii) (C) Principle of maximum travel
- (iii) (B) few varieties in large volume.
- (iv) (A) which resource should do which job and when.
- (v) (D) ISO 9004
- (vi) (B) Predecessor activity
- (vii) (C) To keep the down time of the machine at the maximum.

Suggested Answers_Syl16_December 2019_Paper 9

- (viii) (A) Gantt chart
- (ix) (C) Follow up
- (x) (B) Productibility

1. (b)

- (A) (iv) Lean Production
- (B) (vi) Layout
- (C) (v) Make or Buy Decisions
- (D) (iii) Monte Carlo Method
- (E) (i) KAIZEN
- (F) (ii) Network

1. (c)

- (i) False
- (ii) False
- (iii) True
- (iv) False
- (v) True
- (vi) False

Answer any three questions from the following:

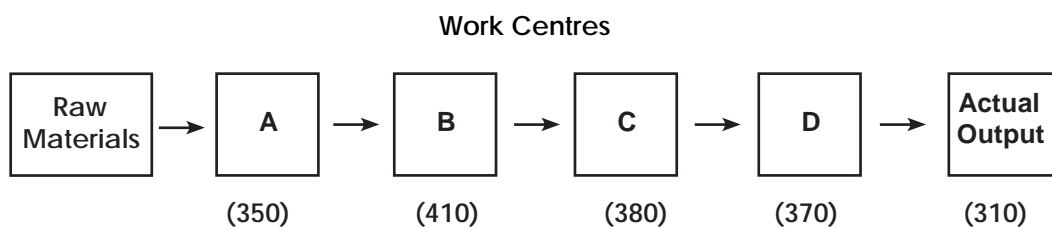
16x3=48

2. (a) Enumerate the characteristics of a modern operations function.

7

(b) A firm has four work centres, A, B, C and D, in series with individual capacities in units per day shown in the figure below:

3x3=9



- (i) Identify the bottle neck centre.
- (ii) Determine the system capacity.
- (iii) Determine the system efficiency.

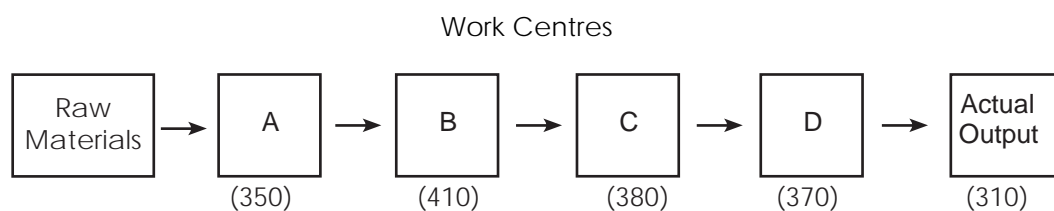
Suggested Answers_Syl16_December 2019_Paper 9

Answer:

2. (a) Today's production system is characterised by the following features:

1. **Manufacturing as Competitive Advantage:** Unlike the past, today plants have excess capacities, competition is mounting and firms look and competitive edge and firms intend to exploit the potential. Total Quality Management (TQM), Time-Based Competition, Business Process Re-engineering (BPRE), Just-in-Time (JIT), Focused Factory, Flexible Manufacturing Systems (FMS), Computer Integrated Manufacturing (CIM), and The Virtual Corporation are but only some techniques which the companies are employing to gain competitive advantage.
2. **Services Orientation:** Service sector is gaining greater relevance these days. The production system, therefore, needs to be organised keeping in mind the peculiar requirements of the service component. The entire manufacturing needs to be geared to serve (i) intangible and perishable nature of the services, (ii) constant interaction with clients or customers, (iii) small volumes of production to serve local markets, and (iv) need to locate facilities to serve local markets. There is increased presence of professionals on the production, instead of technicians and engineers.
3. **Disappearance of Smokestacks:** Protective labour legislation, environmental movement and gradual emergence of knowledge based organisations have brought total transformation in the production system. Today's factories are aesthetically designed and built, environment friendly - in fact, they are homes away from homes. Going to factory every day is no more excruciating experience, it is like holidaying at a scenic spot.
4. **Small has Become Beautiful:** E. F. Schumacher, in his famous book Small is Beautiful, opposed giant organisations and increased specialisation. He advocated, instead, intermediate technology based on smaller working units, community ownership, and regional workplaces utilising local labour and resources. Businessmen, all over the world, did not believe in Schumacher's philosophy. Inspired by economies of scale, industrialists went in for huge organisations and mass production systems.

(b) A firm has four work centres.



- (i) the bottle neck centre is the work centre having the minimum capacity. Hence, work centre 'A' is the bottleneck centre.
- (ii) System capacity is the maximum units that are possible to produce in the system as a whole. Hence, system capacity is the capacity of the bottle neck centre i.e., 350 units.
- (iii) System efficiency = Actual output/ System capacity = $(310/350) \times 100$ (i.e. maximum possible output) = 88.57%

Suggested Answers_Syl16_December 2019_Paper 9

3. (a) What do you understand by Process Design and Selection?

3+5=8

(b) The following data is available for a manufacturing unit:

No. of operators	16
Daily working hours	8
No. of days per month	25
Standard production per month	400 units
Standard labour hours per units	8

The following information was obtained for June 2019:

Man days lost due to absenteeism	36
Units produced	300
Idle time	260 man hours

Find the following:

2×4=8

- (i) Per cent absenteeism
- (ii) Efficiency of utilization of labour
- (iii) Productive efficiency of labour
- (iv) Overall productivity of labour in terms of units produced per man per month.

Answer:

3. (a)

Process Design is concerned with the overall sequences of operations required to achieve the product specifications. It specifies the type of work stations to be used, the machines and equipment necessary to carry out the operations. The sequence of operations is determined by (i) the nature of the product, (ii) the materials used, (iii) the quantities to be produced, and (iv) the existing physical layout of the plant.

The process design is concerned with the following:

- (i) Characteristics of the product or service offered to the customers.
- (ii) Expected volume of output.
- (iii) Kinds of equipments and machines available in the firm.
- (iv) Whether equipments and machines should be of special purpose or general purpose.
- (v) Cost of equipments and machines needed.
- (vi) Kind of labour skills available, amount of labour available and their wage rates.
- (vii) Expenditure to be incurred for manufacturing processes.
- (viii) Whether the process should be capital-intensive or labour-intensive.
- (ix) Make or buy decision.
- (x) Method of handling materials economically.

Suggested Answers_Syl16_December 2019_Paper 9

3. (b)

(i) Percent absenteeism = [(No. of Hrs. lost in absenteeism in a month)/(Total working hours per month)] x 100 = (36 x 8) / (16 x 25 x 8) = 0.09 x 100 = 9%

(ii) Efficiency of utilization of labour = [(Standard labour hour to produce 300 units) / (Total labour hour)] x 100 = [(300 x 8) / (16 x 25 x 8)] x 100 = 75%

(iii) Determination of Productive efficiency of labour:-

Standard time required to produce 300 units = 300 x 8 = 2400 labour hours. In June 2019, man hours lost = 36 x 8 = 288

In June 2019, Idle time (in hours) = 260 Total loss of time = 548 hrs.

Productive hours available in June 2019 = 16 x 25 x 8 = 3,200 hrs. Less, Total loss of time: 548 hrs.

Actual Labour hours = 3200 - 548 = 2,652 hrs

Productive efficiency of labour = [(Standard Labour hours) / (Actual labour hours)] x 100

= (2400/2652) x 100

= 90.497 %

= 90.50 % (approx.)

(iv) Overall productivity of labour in terms of units produced per man per month: 16 men produce 400 units, Standard labour productivity = 400/16 = 25 units In June 2019, overall productivity = 300/16 = 18.75 units

i.e. productivity falls by [(25-18.75)/25] x 100 = 25%

4. (a) Find the Initial Feasible Solution by North-West Corner method.

8

	W1	W2	W3	W4	Supplies
F1	10	12	14	18	210
F2	25	19	21	30	330
F3	18	16	11	23	430
F4	28	34	17	15	290
Demand	270	390	320	280	

W_j = Warehouse

F_i = Factory

Cell entries are unit costs in ₹

(b) A retailer is dealing with FMCG items. The table, as given below, presents the past data of demand per week in hundred kgs with frequency.

Demand/Week	0	5	10	15	20	25
Frequency	3	7	5	11	18	6

Suggested Answers_Syl16_December 2019_Paper 9

Using the following sequence of the random numbers, generate the demand for the next 10 weeks. Also find out the average demand per week. 6+2=8

Random Nos.	27	43	50	11	16	36
	58	64	51	38	18	47

Answer:

4. (a) The Initial Feasible Solution

	W1	W2	W3	W4	Supplies		
F1	10	210	12	14	18	210	
F2	25	60	19	21	30	270	330
F3	18	16	120	11	23	310	430
F4	28	34	17	10	15	280	290
Demand	270	390	320	280			

W_j = Warehouse

F_i = Factory

Cell entries are unit costs in ₹

(b)

Random No. Range Table for Demand				
Demand per week	Frequency (f)	Probability (p=f/∑f)	Cumulative Probability	Range of Random numbers
0	3	0.06	0.06	0-5
5	7	0.14	0.20	6-19
10	5	0.10	0.30	20-29
15	11	0.22	0.52	30-51
20	18	0.36	0.88	52-87
25	6	0.12	1.00	88-99
	∑f=50	1.00		

Suggested Answers_Syl16_December 2019_Paper 9

Simulated Values for next 10 weeks		
Weeks	Random nos.	Demand
1	27	10
2	43	15
3	50	15
4	11	05
5	16	05
6	36	15
7	58	20
8	64	20
9	51	15
10	38	15
Total:	-	135

Average weekly demand is = $135/10=13.5$

5. (a) Draw the network for the following activities and find the Critical Path and Total duration of the project. 6

Activity	Predecessor	Duration (months)
A	-	2
B	-	3
C	-	5
D	A	4
E	B	1
F	B	5
G	C	8
H	D	1
I	E	2
J	F, G	4
K	H, I	3
L	K, J	2

Suggested Answers_Syl16_December 2019_Paper 9

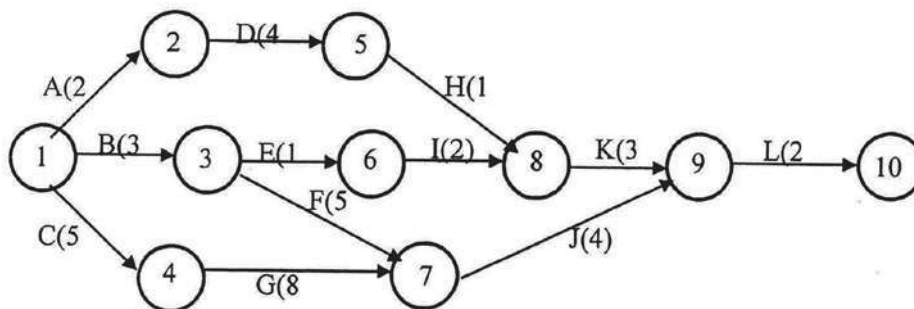
- (b) RST Company has kept records of breakdown of its machines for 300 days work year as shown below:

No. of Breakdown	Frequency in days
0	50
1	140
2	60
3	30
4	20
Total	300

The company estimates that each breakdown costs ₹600 and is considering adopting a preventive maintenance program which would cost ₹ 250 per day and limit the number of breakdown to an average of one per day. What is the expected annual savings from preventive maintenance program? 10

Answer:

5. (a)



Calculation of Critical path:

- (i) A-D-H-K-L = 2+4+1+3+2 = 12
- (ii) B-E-I-K-L = 3+1+2+3+2 = 11
- (iii) B-F-J-L = 3+5+4+2 = 14
- (iv) C-G-J-L = 5+8+4+2 = 19 = Critical Path (Project duration)

(b) Step-1:

No. of Breakdowns (X)	Frequency of breakdowns in days; i.e. f(x)	Probability distribution of break downs; i.e. p(x)	Expected value of breakdown X p(x)
0	50	50/300 = 0.167	Nil
1	140	140/300 = 0.466	0.466
2	60	60/300 = 0.200	0.400

Suggested Answers_Syl16_December 2019_Paper 9

3	30	$30/300 = 0.100$	0.300
4	20	$20/300 = 0.067$	0.268
Total:	300	1.000	1.434

Step - 2 :

Total no. of breakdowns per day = 1.434

Cost of breakdown per day = $1.434 \times 600 = 860.4/-$

Cost of preventive maintenance program per day = ₹ 250 + 600 = 850/- Expected annual savings from the preventive maintenance program = $(860.4 - 850) \times 300 = 10.4 \times 300 = ₹ 3,120$

Section - B

Strategic Management

6. Choose the correct answer:

1x6=6

- (i) Which of the following statements can be closely related with the Mission?
- (A) It includes definition of products & services the organization provides.
 - (B) It specifies management policies towards customers and societies.
 - (C) It provides a roadmap to company's future.
 - (D) It indicates the kind that company management is trying to create for future.
- (ii) Portfolio Analysis is a term used
- (A) to identify what strategy is needed to maintain a strong position or improve a weak one.
 - (B) to find out a best alternative out of various alternatives available.
 - (C) to analyse products and business by market share and market growth.
 - (D) to make managers more adaptable to unforeseen changes.
- (iii) Which one of the following is NOT a role of Marketing?
- (A) It helps in sustaining and improving the existing levels of employment.
 - (B) It helps in the economic growth of a country.
 - (C) It helps in the discovery of entrepreneurial talent.
 - (D) It diminishes potential aggregate demand and thus reduces the size of the market
- (iv) Which one of the following is NOT the benefit of a Vision?
- (A) It helps in the creation of common identity and a shared sense of purpose.
 - (B) It fosters risk taking and experimentation.
 - (C) It fosters short-term thinking.
 - (D) It represents integrity.

Suggested Answers_Syl16_December 2019_Paper 9

- (v) The competitive position of a company's SBU or product line can NOT be classified as one of the following:
- (A) Dominant
 - (B) Strong
 - (C) Favourable
 - (D) Volatile
- (vi) The best test of a successful Strategy Implementation is
- (A) whether the strategies and procedures are observed in the strategy supportive fashion.
 - (B) whether the structure is well-matched to strategy.
 - (C) whether actual organizational performance matches or exceeds the targets spelt out in the strategic plan.
 - (D) whether it is made after the strategy is formulated, so that it is supportive to the strategy.

Answer:

- (i) (A) It includes definition of products & services the organization provides.
- (ii) (A) to identify what strategy is needed to maintain a strong position or improve a weak one.
- (iii) (D) It diminishes potential aggregate demand and thus reduces the size of the market.
- (iv) (C) It fosters short-term thinking.
- (v) (D) Volatile
- (vi) (C) whether actual organizational performance matches or exceeds the targets spelt out in the strategic plan.

Answer any two questions from the following:

12x2=24

7. (a) Define the term 'strategy' and list the characteristics of a strategic decision. 2+6=8
- (b) What do you understand by Product Development Strategy? 4

Answer:

7. (a)

Strategy may be defined as the direction and scope of a organisation over the long term, which achieves advantage for the organisation through the configuration of resources within a changing environment and to fulfill stakeholder expectations.

The definition of strategy encompasses a comprehensive master approach that states how the corporation will achieve its mission and objectives. It maximizes competitive advantage and minimizes competitive disadvantage.

The characteristics of a strategic decision/strategy:

- (i) Strategy is likely to be concerned with long-term direction of an organisation.

Suggested Answers_Syl16_December 2019_Paper 9

- (ii) Strategic decisions are normally about trying to achieve some advantage for the organisation over competition.
- (iii) Strategy is likely to be concerned with the scope of the organisation's activities.
- (iv) Strategy can be seen as matching the resources and activities to the environment in which it operates.
- (v) Strategy can be seen as stretching an organisation's resources and competences to create new opportunities or to capitalise on them.
- (vi) Strategies may require major resource changes for an organisation.
- (vii) Strategic decisions are likely to affect operational decisions.
- (viii) The strategy of an organisation is affected not only by environmental factors and resource availability but also by the values and expectations of those who have power in and around the organisation.

7. (b)

Product Development Strategy involves extending the product range available to the firm's existing markets. These products may be obtained by:

- (i) investment in the research and development of additional products;
- (ii) acquisition of rights to produce someone else's product;
- (iii) buying-in the product and 'badging' it;
- (iv) joint development with owners of another product who need access to the firm's distribution channels or brands.

The critical factor to the success of this strategy is the profitability of the customer group for which the products are being developed. Also the firm's present competitive advantages in serving the market must confer on to the new good. These can include:

- (i) customer information that allows accurate targeting;
- (ii) established distribution channels;
- (iii) a brand which can be credibly applied to the new product.

8. (a) What do you mean by Contingency Plans? Illustrate some contingency plans commonly established by firms. 1+5=6

(b) What are the three most important characteristics of SBU? List down major reasons of using SBU approach. 3+3=6

Answer:

8. (a) Contingency Plans:

Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected.

Some contingency plans commonly established by firms:

1. If a major competitor withdraws from particular markets as intelligence reports indicate, what actions should our firm take?
2. If our sales objectives are not reached, what actions should our firm take to avoid profit losses?
3. If demand for our new product exceeds plans, what actions should our firm take to meet the higher demand?

Suggested Answers_Syl16_December 2019_Paper 9

4. If certain disasters occur—such as loss of computer capabilities; a hostile takeover attempt; loss of patent protection; or destruction of manufacturing facilities because of earthquakes, tornadoes, or hurricanes — what actions should our firm take?
5. If a new technological advancement makes our new product obsolete sooner than expected, what actions should our firm take?

(b) Three most important characteristics of SBU:

- It is a single business or a collection of related businesses which offer scope for independent planning and which might feasibly stand-alone from the rest of the organisation.
- Has its own set of competitors.
- Has a manager who has responsibility for strategic planning and profit performance, and who has control of profit-influencing factors.

Major reasons of using SBU approach :

- A scientific method of grouping the businesses of a multi-business corporation which helps the firm in strategic planning.
- An improvement over the geographical grouping of businesses and strategic planning based on locational units.
- An SBU is a grouping of related businesses that can be taken up for strategic planning distinct from the rest of the businesses.
- Grouping the businesses on SBU lines helps the firm in strategic planning by removing the ambiguity and confusion generally seen in grouping businesses,
- Each SBU is a separate business from the strategic planning standpoint. In the basic factors, viz., mission, objectives, competition and strategy-one SBU will be distinct from another.
- Each SBU will have its own distinct set of competitors and its own distinct strategy.
- Each SBU will have a CEO. He will be responsible for strategic planning for the SBU and its profit performance; he will also have control over most of the factors affecting the profit of the SBU.

9. Write short notes on any three of the following: 4x3=12

- (a) Name the steps involved in the formulation of production strategy.**
- (b) Write a brief note on 'Behaviour Control' aspect of Strategic Control System.**
- (c) What are the various types of firms/organizations where BPR can be applied?**
- (d) What are the various approaches in Strategic Planning?**

Answer:

9. (a) Steps involved in the formulation of production strategy

- (i) Study the overall corporate plan and define the objectives.
- (ii) Analyse the present production operations and the present and future environment.
- (iii) Review sales - forecast and marketing.
- (iv) Make strategic decisions for production.

(b) 'Behaviour Control' aspect of Strategic Control System

The establishment of a comprehensive system of rules and procedures to direct the actions or behaviour of divisions, functions and individuals is called behaviour control. The main purpose of having behaviour control is not to specify goals but to standardise the way of reaching them. It is felt that if rules are standardised then outcomes are predictable. It is of utmost importance that the management reviews behaviour controls over time. The rules that have been established tend to increase over time leading to inflexibility to react to the changing environment thereby adversely affecting the organisation's competitive advantage.

(c) Types of firms/organizations where BPR can be applied

BPR could be implemented to all firms (manufacturing firms, retailers, services, etc.) and public organizations that satisfy the following criteria:

- Minimum Number of employees: 20 (at least 4 in management positions).
- Strong management commitment to new ways of working and innovation.
- Well formed IT infrastructure.

Business Process Reengineering could be applied to companies that confront problems such as the following:

- High operational costs
- Low quality offered to customers
- High level of "bottleneck" processes at peak seasons
- Poor performance of middle level managers
- Inappropriate distribution of resources and jobs in order to achieve performance, etc.

(d) Approaches in Strategic Planning

There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

SUGGESTED ANSWERS TO QUESTIONS

INTERMEDIATE EXAMINATION

GROUP - II

(SYLLABUS 2016)

DECEMBER - 2021

Paper - 9 : OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Time Allowed : 3 Hours

Full Marks : 100

Section : A MCQ

20X1 = 20 Marks

Q.1 The best way of improving the productivity of capital is:

- Ans**
1. Purchase automatic machines
 2. Effective Labour control
 3. Productivity of capital is to be increased through effective materials management
 4. To use good financial management.

Q.2 Routing and Scheduling becomes relatively complicated in:

- Ans**
1. Flow production
 2. Batch production
 3. Mass production
 4. Job production

Q.3 MRP stands for:

- Ans**
1. Material Recording Procedure
 2. Material Requirement Planning
 3. Material Requisition Procedure,
 4. Material Reordering Planning

Q.4 One of the important charts used in Programme control is:

- Ans**
1. Material chart
 2. Route chart
 3. Gantt chart
 4. Inspection chart

Q.5 Number of product varieties that can be manufactured in Mass production is

- Ans**
1. Few varieties in large volumes
 2. One only
 3. Large varieties in small volumes.
 4. Two only

Q.6 In Production by disintegration the material undergoes:

- Ans**
1. Change in economic value only
 2. Change in physical and chemical characteristics
 3. Change in technology only
 4. None of these

Q.7 JIT stands for:

- Ans
1. Just in time order the material
 2. Just in time purchase
 3. Just in time use of materials
 - ✓ 4. Just in time production

Q.8 Production control concerned with:

- Ans
1. Good materials management
 2. Good product design.
 3. Strict control on labours
 - ✓ 4. Passive assessment of plant performance

Q.9 The time horizon selected for forecasting depends on:

- Ans
1. Time required for production cycle.
 2. The salability of the product
 3. The selling capacity of Salesman
 - ✓ 4. Purpose for which forecast is made

Q.10 The starting point of Production cycle is

- Ans
- ✓ 1. Market research
 2. Routing
 3. Product design
 4. ProductionPlanning,

Q.11 To decide work load for men and machines:

- Ans
1. Medium range forecasting is used
 2. A combination of long range and medium range forecasting is used
 - ✓ 3. Short term forecasting is used
 4. Long range forecasting is used

Q.12 Most suitable layout for Job production is:

- Ans
- ✓ 1. Process layout
 2. Line layout
 3. Matrix layout
 4. Product layout

Q.13 In general number of product varieties that can be manufactured in Flow production is:

- Ans
1. Five only
 2. Ten to twenty varieties
 - ✓ 3. One only
 4. Large varieties

Q.14 Most important benefit to the consumer from efficient production system is:

- Ans
1. He can get the product on credit
 2. He can save money
 3. He will have product of his choice easily available
 - ✓ 4. He gets increased use value in the product.

Q.15 For a marketing manager, the sales forecast is:

- Ans
1. To plan the sales methods.
 2. Arranging the sales men to different segments of the market
 - ✓ 3. Estimate of the amount of unit sales for a specified future period
 4. To distribute the goods through transport to satisfy the market demand

Q.16 Production planning deals with:

- Ans
1. What should be the demand for the product in future?
 - ✓ 2. What production facilities are required and how these facilities should be laid out in space available?
 3. What to produce and when to produce and where to sell?
 4. What is the life of the product?

Q.17 Conversion of inputs into outputs is known as:

- Ans ✓
1. Operations management
 2. Application of technology
 3. Product
 4. Manufacturing products

Q.18 The first stage in production planning is:

- Ans
1. Process Planning
 2. Layout planning
 3. Operation Planning
 - ✓ 4. Factory Planning

Q.19 For production planning:

- Ans ✓
1. Short term forecasting is useful
 2. Medium term forecasting is useful
 3. Forecasting is not useful
 4. Long term forecasting is useful

Q.20 Scheduling deals with:

- Ans
1. Number of machine tools used to do a job
 - ✓ 2. Fixing up starting and finishing times of each operation in doing a job
 3. Number of jobs to be done on a machine
 4. Different materials used in the product

Q.1 "The PEST Analysis looks at the external factors and is primarily used for marketresearch". Is this statement correct?

Answer: Yes.

Q.2 What do you mean by Bar chart?

Answer: This is also called Gantt Chart. This is graphical representation of a series of activities drawn to a time scale.

Q.3 The systematic method of probing the future is called.....

Answer: Forecasting

Q.4 "Desired states or outcomes are objectives". Is this correct?

Answer: Yes

Q.5 The term Operations Management is more used for a system where tangible goods are produced. Is this statement correct?

Answer: No.

Q.6 What is the first and foremost reason for Product design?

Answer: To offer new products to remain competitive in the market

Q.7 Is the below statement correct?

"PERT is suitable for non-repetitive projects while CPM is designed for repetitive projects".

Answer: Yes

Q.8 "Increase in production does not necessarily mean the increase in productivity". Isthis statement correct?

Answer: Yes

Q.9 "Production strategy plays crucial role in shaping the ultimate success of a firm". Isthis correct?

Answer: Yes

Q.10 What is the underlying principle of preventive maintenance?

Answer: Prevention is better than cure

Q.11 What do you mean by Marketing Strategy?

Answer: It is finding out attractive opportunities and developing profitable ways to capture the market.

Q.12 Which type of capacity plan takes into account workforce size, overtime budgets, inventories, etc.

Answer: Short-term capacity plan.

Q.13 Production Planning and Control is essentially concerned with the control of Work-in-Process. Is this correct?

Answer: Yes

Q.14 'Strategy is likely to be concerned with the short-term direction of an organization'.Is this correct?

Answer: No.

Q.15 Job evaluation is a systematic approach to ascertain the labour worth of a job. Isthis correct?

Answer: Yes.

Q.16 The ratio of 'Down time due to total maintenance work' to the 'Downtime due to scheduled maintenance' is called Planning effectiveness, with respect to preventivemaintenance. Is this correct?

Answer: No.

Q.17 What is the term "Aesthetics?"

Answer: This includes style, colour, look, feel, etc. which appeals to the human sense and adds value to the product.

Q.18 KAIZEN is concerned with the continuous improvement. Is this statement correct?

Answer: Yes.

Q.19 To provide the 'right thing at the right price at the right time' can be closely associated with which objective of Operations Management?

Answer: Customer service

Q.20 "Seasonal/ Climatical demand of products" and "Global markets for company's products/services" may be the probable threats which may drive or to be faced bythe organization. Is this correct?

Answer: No.

Section : C
(4X12 = 48 Marks)
ONE LAQ

Q.1 With the help of following of following data, project the trend of sales for the next 7 years:

8 Marks

Years	2005	2006	2007	2008	2009	2010
Sales (In Lakhs Rs.)	90	95	100	110	125	140

Answer:

Sales forecast for the next 7 years:

Y2011 = Rs. 145 lakhs

Y2012 = Rs. 155 lakhs

Y2013 = Rs. 165 lakhs

Y2014 = Rs. 175 lakhs

Y2015 = Rs. 185 lakhs

Y2016 = Rs. 195 lakhs

Y2017 = Rs. 205 lakhs

Q.2 State the reasons, why Production or Operations Strategy is directly influenced byproduct design?

4 Marks

Answer:

- (i) As products are designed, all the detailed characteristics of each product are established.**
- (ii) Each product characteristic directly affects how the product can be made or produced (i.e., process technology and process design) and**
- (iii) How the product is made determines the design of the production system (production design) which is the heart of production and operations strategy.**

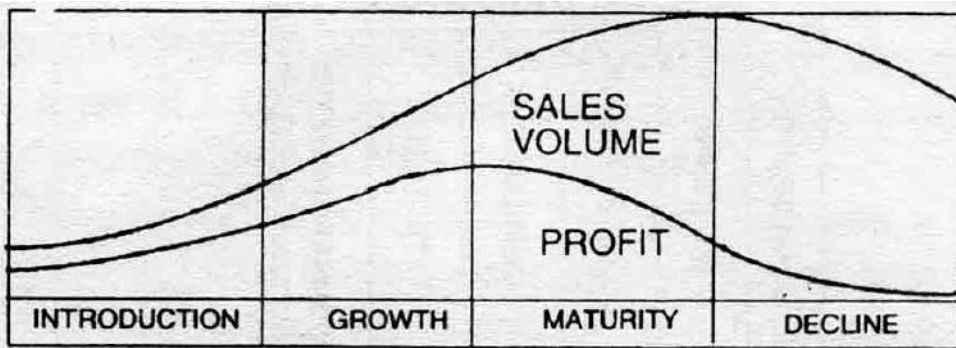
Q.1 Explain the various factors to be considered while determining the Economic LotSize for manufacturing.

Answer:

- (i) Usage rate: The rate of production of parts should match with the rate of usage of these parts in the assembly line.
- (ii) Manufacturing cost: Higher the lot size, lower will be the cost per unit produced because of distribution of set up costs for setting up production or machines and preparing paper work (production orders). But the carrying cost (handling and storing costs) will increase with increase in lot size.
- (iii) Cost of deterioration and obsolescence: Higher the lot size, higher will be the possibility of loss due to deterioration (items deteriorating

Q.2 Briefly describe four stages of Product Life Cycle.

Answer:



The introduction stage is preceded by „production planning and development“. This period requires greater investment. This investment should be gradually recouped as the sales pick up. The concept of life cycle would give the management an idea as to the time within which the original investment could be recouped. After testing, a product enters the introduction stage and the product will then become available in the national market. Sales would begin gradually as potential buyers learn of the product through advertising and other selling techniques. But the profits will be low as part of the investment is to be recouped besides heavy expenditure on selling. In the growth stage, both sales and profits will begin to increase. It is here that similar other new products begin to appear in the market as substitutes and offer competition. The management, therefore, should try to change its approach by changing its strategy from “buy my product” to “try my product”. At the end of this stage, the distribution arrangement is likely to get completed and the prices, if necessary, are reduced a little. The third stage is the maturity stage. During this stage the manufacturers introduce new models or adopt methods such as trading-in, etc., to promote the sale of their brands with a view to retaining their position in the market. The number of buyers will continue to grow, but more slowly. In economic terms this is the stage where supply exceeds demand. Some of the promotional efforts may lengthen the span of this stage but they will not offer a permanent solution.

At the final stage of decline, profit margins touch a low level, competition becomes severe and customers start using newer and better products. It is here that the story of a product ends-a natural but hard end.

THREE LAQ

6 Marks

Q.1 XYZ Co. Ltd. is committed to supply 25,000 components per annum to M/s ABC Co. on a steady daily basis. It is estimated that it costs 15 paise as inventory holding cost per component per month and that the setup per run of component manufacture is Rs. 350/-.

- (i) What is the optimum run size for component manufacture?[2]
- (ii) What should be the interval between the consecutive optimum runs?[2]
- (iii) Find out the minimum inventory holding cost.[2]

Answer:

- (i) Optimum Run size or Economic Batch Quantity (EBQ): = 3118 units.
- (ii) Interval Between two consecutive optimum runs: = 44.8 ≈ 45 days.
- (iii) Min. Inventory Handling cost = Rs. 2806.2/-

6 Marks

Q.2 What are the objectives of Just-in-Time (JIT) manufacturing?

Answer:

JIT Manufacturing: The specific goal of JIT manufacturing is to provide the right quality level at the right place. Customer demand always determines what is right. JIT tries to build only what internal and external customers want and when they want it. The more focused objectives of JIT are:

- (i) Produce only the products (goods or services) that customers want.
- (ii) Produce products only as quickly as customers want to use them.
- (iii) Produce products with perfect quality.
- (iv) Produce in the minimum possible lead times.
- (v) Produce products with features that customers want and no others.
- (vi) Produce with no waste of labour, materials or equipment, designate a purpose for every movement to leave zero idle inventory.
- (vii) Produce with methods that reinforce the occupational development of workers.

FOUR LAQ

8 Marks

Q.1

Job	Machine A	Machine B
1	6	4
2	5	2
3	3	8
4	1	6
5	9	5
6	7	2

In a factory, there are six jobs to perform, each of which should go through two machines A and B, in the order AB. The processing timings (in hours) for the jobs are given here. You are required to determine the sequence for performing the jobs that would minimise the total elapsed time, T. What is the value of T?

Answer:

Value of T = 33 hours

Q.2 What are the disadvantages of Matrix Organization Structure?

4 Marks

Answer:

Disadvantages of Matrix Organization Structure: (i) Complex structure as this contains both vertical and horizontal flow of information (ii) High-cost approach due to more management positions (iii) Dual lines of authority (iv) Conflicts arises in the allocation of resources

Q.1 A firm is using a machine whose purchase price is Rs. 12,000/-. The installation charges amount to Rs. 3,500/- and the machine has scrap value of Rs. 1,500 because the firm has a monopoly of this type of work. The maintenance cost in various years is given in the following table:

Year	1	2	3	4	5	6	7	8	9
Maintenance Cost (Rs.)	250	760	1200	1800	2500	3200	4100	5000	6000

(i) Find out Cost of machine.
Calculate the replacement period of the machine.

(ii) Determine the Optimal Replacement Period.

Answer:

- (i) Cost of Machine = Rs. 15500
Replacement period of Machine is 6th year.
- (ii) Here the lowest average cost is Rs. 3,951 approximately, in 6th year. Therefore, the machine may best be replaced every 6 years.

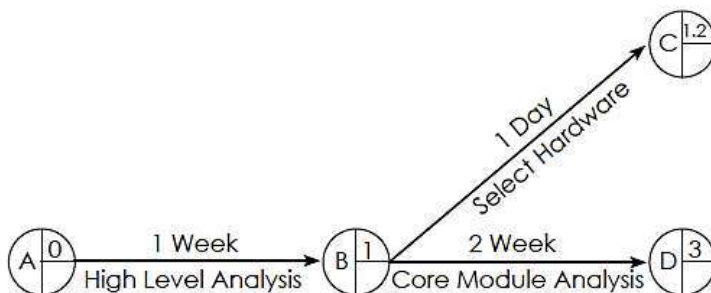
Q.2 Draw a Circle and Arrow Diagram to show two activities, that cannot be started until the first activity has been completed.

Answer:

Indicative example of Circle & Arrow Diagram

Here the activities of 'Select Hardware' and 'Core Module Analysis' cannot be started until 'High Level Analysis' has been completed.

Circle and Arrow Diagram showing two activities that cannot be started until the first activity has been completed.



and started

Q.1 Write short notes on Aggregate Planning

3 Marks

Answer:

Aggregate Planning: It is an intermediate-term planning decision. It is the process of planning the quantity and timing of output over the intermediate time horizon (3 months to one year). Within this range, the physical facilities are assumed to be fixed for the planning period. Therefore, fluctuations in demand must be met by varying labour and inventory schedule. Aggregate planning seeks the best combination to minimise costs. It is called „Aggregate Planning“ because the demand on facilities and available capacities is specified in aggregate quantities. For example. aggregate quantities of number of Automobile vehicles, Aggregate number of soaps etc. Intermediate Planning or Aggregate Planning, which is in between long range and short-term planning, which is concerned in generally acceptable planning, taking the load on hand and the facilities available into considerations. In aggregate planning the management formulates a general strategy by which capacity can be made to satisfy demand in a most economical way during a specific moderate time period, say for one year.

Q.2 Write short notes on Importance of Strategic Management

3 Marks

Answer:

Importance of Strategic Management: (i) Discover organization strengths and weaknesses (ii) Identify the available opportunities and possible threats (iii) Discover the objectives and goals in line with organizations strengths and available opportunities (iv) Implement changes to overcome weaknesses and manage the threats. (v) Provide vision/mission or direction to future of organizations (vi) Build a dynamic and strong organization.

Q.3 Write short notes on Process Planning

3 Marks

Answer:

Process Planning: Process planning refers to the way production of goods or services is organised. It is the basis for decisions regarding capacity planning, facilities (or plant) layout, equipment and design of work systems. Process selection is necessary when a firm takes up production of new products or services to be offered to the customers. Three primary questions to be addressed before deciding on process selection are:

- (i) How much variety of products or services will the system need to handle?
- (ii) What degree of equipment flexibility will be needed?
- (iii) What is the expected volume of output?

Q.4 Write short notes on Stages in Strategic Planning

3 Marks

Answer:

Stages in Strategic Planning:

Stage I: Strategic Option Generations At this stage, a variety of alternatives are considered, relating to the firm's product and markets, its competitors and so forth. Examples of strategies might be:

- a) increase market share
- b) penetration into international market
- c) concentration on core competencies
- d) Acquisition or expansion etc.

Stage II - Strategic Options Evaluation Each option is then examined on its merits.

- a) Does it increase existing strengths?
- b) Does it alleviate existing weaknesses?
- c) Is it suitable for the firm's existing position?
- d) Is it acceptable to stakeholders?

Q.5 Write short notes on Scheduling

3 Marks

Answer:

Scheduling: "Scheduling" is the next important function of production planning and control after "Routing". It determines the starting and the completion timings for each of the operations with a view to engage every machine and operator of the system for the maximum possible time and without imposing unnecessary burden over them. Scheduling is the determination of the time that should be required to perform each operation and also the time that should be required to perform the entire series as routed. Scheduling involves establishing the amount of work to be done and the time when each element of the work will start or the order of the work. Scheduling technique is an important technique of determining the starting and the completion timings of each operation and that of the total manufacturing process so that the man and machines can be utilized to the maximum.

Q.1 You are working as a Production Manager in a manufacturing unit. The executive management of this company has decided to go for the ISO certification for this unit. For this purpose, you are appointed as a Management Representative to ensure successful implementation of ISO certification. Now answer the following:

- (i) What are all those broad activities that you have to consider for such responsibility?
- (ii) What are the five standards associated with ISO 9000 series, that you have to thoroughly refer to, for finding out the best fitment for your unit?
- (iii) In which scenarios, ISO certification is a must, and is particularly helpful?
- (iv) When is it reviewed?

Answer:

- (i) ISO certification is an elaborate and expensive process. You need to document how workers of your unit perform every function that affects quality and install mechanisms to ensure that, they follow on expected lines. ISO 9000 certification entails a complex analysis of management systems and procedures. Rather than judging the quality of a particular product, ISO 9000 evaluates the management of the entire manufacturing process, from purchasing, to design, to training. You must fill out a report and then be certified by a team of independent auditors. With certification comes registration in an ISO directory, that your firm (seeking suppliers) can refer to, for a list of certified companies. They are generally given preference over unregistered companies.
- (ii) Quality System: 9001 Model for Quality Assurance in Design, Production, Installation and Servicing. (To be used when conformance to specified requirements is to be assured by the supplier during several stages that may include design/development, production, installation and servicing). 9002 Model for Quality Assurance in Production and Installation. (To be used when conformance to specified requirements is to be assured by the supplier during production and installation). 9003 Model for Quality Assurance in Final Inspection Test. (To be used when conformance to specified requirements is to be assured by the supplier solely at final inspection and test). Guidelines for Use: 9000 Quality Management and Quality Assurance Standards - Guidelines for Selection and Use. 9004 Quality Management and Quality System Elements – Guidelines
- (iii) ISO certification is a must for doing business with any member of the EU. In addition to the benefits of accessing the EU, ISO 9000 certification and registration is particularly helpful for companies that do not currently have a quality management system, as it provides guidelines for establishing the system and making it effective.
- (iv) ISO standards are reviewed every 5 years and revised, if needed. This helps ensure they remain useful tools for market place.

INTERMEDIATE EXAMINATION

December 2022

**P-9(OMSM)
Syllabus 2016****Operations Management and Strategic Management**

Time Allowed: 3 Hours

Full Marks: 100

*The figures in the margin on the right side indicate full marks.**All Sections are compulsory. Each section contains instructions regarding the number of questions to be answered within the section.**All working notes must form part of the relevant answer.**Wherever necessary, candidates may make appropriate assumptions and clearly state them in answer.***Section-A****Operations Management****PART-I**

Part-I contains Question No.1. All parts of this question are compulsory.

Answer the following questions:

1. (a) **Choose the correct answer from the given alternatives (You may write only the Roman numeral and the alphabet chosen for your answer):** 1×10=10
- (i) While referring to the customer service objective of Operations Management, primary consideration "Movement of a given, requested or acceptable specification" can be associated with which one of the following principal function?
- (A) Manufacture
(B) Supply
(C) Transport
(D) Services
- (ii) Which one of the following is *not* the factor influencing effective capacity of a plant?
- (A) Forecasts of demand
(B) Plant and labour efficiency
(C) Multiple shift operation
(D) Proper record keeping of maintenance
- (iii) Which one is the objective of product design?
- (A) Profit reduction in long run
(B) To increase the development time to maximum
(C) To increase the cost of the product
(D) To achieve the desired product quality

- (iv) The type of production control which is typically found where a particular bottleneck machine exists in the process of manufacturing is
- (A) Block control
 - (B) Load control
 - (C) Flow control
 - (D) Batch control
- (v) The ratio of "Value of output of goods of services" to "Capital assets employed" is
- (A) Manpower Productivity
 - (B) Materials Productivity
 - (C) Capital Productivity
 - (D) Energy Productivity
- (vi) With reference to project planning, which one of the following signifies the "freedom for rescheduling or to start the job"?
- (A) Slack
 - (B) Float
 - (C) Free Float
 - (D) Total Float
- (vii) Which one of the following is the benefit of preventive maintenance?
- (A) Increased breakdowns
 - (B) Increased downtime
 - (C) Higher large scale repairs
 - (D) Less standby or reserve equipment or spares required
- (viii) ZAB Ltd. a large scale industry manufactures product-M of 24 units per shift of 8 hours. The standard time per unit is 15 minutes. What is the productivity of the per shift of 8 hours?
- (A) 50%
 - (B) 60%
 - (C) 75%
 - (D) 80%
- (ix) Which one of the following ISO standards concerns minimization of harmful effects to the environment caused by the operations of an organization?
- (A) ISO 9001
 - (B) ISO 14000
 - (C) IS 9002
 - (D) ISO 9004

(x) The type of basic process types, which is used when a very highly standardized product is desired in high volume is

- (A) Job shop
- (B) Batch
- (C) Project
- (D) Continuous

(b) Match the statement in Column I with the most appropriate statement in Column II (You may opt to write only the Roman numeral and the matched alphabet): 1×6=6

Column-I	Column-II
(A) OLAP	(1) Change for the better
(B) KAIZEN	(2) Value Analysis
(C) Ranking Method	(3) Analysis of Information from a data warehouse
(D) Gantt Chart	(4) Difference in time length of any path and the critical path
(E) Brainstorming	(5) Job Evaluation
(F) Path Slack	(6) Visual aid to plan and monitor individual activities

(c) State whether the following are 'True or False' (You may write only the Roman numeral and whether 'True' or 'False' without copying the statements into the answer books): 1×6=6

- (i) Short-term planning deals with day-to-day work, scheduling and sometimes inventories problems.
- (ii) The term Operations Management is more used for a system where tangible goods are produced.
- (iii) Simulation is an optimizing technique.
- (iv) There are essentially four standards associated with the ISO 9000 series.
- (v) CPM Technique is designed for repetitive projects.
- (vi) Preventive maintenance includes lubrication, cleaning, periodic overhaul etc.

PART-II

Answer any three from the question nos. 2 to 5:

16×3= 48

2. (a) (i) Enumerate what are the Activities which are listed under the production and Operations Management functions. 4
- (ii) Recent trends in production/operations management relate to Global Competition and the impact it has on manufacturing firms. In this context list down what are the recent trends in production/operations management. 4

- (b) The productions (in thousand tones) of a fertilizer factory of ROMY Ltd. for the year 2013 through 2022 are given below:

Year	2013	2015	2016	2017	2018	3019	2022
Production (in thousand tones)	70	75	90	98	85	91	100

(Present calculation upto three decimal points.)

Required.

- (i) Fit a straight line by the method of least squares and tabulate the trend values.
 (ii) Estimate production (in thousand tones) of fertilizer in the year 2020 and year 2025. $6+2=8$
3. (a) **State in brief** what are the characteristics of Good Product Design (*any seven*). $1 \times 7 = 7$

- (b) The following table shows the time remaining (number of days until due date) and the work remaining (number of days still required to finish the work) for 5 jobs of ZBA Ltd. which were assigned the letters A to E as they arrived to the shop.

Job	Number of days until due date	Number of days of work remaining
A	12	13
B	7	9
C	2	5
D	8	4
E	4	1

Required:

Sequence the jobs according to priority rules established by (i) First cum first served (FCFS) (ii) Early due date job first (EDD) (iii) Least slack (LS) (iv) Shortest processing time job first (SPT) and (v) Longest processing time job first (LPT).

$1+2+3+1+2=9$

4. (a) MABUN Ltd. a company producing industrial adhesives has four sales representatives who are to be assigned to four outlets in metro cities. The monthly sales (₹ in lakh) increase estimated for each salesman for different sales territories is shown in the following table:

Salesman	City A	City B	City C	City D
I	47	40	33	26
II	35	30	25	20
III	35	30	25	20
IV	29	25	21	17

Required:

- (i) Find the optimum assignment of salesmen to outlets (cities).
 (ii) Find the total maximum sales (₹ in lakh) increase per month.

$6+2=8$

- (b) The counter of a **Ration shop** experiences the arrival of 25 customers during peak working hours. Service time will have Poisson Distribution. Experience suggests that mean service time should average about two minutes per customer.

Determine each of the following:

- (i) System utilization,
 - (ii) Percentage of time the server (agent) will be idle,
 - (iii) The expected number of customers waiting to be served,
 - (iv) The average time customers will spend in the system. 2×4= 8
5. (a) ANEX Ltd. an Engineering firm is using a machine whose purchase price is ₹ 13,000. The installation charges amount to ₹ 3700 and the machine has a scrap value of only ₹ 1400 because the firm has a monopoly of this type of work. The maintenance cost in various years as is shown below:

Year	1	2	3	4	5	6	7	8	9
Cost (₹)	300	850	1300	1900	2600	3300	4200	6000	7500

Required:

- (i) Determine after how many years should the machine be replaced on economic considerations (Assuming that machine replacement can be done only at the year end).
 - (ii) What will be the average cost of Replacement? 5+1=6
- (b) AXON TECH Ltd. has recently won a contract for the installation of a die casting machine and its associated building construction work at a local factory of large national firm of electronic engineers. Project manager has listed down the activities in the project as under:

Activity Identification	Preceding Activities	Duration (Days)
A	1-2	-
B	2-3	A
C	2-4	A
D	2-5	A
E	3-5	B
F	4-5	C
G	5-6	D,E,F
H	6-7	G
I	6-8	G
J	7-8	H

Required:

- (i) Draw the network for the project.
- (ii) What are the possible paths with duration of the project?
- (iii) Identify the critical path with duration of the project.
- (iv) Find Total Float, Free Float and Independent Float of the activities D,E,H and J of the Project. 3+2+2+3=10

Section-B

Strategic Management

PART-I

Part-I contains Question No. 6 which is compulsory.

- 6. Choose the correct answer from the given four alternatives (You may write only the Roman numeral and alphabet chosen for your answer):** 1×6=6

- (i) Strategic Management can be defined as
 - (A) the direction and scope of an organization over the long run.
 - (B) a stream of decisions and actions which leads to the development of an effective strategy or strategies to help achieve objectives.
 - (C) the statement of the future.
 - (D) a statement of the activities or steps needed to support a strategy.
- (ii) PEST analysis refers to the following factors:
 - (A) Political, environmental, structural and technical
 - (B) Portfolio, energy, solar and transformation
 - (C) Purchase, economic, supply and transportation
 - (D) Political, economical, social and technological
- (iii) Business Process Reengineering could be applied to companies that confront problems such as
 - (A) low operational costs.
 - (B) high performance of middle level managers.
 - (C) appropriate distribution of resources and jobs in order to achieve maximum performance etc.
 - (D) low quality offered to customers.
- (iv) Vision is associated with—
 - (A) Types of markets
 - (B) Customer need or requirement
 - (C) Road map to Company's future
 - (D) Distinctive competencies

- (v) While performing SWOT analysis, which one of the following can be treated as a Threat?
- (A) Price cutting war
 - (B) Reduction in financing cost
 - (C) Lesser competition
 - (D) Industrial stability
- (vi) Which one of the following 'S' is not a part of McKinsey's 7s Framework?
- (A) Skills
 - (B) Style
 - (C) Synergy
 - (D) Structure

PART-II

Answer *any two* questions out of three questions:

12×2= 24

7. (a) Enumerate the need for an Explicit Mission. How does a company's mission statement differ from its strategic vision? 5+1=6
- (b) State the aims of analyzing the product market portfolio. How value system influences the strategy? 4+2= 6
8. (a) Robert Linneman and Rajan Chandran have suggested that a seven step process in contingency planning. **In this context**, describe in brief what are the said steps in contingency planning. 6
- (b) Explain with examples, why do we need the Strategic Business Unit. 6
9. Write short notes on *any three* out of following four questions: 4×3= 12
- (a) Enumerate what are the characteristics of Core Competence.
 - (b) State what are the steps involved in formulation of production strategy.
 - (c) The **3-Rs of Re-Engineering**
 - (d) Enumerate the approaches that can be adopted to strategic planning.
-

SUGGESTED ANSWERS TO QUESTIONS

SECTION – A (PART – I)

Answer to Question No. : 1 (a)

1X10 = 10 Marks

- (i) – (C)
- (ii) – (D)
- (iii) – (D)
- (iv) – (B)
- (v) – (C)
- (vi) – (A)
- (vii) – (D)
- (viii) – (C)
- (ix) – (B)
- (x) – (D)

Answer to Question No. : 1 (b)

1X6 = 6 Marks

- (A) – (3)
- (B) – (1)
- (C) – (5)
- (D) – (6)
- (E) – (2)
- (F) – (4)

Answer to Question No. 1 (c) :

1X6 = 6 Marks

- (i) – TRUE
- (ii) – FALSE
- (iii) – FALSE
- (iv) – FALSE
- (v) – TRUE
- (vi) – FALSE

PART – II

(Any three from the questions 2 to 5)

16X3=48 Marks

Answer to Question No. 2 (a) (i) :

4 Marks

The following are the activities which are listed under Production and Operations Management functions :

1.	Location of facilities.
2.	Plant Layouts and Material Handling.
3.	Product Design.

4.	Process Design.
5.	Production Planning and Control.
6.	Quality Control.
7.	Materials Management.
8.	Maintenance Management.



Answer to Question No. : 2 (a) (ii) :

4 Marks

Recent trends in Production/Operations Management:	
1.	Global Market Place
2.	Production/Operations Strategy
3.	Total Quality Management (TQM)
4.	Flexibility
5.	Time Reduction
6.	Technology
7.	Worker Involvement
8.	Re-Engineering
9.	Environmental Issues
10.	Corporate Downsizing (or Right Sizing)
11.	Supply-Chain Management
12.	Lean Production

Answer to Question No. : 2 (b)

6+2 = 8 Marks

- (i) The equation of Straight line Trend is $Y = 86.55 + 3.146\chi$
- (ii) **The estimated production (in Thousand Tons) for the year :**
 Year 2020= $(Y_{20})= 95.988$
 Year 2025= $(Y_{25})= 111.718$

The Characteristics of Good Product Design are stated below : (Any Seven)

- (i) **Function or performance :** The function or performance is what the customer expects the product to do to solve his / her problem or offer certain benefits leading to satisfaction. **For example,** a customer for a motor bike expects the bike to start with a few kicks on the kick peddle and also expects some other functional aspects such as pick-up, maximum speed, engine power and fuel consumption etc.
- (ii) **Appearance or aesthetics :** This includes the style, colour, look, feel, etc. which appeals to the human sense and adds value to the product.
- (iii) **Reliability:** This refers to the length of time a product can be used before it fails. In other words, reliability is the probability that a product will function for a specific time period without failure.
- (iv) **Maintainability :** This refers to the restoration of a product once it has failed. High degree of maintainability is desired so that the product can be restored (repaired) to be used within a short time after it breaks down. This is also known as serviceability.
- (v) **Availability:** This refers to the continuity of service to the customer. A product is available for use when it is in an operational state. Availability is a combination of reliability and maintainability. High reliability and maintainability ensures high availability.
- (vi) **Productibility:** This refers to the ease of manufacture with minimum cost (economic production). This is ensured in product design by proper specification of tolerances, use of materials that can be easily processed and also use of economical processes and equipments to produce the product quickly and at a cheaper cost.
- (vii) **Simplification:** This refers to the elimination of the complex features so that the intended function is performed with reduced costs, higher quality or more customer satisfaction.
- (viii) **Standardisation:** This refers to the design activity that reduces variety among a group of products or parts. For example, group technology items have standardised design which calls for similar manufacturing process steps to be followed.
- (ix) **Specification:** A specification is a detailed description of a material, part or product, including physical measures such as dimensions, volume, weight, surface finish etc. These specifications indicate tolerances on physical measures which provide production department with precise information about the characteristics of products to be produced and the processes and production equipments to be used to achieve the specified tolerances (acceptable variations).
- (x) **Safety:** The product must be safe to the user and should not cause any accident while using or should not cause any health hazard to the user. **For example,** a pharmaceutical product while used by the patient, should not cause some other side effect threatening the user.

Answer to Question No. 3 (b) :

1+2+3+1+2 = 9 Marks

- (i) FCFS (First come first served): Since the jobs are assigned letters A to E as they arrived to the shop, the sequence according to FCFS priority rule is: A, B, C, D, E.
- (ii) EDD (Early due date job first) rule: Taking into account the number of days until due date, the sequence of jobs as per EDD rules is :

Jobs	C	E	B	D	A
No. of days until due date	2	4	7	8	12

- (iii) LS (Least slack) rule also called as Minimum slack rule.

Calculation of slack :

Slack = (Number of days until due date) – (Number of days work remaining)

Jobs	Number of days until due date	Number of days of work remaining	Slack (Days)
A	12	13	12-13 = -1
B	7	9	7-9 = -2
C	2	5	2-5 = -3
D	8	4	8-4 = 4
E	4	1	4-1 = 3

Sequence is thus :

Jobs	C	B	A	E	D
Slack	-3	-2	-1	3	4

- (iv) **SPT** (Shortest Processing Time job first) also referred as **SOT** (Shortest Operation time job First) rule or **MINPRT** (Minimum Processing time job first) rule.

Sequence is thus :

Jobs	E	D	C	B	A
Processing time (days)	1	4	5	9	13

- (v) **LPT** (Longest Processing time job first) also referred to as **LOT** (Longest Operation time job first) rule. Sequence is thus :

Jobs	A	B	C	D	E
Processing time (days)	13	9	5	4	1

Answer to Question No. 4 (a) : (i)

6+2 = 8 Marks

Relative Loss Matrix

Sales Man \ City	A	B	C	D
I	0	7	14	21
II	12	17	22	27
III	12	17	22	27
IV	18	22	26	30

As this is a problem of Maximization, the same is converted to one of Minimization by forming a Relative Loss Matrix where all the elements of the given matrix are subtracted from the highest element of the matrix (which is 47 in this case).

Matrix after Row Operation

Sales Man \ City	A	B	C	D
I	0	7	14	21
II	0	5	10	15
III	0	5	10	15
IV	0	4	8	12

Matrix after Column Operation

Sales Man \ City	A	B	C	D
I	0	3	6	9
II	0	1	2	3
III	0	1	2	3
IV	0	0	0	0

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 2 \neq Order of the matrix (4)

So the solution is non optimal.

Improved Matrix (Non Optimal)

Sales Man \ City	A	B	C	D
I	0	2	5	8
II	0	0	1	2
III	0	0	1	2
IV	1	0	0	0

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 3 \neq Order of the matrix (4)

So the solution is non optimal.

Further Improved Matrix [(Optimal Solution (i))]

Sales Man \ City	A	B	C	D
I	0	2	4	7
II	0	0	0	1
III	0	0	0	1
IV	2	1	0	0

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 4 = Order of the matrix.

So the solution is optimal.

Further Improved Matrix [(Optimal Solution (ii))]

City Sales Man	A	B	C	D
I	0	2	4	7
II	∅	∅	0	1
III	∅	0	∅	1
IV	2	1	∅	0

(ii)

(Rs. In Lakh)					
Assignment as per Solution (i)			Assignment as per Solution (ii)		
Sales man	City	Sales	Sales man	City	Sales
I	A	47	I	A	47
II	B	30	II	C	25
III	C	25	III	B	30
IV	D	17	IV	D	17
Total		119	Total		119

Answer to Question No. 4 (b) :

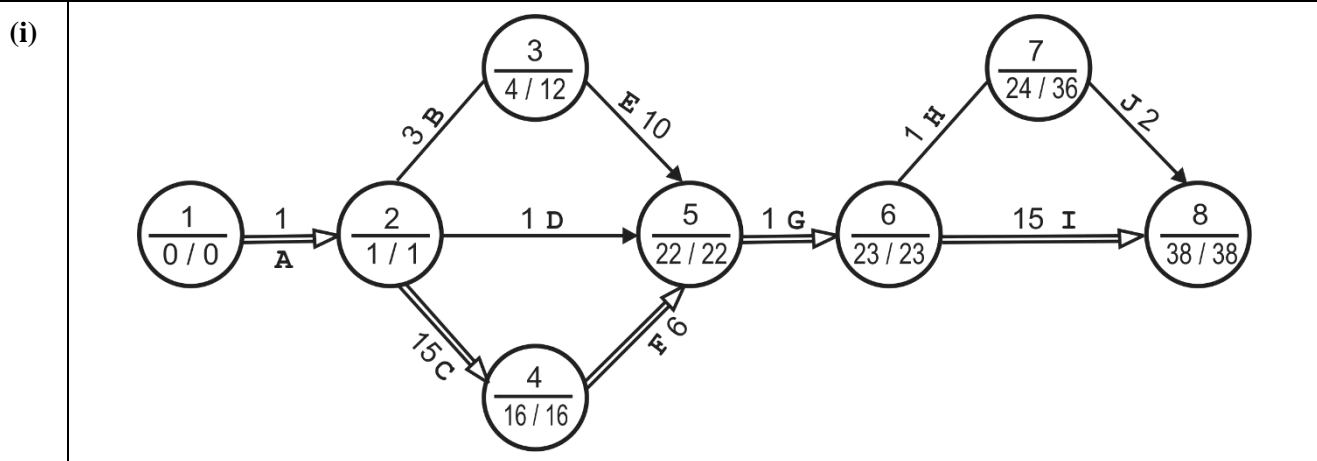
2X4 = 8 Marks

- (i) System Utilization = 0.8333
- (ii) Percentage of time the Server (agent) will be idle : = 0.1667, or 16.67 %
- (iii) Expected no. of customers waiting to be served. = 4.17 customers
- (iv) Average time customers will spend in the system = 0.200 hours = 12 minutes

Answer to Question No. 5 (a) :

5+1 = 6 Marks

- (i) The machine may best be replaced every **7th year.**
- (ii) The average cost of Replacement is **Rs 4250** approximately



- (ii) **The Possible Paths :**
- 1 – 2 – 3 – 5 – 6 – 7 – 8 = 18 Days
 - 1 – 2 – 5 – 6 – 7 – 8 = 6 Days
 - 1 – 2 – 5 – 6 – 8 = 18 Days
 - 1 – 2 – 4 – 5 – 6 – 7 – 8 = 26 Days
 - 1 – 2 – 4 – 5 – 6 – 8 = 38 Days

(iii) **Critical Path & Duration :**
 1 – 2 – 4 – 5 – 6 – 8 and duration is 38 Days

(iv)	Activity	Total Float (Days)	Free Float (Days)	Independent Float (Days)
	D	20	20	20
	E	8	8	0
	H	12	0	0
	J	12	12	0

SECTION – B

(PART – I)

Answer to Question No. : 6

1X6 =6 Marks

- (i) (B)
- (ii) (D)
- (iii) (D)
- (iv) (C)
- (v) (A)
- (vi) (C)

(PART – II)

(Any two from the questions 7 to 9)

12X2=24 Marks

Answer to Question No. : 7 (a)

5+1 = 6 Marks

The need for an explicit mission arises for varied reasons:

1. Unanimity of purpose,
2. Motivating the use of the organization's purpose,
3. Develop a basis for use of the organization's resources,
4. Facilitate the translation of objectives into a work structure.
5. Cost, time, and performance parameters can be controlled.
6. Specify organizational purpose and assign tasks.

A strategic vision portrays a company's aspirations for its future destination. A company's mission describes its purpose and its present business.

A company's mission describes its purpose and its present business (who we are, what we do, and why we are here). It announces what the company is providing to society; either a service or a product. The mission contains few specific directives, only broadly outlined or implied objectives and strategies. Characteristically, it is a statement of attitude, outlook, and orientation rather than of details and measurable targets.

Answer to Question No. : 7 (b)

4+2 = 6 Marks

Portfolio Analysis is the process of reviewing or assessing the elements of the entire portfolio of securities or products in a business. The review is done for careful analysis of risk and return. The Analysis is used in describing a product-market portfolio with the following aims:

- (i) To identify the current strengths and weaknesses of an organization's products in its markets, and the state of growth or decline in each of these markets.
- (ii) To identify what strategy is needed to maintain a strong position or improve a weak one.

Several matrices have been developed over the years to analyze market share, market growth, and market position.

Value system : A factor very much complimentary to the mission that influences the portfolio strategy is the value system of the promoters or major stockholders. After the Murugappa group took over the EID Parry, the liquor business of the EID Parry group was sold off as the Murugappa group management felt that it was unethical to be in the liquor business.

Answer to Question No. : 8 (a)

6 Marks

The Seven Steps in Contingency Planning are enumerated below :

- **Step 1** – Identify the beneficial and unfavourable events that could possibly derail the strategy or strategies.
- **Step 2** – Specify trigger points. Calculate about when contingent events are likely to occur.
- **Step 3** – Assess the impact of each contingent event. Estimate the potential benefit or harm of each contingent event.
- **Step 4** – Develop contingency plans. Be sure that contingency plans are compatible with current strategy and are economically feasible.
- **Step 5** – Assess the counter impact of each contingency plan. That is, estimate how much each contingency plan will capitalize on or cancel out its associated contingent event. Doing this will quantify the potential value of each contingency plan.
- **Step 6** – Determine early warning signals for key contingency event. Monitor the early warning signals.
- **Step 7** – For contingent event with reliable early warning signals, develop advance action plans to take advantage of the available lead time.

Answer to Question No. : 8 (b)

6 Marks

A Strategic Business Unit is a relatively autonomous division of a large company that operates as an independent enterprise with responsibility for a particular range of products or activities. These strategic business units are responsible for their own profit or loss but are answerable to the top management.

SBU or a Strategic Business unit mostly targets a particular market segment and it provides expertise in product management and operations which help the parent company manage and track the different products that are produced in the company. The SBU is given the authority to make its own strategic decisions within corporate guidelines as long as it meets corporate objectives. A big organization like Unilever etc. has many SBUs for their different categories of products like Cosmetics, Food products, Beverages, etc., and each is managed through a separate unit head. It promotes accountability.

Since units' heads are responsible for individual SBU profitability. Career development opportunities are further higher in this structure.

It allows better control of categories of products manufacturing, marketing, and distribution.

Short Notes : (Any Three)

(a) Characteristics of Core Competence :

The Core Competences have the following Characteristics:

- (i) Provide distinctive advantage for the firm.
- (ii) Difficult for the competitors to imitate.
 - Competence is rare.
 - Competence is concerned with managing complex activities or processes.
 - Competitors are not clear which resource or competences have caused the success of the firm. This is known as causal ambiguity.
 - The competence is embedded in the culture.
- (iii) They make a significant contribution to customer value and the end products offered by the firm.
- (iv) They provide access to a wide variety of markets.

For example : Honda’s Core competence lies in design and manufacture of Engine and its end products includes motorcycles, cars, generators etc.

(b) Steps involved in formulation of Production Strategy :

The following steps are involved in the formulation of production strategy —

- (i) Study the overall corporate plan and define the Objectives.
- (ii) Analyse the present production operations and the present and future environment.
- (iii) Review sales- forecast and marketing.
- (iv) Make strategic decisions for production.

(c) The 3-Rs of Re-engineering:

The 3 Rs of Re-engineering are enumerated are as shown in below Table :

REDESIGN	RETOOL	RECORCHESTRATE
<ul style="list-style-type: none"> • Simplify • Standardize • Empowering • Employee ship • Groupware • Measurements 	<ul style="list-style-type: none"> • Networks • Intranets • Extranets • Work Flow 	<ul style="list-style-type: none"> • Synchronize • Process • IT • Human Resources

(d) The approaches that can be adopted to Strategic Planning :

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning :

- (i) A top-down process, in which managers are given, targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to and from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

INTERMEDIATE EXAMINATION

June 2023

P-9(O MSM)
Syllabus 2022

OPERATIONS MANAGEMENT AND STRATEGIC MANAGEMENT

Time Allowed: 3 hours

Full Marks: 100

The figures in the margin on the right side indicate full marks.

All Sections are Compulsory. Each section contains instructions regarding the number of questions to be answered within the section.

All working notes must form part of the answer.

Wherever necessary, candidates may make appropriate assumptions and clearly State them in the respective answer.

Section-A

Operations Management

Answer Question No. 1 which is compulsory and any three from Question Nos. 2, 3, 4 and 5.

1. (a) **Choose the correct answer from the given alternatives (You may write only the Roman numeral and the Alphabet chosen for your answer):** 1×8=8

(i) With reference to the aspects of customer service under Operations Management, if Primary consideration focuses on “Movement of a given, requested or acceptable specification”, it's corresponding Principal function will be:

- (A) Manufacture
- (B) Transport
- (C) Supply
- (D) Service

(ii) Which one of the following forecasting is more useful in production planning?

- (A) Short-term
- (B) Medium-term
- (C) Long-term
- (D) None of the above

(iii) In which one of the following layouts, similar type of machines and services (i.e. facilities) are located together?

- (A) Product or Line layout
- (B) Process layout
- (C) Group layout
- (D) Fixed layout

- (iv) Point-rating method is closely associated with
- (A) Transportation
 - (B) Simulation
 - (C) Queuing system
 - (D) Job Evaluation
- (v) The ratio of Actual Production to the Standard Production is referred to as:
- (A) Standardization
 - (B) Simplification
 - (C) Productivity
 - (D) Actual Yield
- (vi) Which one of the following is the project management software program?
- (A) MS PowerPoint
 - (B) MS Excel
 - (C) MS Project
 - (D) MS Access
- (vii) The type of spare parts which although acknowledged to have a long life or a small chance of failure, would cause a long shutdown of equipment because it would take a long time to get a replacement for them, are known as
- (A) Insurance spares
 - (B) Rotable spares
 - (C) Regular spares
 - (D) Capital spares
- (viii) Which of the following is not the method used for Operations Research problems?
- (A) Analytical method
 - (B) Simulation method
 - (C) Trail and error method
 - (D) None of the above
- (b) **State whether the following statements are 'true' or 'false' (You may write only the Roman numeral and whether 'True' or 'False' without copying the statements into the answer books):** 1×4=4
- (i) The term Operations Management is more used for a system where tangible goods are produced.
 - (ii) Aggregate planning is an Intermediate term planning decision.
 - (iii) The first and foremost stage of Design Thinking is Prototype.
 - (iv) The ISO Standards are reviewed every 10 years and revised if needed.

(c) **Fill in the blanks: (You may write only the Roman numeral and the content filling the blank)** 1×3=3

- (i) Operations management is concerned essentially with the utilization of _____.
- (ii) A _____ can be considered as a means of graphically depicting all the operations involved in a Project.
- (iii) The two types of maintenance costs need to be balanced: Cost of premature replacement and Cost of _____.

2. (a) **List down** various major decision areas under Production and Operations management. (Any Ten) 5

(b) (i) **Discuss** with appropriate examples, various properties of aggregate planning. 4

(ii) The Sales of CTV (₹ In Million) of SONTON LTD. for the 5 years are given below:

Year	2014	2016	2018	2020	2022
Sales of CTV (₹ In Million)	18	21	23	27	16

Required:

Estimate the Trend values of Sales of CTV for the years of 2021, 2024 and 2026. 6

3. (a) The Design Thinking can be thought of as a five stage process. Are these stages performed in a sequential order?

Examine each stage of Design Thinking. 7

(b) Below table shows the time remaining (number of days until due date) and the work remaining (number of days still required to finish the work) for 5 jobs which were assigned the letters A to E as they arrived to the shop.

Job	Number of days until due date	Number of days of work remaining
A	6	3
B	4	8
C	2	5
D	8	6
E	7	2

Required:

Sequence the jobs according to priority established by

- (i) Early Due Date (EDD) Rule
- (ii) Least Slack (LS) Rule
- (iii) Longest Processing Time (LPT) Rule
- (iv) Critical Ratio Rule

2×4=8

4. (a) A factory of SPON LTD. manufactures 3 products which are processed through 3 different production stages. The time required to manufacture one unit of each of the three products and the daily capacity of the stages are given in the following table:

State	Time/Unit in minutes			Stage capacity (minutes)
	Product 1	Product 2	Product 3	
1	1	2	1	430
2	3	-	2	460
3	1	4	-	420
Profit/Unit	₹ 3	₹ 2	₹ 5	

Required:

Develop a linear programming model to determine how many products to be manufactured to maximize profit. 5

- (b) (i) TANEESA, a car rental Agency has collected the following parameters on the demand for five-seater vehicles over the past 50 days.

Daily demand	5	6	7	8	10
No. of days	4	10	16	14	6

The agency has only 7 cars currently.

[Given: Random numbers: 15, 48, 71, 56, 90]

Required:

- (1) **Using the Random** numbers stated supra, **develop** 5 days of demand for the car rental agency.
 - (2) **Calculate** the average number of cars rented per day for the 5 days.
 - (3) **Assess** how many rentals will be lost over the 5 days. 4+1+1=6
- (b) (ii) The Quantitative Parameters pertaining to a machine extracted from the records of a manufacturing unit of SONIX Ltd. are as given below:

Working days per month	25
Hours worked per day	8
Standard Minutes per unit of production:	
Operator Time (Minutes)	12
Machine Time (Minutes)	36
Total time per unit (Minutes)	48
Number of Operators	1
Number of Machines	1

(No. of Units to be rounded off to the nearest integer)

Required:

- (1) If the plant is operated at 80% efficiency and the operator is working at 100% efficiency, **calculate** the output (units) per month.
- (2) If the Machine productivity is reduced by 10% over existing level, **assess** the output (in units) per month. 2+2=4

5. (a) SONTECH Ltd., a Solar manufacturing company has observed the following number of breakdowns in the new Lantern over the past year:

No. of breakdowns	0	1	2	3
No. of months it occurred	3	6	2	1

It costs the company ₹ 2000 to rectify a lantern. For a cost of ₹ 600 per month, preventive maintenance can be carried out to limit the breakdown to one per month.

Required:

Which policy is suitable for the company? Support your answer with needful calculations and justification. 5

- (b) Prantik (P) Ltd., a publisher, is preparing to produce the second edition of a Project Management Text Book. The activities required and their estimated times are as follows:

Activity and Identification		Estimated duration in days		
		Optimistic	Most Likely	Pessimistic
A	1-2	1	1	7
B	1-3	1	4	7
C	1-4	2	2	8
D	2-5	1	1	1
E	3-5	2	5	14
F	4-6	2	5	8
G	5-6	3	6	15

Required:

- (i) **Draw** the project network and identify all the paths through it.
- (ii) **Assess** the expected duration and variance for each activity and also project length.
- (iii) **Identify** the critical path and **assess** the EST, EFT, LST, LFT and total float for each activity. 3+3+4=10

Section-B
(Strategic Management)

Answer Question No. 6 which is compulsory and any two from Question Nos. 7, 8, & 9.

6. (a) **Choose the correct answer from the given four alternatives (You may write only the Roman numeral and Alphabet chosen for your answer)** 1×4=4
- (i) Which one of the following provides the standards for performance appraisal?
 - (A) Mission
 - (B) Vision
 - (C) Objectives
 - (D) Values
 - (ii) Which one of the following provides the broad 'data' from which to identify key drivers of change?
 - (A) BCG matrix
 - (B) PESTEL analysis
 - (C) SWOT analysis
 - (D) Critical Success Factors
 - (iii) Any metric that measures whether an organization is meeting certain objectives and goals that are set to help the organization succeed is called
 - (A) Key Result Areas
 - (B) Key Performance Areas
 - (C) Task Control
 - (D) Key Performance Indicators
 - (iv) A shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network is referred to as
 - (A) Artificial Intelligence
 - (B) Virtual Machine
 - (C) Machine Language
 - (D) Blockchain
6. (b) **State whether the following statements are 'True' or 'False'. (You may write only the roman numeral and whether 'True' or 'False' without copying the statements into the answer books):** 1×3=3
- (i) Organizational behaviour is about how people may be motivated to work together in more effective ways.
 - (ii) The term threats can also be seen as challenges.
 - (iii) The advantages of JIT system is that it enables a company to maintain buffer stock of Inventory.

- (c) **Fill in the blanks (You may write only the Roman numeral and the content filling the blanks):** 1×3=3
- (i) While under Red Ocean Strategy, focus is on current customers, in _____ Strategy, focus is on non-customers.
 - (ii) _____ exists when consumers have a preference for the products of established companies.
 - (iii) _____ is a collection of data that is huge in volume and is growing exponentially with time.
7. (a) (i) Define the term 'Strategy'.
(ii) **Explain** the three types of strategy usually considered by a typical business firm. 1+6=7
- (b) With reference to Business Environment, **examine** in detail (i) Various layers and (ii) Characteristics. 4+4=8
8. (a) (i) After assuming an organization of your own choice, **apply** the concept of Portfolio Analysis on it. Now **derive** (1) Various objectives of Portfolio Analysis and (2) Advantages of Portfolio Analysis. 3+4=7
- (b) Visualise as if you are heading a Project-based firm. **Justify** the formation of 'Project-based structure' in your firm. **Evaluate** the advantages and limitation of Project-based structures. 2+4+2=8
9. (a) What do you understand by Business Process Re-engineering? What are the important reasons that lead an organization to undertake re-engineering? 2+3=5
- (b) (i) **Compare and contrast** the two terms: Digitization and Digitalization.
(ii) **Examine** various application areas of Internet of Things (IoT). (any six) 4+6=10
-

SUGGESTED ANSWERS TO QUESTIONS

SECTION – A

1(a)

- (i) (B) Transport
- (ii) (A) Short-Term
- (iii) (B) Process Layout
- (iv) (D) Job Evaluation
- (v) (C) Productivity
- (vi) (C) MS Project
- (vii) (D) Capital Spares
- (viii) (D) None of the Above

1(b)

- (i) False
- (ii) True
- (iii) False
- (iv) False

1(c)

- (i) Resources
- (ii) Network
- (iii) Breakdown

2(a)

1. Product Selection
2. Facility Location Selection
3. Demand Forecasting
4. Process Selection & Layout Decision
5. Capacity Planning
6. Aggregate Planning, Master production schedule
7. Materials Requirement Planning (MRP) / Manufacturing Resource Planr (MRP1) / Distribution Resource Planning (DRP) / Enterprise Resource Planr (ERP)
8. Inventory Management
9. Supplier Section / Sourcing
10. Process Management
11. Quality Management
12. Maintenance
13. Warehousing / Transportation
14. Reverse Logistics

In Addition, an operations manager is also responsible for working capital management, skill – Management etc.

2 (b)

(i)

Various properties of Aggregate Planning with examples:

1. Both output and sales should be expressed in a logical overall unit of measuring. For example, an automobile manufacturing company can say 1000 vehicles per year, without giving the number of each variety of vehicle. Similarly a paint industry can say 10000 litres of paint and does not mention the quantities of each variety of colour.
2. Acceptable forecast for some reasonable planning period, say one year.
3. A method of identification and fixing the relevant costs associated with the plant. Availability of alternatives for meeting the objective of the organisation. Ability to construct a model that will permit to take optimal or near optimal decisions for the sequence of planning periods in the planning horizon.
4. Facilities that are considered fixed to carry out the objective.

(ii)

Trend values of Sales of CTV for years:

YEAR 2021	Rs. 21.30 Million
YEAR 2024	Rs. 21.60 Million
YEAR 2026	Rs. 21.80 Million

3 (a)

The Design Thinking stages :

No, these stages are not always sequential, and teams often run them in parallel, out of order and repeat them in an iterative fashion.

Examination of each stage of Design Thinking :

Stage 1: Empathize — Research Your Users Needs

Here, you should gain an empathetic understanding of the problem you're trying to solve, typically through user research. Empathy is crucial to a human-centered design process such as design thinking because it allows you to set aside your own assumptions about the world and gain real insight into users and their needs.

Stage 2: Define — State Your Users' Needs and Problems

It's time to accumulate the information gathered during the Empathize stage. You then analyze your observations and synthesize them to define the core problems you and your team have identified. These definitions are called problem statements. You can create personas to help keep your efforts human-centered before proceeding to ideation.

Stage 3: Ideate — Challenge Assumptions and Create Ideas

Now, you're ready to generate ideas. The solid background of knowledge from the first two phases means you can start to "think outside the box", look for alternative ways to view the problem and identify innovative solutions to the problem statement you've created. Brainstorming is particularly useful here...

Stage 4: Prototype — Start to Create Solutions

This is an experimental phase. The aim is to identify the best possible solution for each problem found. Your team should produce some inexpensive, scaled - down versions of the product (or specific features found within the product) to investigate the ideas you've generated. This could involve simply paper prototyping.

Stage 5: Test — Try Your Solutions Out

Evaluators rigorously test the prototypes. Although this is the final phase, design thinking is iterative: Teams often use the results to redefine one or more further problems. So, you can return to previous stages to make further iterations, alterations and refinements - to find or rule out alternative solutions.

3 (b)

(i) EDD (Early due date job first) rule:

Sequence:

Job	C	B	A	E	D
No. of days until due date	2	4	6	7	8

(ii) LS (Least Slack) or minimum Slack Rule :

Sequence:

Job	B	C	D	A	E
Slack	- 4	- 3	2	3	5

(iii) LPT (Longest Processing time) Rule:

Sequence :

Job	B	D	C	A	E
Processing time (days)	8	6	5	3	2

(iv) Critical Ratio Rule :

Sequence :

Job	C	B	D	A	E
Critical Ratio	0.4	0.5	1.33	2	3.5

4 (a)Let χ_1 be the no. of units of product 1.Let χ_2 be the no. of units of product 2.Let χ_3 be the no. of units of product 3.Objective function: Max $Z = 3\chi_1 + 3\chi_2 + 5\chi_3$

Subject to constraints:

$$\chi_1 + 2\chi_2 + \chi_3 \leq 430$$

$$3\chi_1 + 2\chi_3 \leq 460$$

$$\chi_1 + 4\chi_2 \leq 420$$

And $\chi_1, \chi_2, \chi_3 \geq 0$ (Non - negative Constraints)

4 (b)

(i)

1. Generation of 5 days of Demand for the Rental Agency :

Days	Demand
1	6
2	7
3	8
4	7
5	10

2. Average No. of Cars Rented per day for the 5 days:

6.8 Cars

3. Rental Lost Over 5 days = 4 Nos.

(ii)

(1) As Plant operates at 80% efficiency monthly output is = 200 units

(2) If the Machine productivity is reduced by 10% over existing level, the output per month = 184 units

5(a)

Break down cost per month = Rs 2160

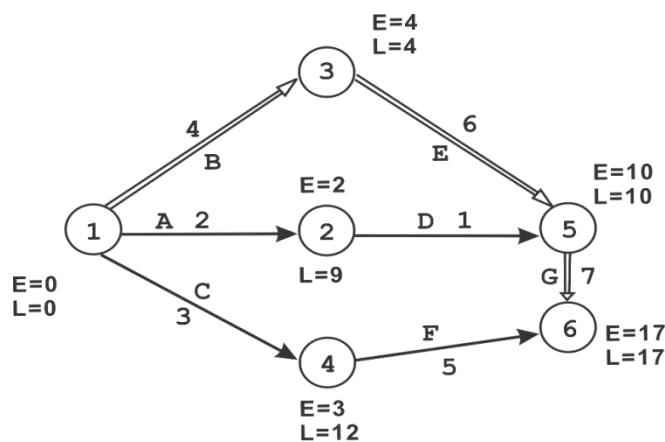
Preventive maintenance cost per month = Rs. 2600

Decision:

Since the Prevention maintenance cost per month is higher than the individual breakdown cost per month. The preventive policy is not suitable for the Company. So the Policy for rectification of individual breakdown is suitable for the Company.

5 (b)

(i) The Network is drawn as shown below :



Identification of Paths are:

(1) 1 – 3 – 5 – 6

(2) 1 – 2 – 5 – 6

(3) 1 – 4 – 6

(ii) & (iii)

Activity and Identification		$T_e =$	$V_t =$	EST	EFT	LST	LFT	Total Float
A	1 – 2	2	1	0	2	7	9	7
B	1 – 3	4	1	0	4	0	4	0
C	1 – 4	3	1	0	3	9	12	9
D	2 – 5	1	0	2	3	9	10	7
E	3 – 5	6	4	4	10	4	10	0
F	4 – 6	5	1	3	8	12	17	9
G	5 – 6	7	4	10	17	10	17	0

Project Length = 17 Days

Critical Path:

B – E – G (1 – 3 – 5 – 6)

SECTION – B

6(a)

- (i) (C) Objectives
- (ii) (B) PESTEL Analysis
- (iii) (D) Key Performance Indicators (KPI)
- (iv) (D) Blockchain

6(b)

- (i) True
- (ii) True
- (iii) False

6(c)

- (i) Blue Ocean
- (ii) Brand Loyalty
- (iii) Big Date

7 (a)

(i) "Strategy" can be defined as "the direction and scope of an organisation over the long term, which achieves advantage for the organisation through the configuration of resources within a changing environment and to fulfill stakeholder expectations.

(ii) Three types of Strategy :

• **Corporate Strategy :**

- Concerned with overall purpose and scope of an organization
- How value will be added to the different parts / business units and product lines of an organization ?
- Three main categories : stability, growth & retrenchment
- Decisions include : investments in diversification, vertical integration, acquisitions, new ventures, allocation of resources between different businesses of the firm and divestments.

• **Business Strategy :**

- It is about - how to compete successfully in particular markets.
- It emphasizes improvement of the competitive position of organisation's products or services in the specified industry or market segment served by that business unit.
- Two main categories: competitive and cooperative strategies.

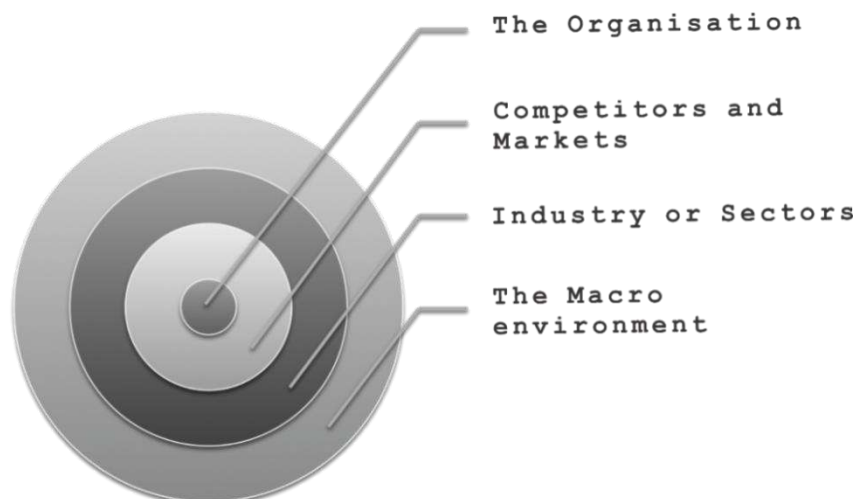
• **Functional or Operational level Strategy :**

- How the component parts of an organisation deliver effectively the corporate and business level strategies in terms of resources, processes and people ?
- Concerned with developing and nurturing competence to provide a business unit with a competitive advantage.
- Directed towards maximizing resource productivity.

7 (b)

(i)

Layers of Business Environment:



- The Macro Environment is the outermost and the highest level layer.
 - This consists of environments factors that impact to a greater or lesser extent on almost all organisations.
 - Here the PESTEL framework can be used to identify how future trends in the political, economic, social, technological, environmental and legal environments might impinge on the organisations.
- Industry or Sector form the next layer.
 - This is made up of the organisations producing the same products or service.
 - Here the Porter's 5 Framework can be used.
- Competitors and markets are the most Immediate layer surrounding organisations.
 - Within most industries or sectors, there will be many different organisations with different characteristics and competing on different bases, some closer to a particular organisation, some more remote.
 - The concept of strategic groups can help identify close more remote competitors.

Similarly, in the marketplace, customers' expectations are not all the same.

(ii) Characteristics of Business Environment :

- Environment is complex :
 - as it comprises of a number of factors like: events, conditions, influences arising from different sources interacting with each other to create entirely new sets of influences.
 - It can be understood in segments rather as a total.
- Environment is dynamic :
 - It is dynamic due to no. of factors that continuously influences its character and shape.
- Environment is Multi-faceted :
 - It's changes can be perceived differently by different individuals.
 - The changes and developments may be considered to be an opportunity to one and a threat to others.
- Environment has a far reaching impact :
 - The Impact of environment on an organisation is huge.
 - It critically underpins the growth and profitability of an organisation.
 - Any changes in an environment affect the organisation in more ways than one.
 - The very survival and existence of an organisation is critically dependent on its environment.

8 (a)

Portfolio Analysis :

(i) Various objectives :

- To analyse the current mix of business and take investment decisions.
- To develop strategies for adding new business in the portfolio thereby inducing growth.
- To decide the business to be retained and the one to be excluded from the portfolio.

(ii) Advantages of Portfolio Analysis :

- It encourages top management to evaluate each of the corporation's business individually and to set objectives and allocate resources for each.
- It stimulates the use of externally oriented data to supplement management's judgement.
- It raises the issue of cash-flow availability for use in expansion and growth.
- Its graphic depiction facilitates communication
-

8(b)

Justify the formation of "Project-based structure" in your firm :

The project-based structure is one where teams are created, undertake the work and are then dissolved. This can be particularly appropriate for your organization if it deliver large and expensive goods or services (civil, engg., information systems, films) or those delivering time-limited events (Conference, sporting events, or consulting engagements). The organisation structure is a constantly changing collection of project teams created, steered and glued together loosely by a small corporate group. Many organisations use such teams in a more adhoc way to complement the 'main' structure. For ex. Taskforces are set up to make progress on new elements of strategy or to provide momentum where the regular structure of the organisation is not effective.

Advantages of project-based structures:

- The project-based structure can be highly flexible, with projects being set up and dissolved as required.
- Accountability and control are good because project teams should have clear tasks to achieve within a define life.
- Projects can be effective at knowledge exchange as project team members will typically be drawn from different departments within the firm.
- Projects can also draw members internationally and, because project life spans are typically short, project teams may be more willing to work temporarily around the world.

Limitations of project-based structures:

- Without strong programme management providing overarching strategic control, organisations are prone to proliferate projects in an ill-coordinated fashion.
- The constant breaking up of project teams can also hinder the accumulation of knowledge over time or within specialisms.

9(a)

Business Process Re-engineering :

Business Process Re-engineering may be considered to be radical redesign of the business processes often used by companies to cut costs and return to profitability. It is fundamental re-thinking and radical re-design of business processes to achieve dramatic improvements in critical contemporary measures of performances such as cost, quality, service and speed.

Three Important reasons :

1. An organisation needs dramatic improvement to sustain itself and is already in deep trouble. High failure rates of products and repetitive customer complaints can be one of the reasons that can cause huge disruption in functioning of an organization.
2. The need for re-engineering can be felt by management keeping in mind the eminent problems that the organisation is expected to face in the future due to some dramatic changes in the environment both internal and external.
3. There can be situations when re-engineering can help organisations to be in better position than they are currently in.

9 (b)

(i) Digitization and Digitalization :

Digitization :

All analogue data needs to be converted and generated by operating machinery and legacy systems, devices, physical documents, etc. into digital data and records. Taking steps to ensure that all data to be used in the process of business transformation are relevant, generated from first-hand sources and trustworthy is important.

Digitalization : The need to use digital technologies befitting the needs for changing business, operating and revenue models with the objective to generate more turnover and achieving maximisation of value creation as well as minimisation of value destruction needs to be implemented. For example, brick and mortar business models is added with and / or replaced by virtual marketplace for e-Commerce.

(ii) Application areas of Internet of Things (IoT):

- Increasingly, organisations in a variety of industries are using IoT to operate more efficiently, better understand customers to deliver enhanced customer service, improve decision-making and increase the value of the business.
- **Access to low-cost, low-power sensor technology :**
Affordable and reliable sensors are making IoT technology possible for more manufacturers.
- **Connectivity :**
A host of network protocols for the internet has made it easy to connect sensors to the cloud and to other “things” for efficient data transfer.
- **Machine learning and analytics :**
With advances in machine learning and analytics, along with access to varied and vast amounts of data stored in the cloud, businesses can gather insights faster and more easily. The emergence of these allied technologies continues to push the boundaries of IoT and the data produced by IoT also feeds these technologies.

- **Conversational artificial intelligence (AOI) :**

Advances in neural networks have brought natural-language processing (NLP) to IoT devices (such as digital personal assistants Alexa, Cortana, and Siri) and made them appealing, affordable and viable for home use.

- **Smart Lighting :**

This is another one of the Internet of Things examples that have gradually been coming into common usage. Bulbs and battens connected to Wifi can be turned on and off remotely. Schedule for usage can be set for these devices along with their brightnesses controlled and their power consumption monitored. Using other IoT devices, smart lighting devices can also be turned on and off by voice alone. The power consumption of these devices can also be easily monitored using IoT.

- **Smart Parking :**

It is hard to regulate the occupancy and parking coverage in large multi-story car parking facilities. Among the many Internet of Things examples is the use of IoT in such facilities for counting the number of cars that have driven into the facility and the number that have driven out. Specific devices can also give you the exact location where you have parked your car so you are not lost.

- **Medical Fridges :**

Medical fridges are a grand entry to the Internet of Things examples list and can be used for regulatory compliance and safety purposes. Vials of vaccines and medicines can often be spoiled if they are not kept at the correct temperatures. Medical refrigerators cannot be monitored throughout the day, especially in person. Having IoT sensors inside medical fridges can enable them to be monitored remotely, and their temperature changed as per requirement.

CMA-INTER

MTP

(JUNE-2017 to DEC-2023)

ON

Paper-9 OMSM

BY CMA SUMIT RASTOGI

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Paper 9 – OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Paper 9- OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Full Marks: 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – A

1. (a) Choose the correct answer: [1x10=10]

- (i) Generally the size of the order for production in Job production is :
 - (a) Small
 - (b) Large
 - (c) Medium
 - (d) Very large

- (ii) The activity of specifying when to start the job and when to end the job is known as:
 - (a) Planning
 - (b) Scheduling
 - (c) Timing
 - (d) Follow-up

- (iii) In job production system, we need:
 - (a) More unskilled labours
 - (b) Skilled labours
 - (c) Semi-skilled labours
 - (d) Old people

- (iv) The lead-time is the time:
 - (a) To place holders for materials
 - (b) Time of receiving materials
 - (c) Time between receipt of material and using materials,
 - (d) Time between placing the order and receiving the materials

- (v) The method used in scheduling a project is:
 - (a) A schedule of break-down of orders
 - (b) Outline master programme
 - (c) PERT & CPM
 - (d) Schedule for large and integrated work

- (vi) The act of going round the production shop to note down the progress of work and feedback the information is known as:
 - (a) Follow up
 - (b) Dispatching
 - (c) Routing
 - (d) Trip card

- (vii) MRP stands for:
 - (a) Material requirement planning
 - (b) Material reordering planning
 - (c) Material requisition procedure
 - (d) Material recording procedure

(viii) One of the important charts used in programme control is:

- (a) Material chart
- (b) Gantt chart
- (c) Route chart
- (d) Inspection chart

(ix) Variety reduction is generally known as:

- (a) Less varieties
- (b) Simplification
- (c) Reduced varieties
- (d) None of the above

(x) Conversion of inputs into outputs is known as:

- (a) Application of technology
- (b) operations management
- (c) Manufacturing products
- (d) product

(b) Match the products in column-I with production centers in column –II: [1x6=6]

I	II
(A) Electricity	(a) Blast Furnace
(B) Petrol	(b) generator
(C) Iron	(c) Refinery
(D) Cloth	(d) Assembly line
(E) Car	(f) spinning Mill
(F) Cotton yarn	(g) power Loom

(c) State whether the following statements are True or False: [1x6=6]

- (i) Method study should precede work measurement ()
- (ii) Increased productivity leads to cost reduction ()
- (iii) A good materials handling system always consists of conveyors ()
- (iv) Project costs increase as the duration of the project increases ()
- (v) It is desirable to conduct work measurement after method study()
- (vi) No handling is the best handling ().

Answer:

- (1) (a) (i) (a) Small
- (ii) (b) Scheduling
- (iii) (b) Skilled labours
- (iv) (d) Time between placing the order and receiving the materials
- (v) (c) PERT & CPM
- (vi) (a) Follow up
- (vii) (a) Material requirement planning
- (viii) (b) Gantt chart
- (ix) (b) Simplification
- (x) (c) Manufacturing products

(b)

I	II
(A) Electricity	(b) generator
(B) Petrol	(c) Refinery
(C) Iron	(a) Blast Furnace
(D) Cloth	(f) Power Loom
(E) Car	(d) Assembly line
(F) Cotton yarn	(e) Spinning Mill

- (c) (i) Method study should precede work measurement (T)
- (ii) Increased productivity leads to cost reduction (T)
- (iii) A good materials handling system always consists of conveyors (F)
- (iv) Project costs increase as the duration of the project increases (T)
- (v) It is desirable to conduct work measurement after method study(T)
- (vi) No handling is the best handling (T).

Answer any three questions from the following:

[3x16=48]

2. (a) What are the principle functions of an operating system?

[8]

(b) What are the characteristics of a good plant layout?

[8]

Answer:

2. (a) Operations Management concern with the conversion of inputs into outputs, using physical resources, so as to provide the desired utilities to the customer while meeting the other organizational objectives of effectiveness, efficiency and adoptability. It distinguishes itself from other functions such as personnel, marketing, finance, etc. by its primary concern for 'conversion by using physical resources'. Following are the activities, which are listed under Production and Operations Management functions:

1. Location of facilities.
2. Plant layouts and Material Handling.
3. Product Design.
4. Process Design.
5. Production and Planning Control.
6. Quality Control.
7. Materials Management.
8. Maintenance Management.



Scope of production and operations management

(b) Characteristics of good plant layout-

- Efficient utilisation of labour reduced idle time of labour and equipments,
- Higher flexibility (to change the layout easily),
- Higher utilisation of space, equipment and people (employees),
- Improved employee morale and safe working conditions,
- Improved flow of materials, information and people (employees),
- Improved production capacity,

- Reduced congestion or reduced bottleneck centers,
- Reduced health hazards and accidents,
- To allow ease of maintenance,
- To facilitate better coordination and face-to-face communication where needed,
- To improve productivity,
- To provide ease of supervision,
- To provide product flexibility and volume flexibility,
- To utilise available space efficiently and effectively.

3. (a) Mention any six characteristics of a good Product Design. [6]

(b) The following data is available for a manufacturing unit:

No. of operators	:	15
Daily working hours	:	8
No. of days per months	:	25
Std. production per month	:	300 units
Std. Labour hours per unit	:	8

The following information was obtained for November 2015:

Man days lost due to absenteeism	:	30
Unit produced	:	240
Idle Time	:	276 man hours

Find the following:-

- (a) Percent absenteeism
- (b) Efficiency of utilization of labour
- (c) Productive efficiency of labour
- (d) Overall productivity of labour in terms of units produced per man per month. [10]

Answer:

3. (a) A good product design must ensure the following:

- (i) **Function or performance:** The function or performance is what the customer expects the product to do to solve his/her problem or offer certain benefits leading to satisfaction. For example, a customer for a motor bike expects the bike to start with a few kicks on the kick peddle and also expects some other functional aspects such as pick-up, maximum speed, engine power and fuel consumption etc.
- (ii) **Appearance or aesthetics:** This includes the style, colour, look, feel, etc. which appeals to the human sense and adds value to the product.
- (iii) **Reliability:** This refers to the length of time a product can be used before it fails. In other words, reliability is the probability that a product will function for a specific time period without failure.
- (iv) **Maintainability:** Refers to the restoration of a product once it has failed. High degree of maintainability is desired so that the product can be restored (repaired) to be used within a short time after it breaks down. This is also known as serviceability.
- (v) **Availability:** This refers to the continuity of service to the customer. A product is available for use when it is in an operational state. Availability is a combination of

reliability and maintainability. High reliability and maintainability ensures high availability.

(vi) Productibility: This refers to the ease of manufacture with minimum cost (economic production). This is ensured in product design by proper specification of tolerances, use of materials that can be easily processed and also use of economical processes and equipments to produce the product quickly and at a cheaper cost.

(vii) Simplification: This refers to the elimination of the complex features so that the intended function is performed with reduced costs, higher quality or more customer satisfaction. A simplified design has fewer parts which can be manufactured and assembled with less time and cost. "

(viii) Standardisation: Refers to the design activity that reduces variety among a group of products or parts. For example, group technology items have standardised design which calls for similar manufacturing process steps to be followed. Standard designs lead to variety reduction and results in economies of scale due to high volume of production of standard products. However, standardised designs may lead to reduced choices for customers.

(ix) Specification: A specification is a detailed description of a material, part or product, including physical measures such as dimensions, volume, weight, surface finish etc. These specifications indicate tolerances on physical measures which provide production department with precise information about the characteristics of products to be produced and the processes and production equipments to be used to achieve the specified tolerances (acceptable variations).

Interchangeability of parts in products produced in large volumes (mass production and flow-line production) is provided by appropriate specification of tolerances to facilitate the desired fit between parts which are assembled together.

(x) Safety: The product must be safe to the user and should not cause any accident while using or should not cause any health hazard to the user. Safety in storage, handling and usage must be ensured by the designer and a proper package has to be provided to avoid damage during transportation and storage of the product. For example, a pharmaceutical product while used by the patient, should not cause some other side effect threatening the user.

(Mention any six characteristics)

(b) No. of days per month	=	25
Daily working hrs	=	8
No. of operators	=	15
No. of Man days	=	$15 \times 25 = 375$ Man days.
Total working hrs.	=	$375 \times 8 = 3,000$
Hours lost in absenteeism	=	$30 \times 8 = 240$
(i) Percent absentees	=	$\frac{240 \text{ hrs.} \times 100}{3000 \text{ hrs.}} = 8\%$
(ii) Efficiency of utilisation of labour	=	$\frac{\text{Standard labour hour to produce 240 units}}{\text{Total labour hour}}$

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$$= \frac{240 \times 8}{3000} = 64\%$$

(iii) Standard time required to produce 240 units = $240 \times 8 = 1920$ labour-hours.

In November, man hours lost	=	30 × 8 = 240		
„ „ idle time	=	<u>276</u>		
Total loss of time	=	516 hours.		
Productive hours available in November	=	3000		
Less, Total loss of time	=	<u>516</u>		
Actual labour-hours	=	2484 hours		
Efficiency of labour	=	$\frac{\text{Std. Labour hrs.}}{\text{Actual Labour hrs.}} = \frac{1920 \times 100}{2484} = 77.3\%$		

- (v) 15 men produces 300 units,
 Std. labour productivity = $300/15 = 20$ units.
 In November, overall productivity = $240/15 = 16$ units. (Ans.)
 i.e., productivity falls by 25%.

4. (a) A captain of a cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows:

	Batting Position					
		III	IV	V	VI	VII
Batsmen	A	40	40	35	25	50
	B	42	30	16	25	27
	C	50	48	40	60	50
	D	20	19	20	18	25
	E	58	60	59	55	53

Make the assignment so that the expected total average runs scored by these batsmen are maximum. [10]

- (b) Table shows the time remaining (number of days until due date) and the work remaining (number of day's work) for 5 jobs which were assigned the letters A to E as they arrived to the shop. Sequence these jobs by priority rules viz., (a) FCFS, (b) EDD, (c) LS(d) SPT and (e) LPT. [6]

Job	Number days until due date	Number of days work remaining
A	8	7
B	3	4
C	7	5
D	9	2
E	6	6

Answer:

4. (a)

Loss Matrix

	III	IV	V	VI	VII					
A	40	40	35	25	50	20	20	25	35	10
B	42	30	16	25	27	18	30	44	35	33
C	50	48	40	60	50	10	12	20	0	10
D	20	19	20	18	25	40	41	40	42	35
E	58	60	59	55	53	2	0	1	5	7

Raw Operation

M₃

10	10	14	25	25	0
0	12	25	17	17	15
10	12	19	0	0	10
5	6	4	7	7	0
2	0	0	5	5	7

Column Operation

10	10	15	25	0
0	12	26	17	15
10	12	20	0	10
5	6	5	7	0
2	0	1	5	7

Improved Matrix

10	6	10	25	0
0	8	21	17	15
10	8	15	0	10
5	2	0	7	0
6	0	0	9	11

Maximum Average Runs

A	→	VII	-	50
B	→	III	-	42
C	→	VI	-	60
D	→	V	-	20

(b)

(a) **FCFS (First come first served):** Since the jobs are assigned letters A to E as they arrived to the shop, the sequence according to FCFS priority rule is A B C D E

(b) **EDD (Early due date job first) rule:** Taking into account the number of days until due date, the sequence of jobs as per EDD rules is B E C A D
 (3) (6) (7) (8) (9)

(c) L.S. (Least slack) rule also called as Minimum slack rule.

Calculation of slack :

Slack = (Number of days until due date) - (Number of days work remaining)

Job	Slack	(Days)
A	8-7	= 1
B	3-4	= (-1)
C	7-5	= 2
D	9-2	= 7
E	6-6	= 0

Sequence:

B	E	A	C	D
-1	0	1	2	7

(d) **SPT (Shortest Processing Time job first)** also referred as **SOT (Shortest Operation time job First)** rule or **MINPRT (Minimum Processing time job first)** rule.

Sequence:

D	B	C	E	A
2	4	5	6	7

(e) **LPT (Longest Processing time job first)** also referred to as **LOT (Longest operation time job first)** rule.

Sequence:

A	E	C	B	D
7	6	5	4	2

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5. (a) project with the following data is to be implemented,. Draw the network and find the critical path.

Activity	Predecessor	Duration(days)	Cost (₹ day)
A	-	2	50
B	-	4	50
C	A	1	40
D	B	2	100
E	A,B	3	100
F	E	2	60

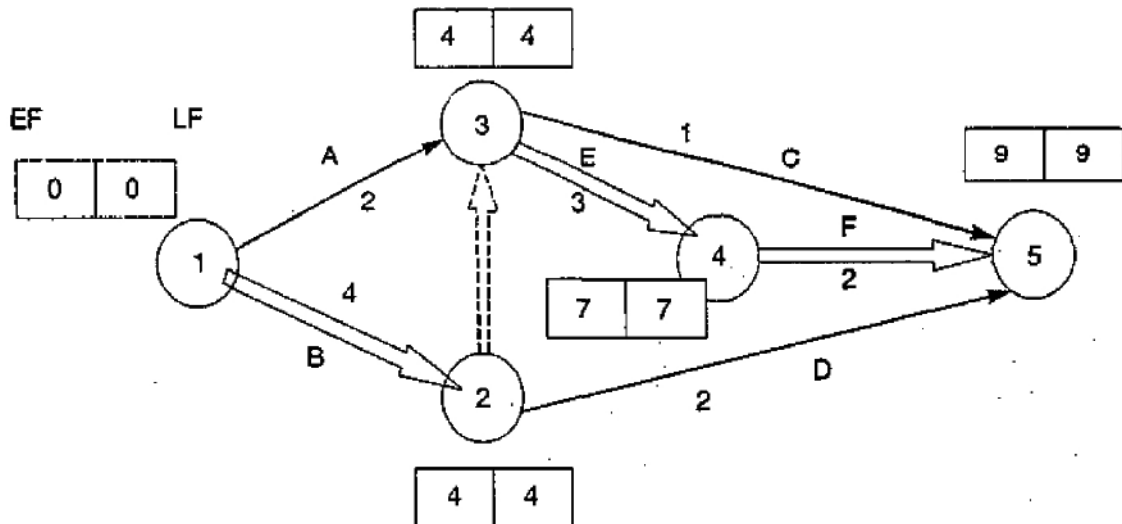
1. What is the minimum duration of the project?
 2. Draw a Gantt chart for early start schedule.
 3. Determine the peak requirement money and day on which it occurs above schedule. [8]
- (b) A public transport system is experiencing the following number of breakdowns for months over the past 2 years in their new fleet of vehicles: [8]

Number of breakdowns	0	1	2	3	4
Number of months this occurred	2	8	10	3	1

Each break down costs the firm an average of ₹ 2,800. For a cost of ₹ 1,500 per month, preventive maintenance can be carried out of limit the breakdowns to an average of one per month. Which policy is suitable for the firm?

Answer:

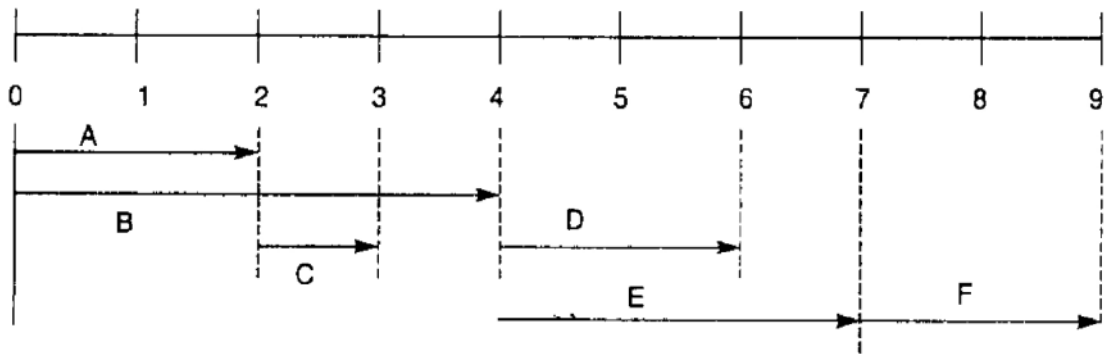
5. (a)



Critical Path 1 – 2 – 3 – 4 – 5
 Minimum time = 9

Table : Activity Relationship

Activity	t	ES (EF- t)	EF	LS (LF- t)	LF	Event Slack (LS-ES) (LF-EF)	On Critical Path
A	2	0	2	2	4	2	No
B	4	0	4	0	4	0	Yes
C	1	4	5	8	9	4	No
D	2	4	6	7	9	3	No
E	3	4	7	4	7	0	Yes
F	2	7	9	7	9	0	Yes



(b) Converting the frequencies to a probability distribution and determining the expected cost/month of breakdowns we get:

No. of breakdowns	Frequency in months	Frequency in per cent	Expected Value
0	2	0.083	0.000
1	8	0.333	0.333
2	10	0.417	0.834
3	3	0.125	0.375
4	1	0.042	0.168
		Total	1.710

Breakdown cost per month; Expected cost = $1.710 \times ₹ 2800 = ₹ 4788$.

Preventive maintenance cost per month: -

Average cost of one breakdown/month = ₹ 2,800

Maintenance contract cost/month = ₹ 1,500

Total = ₹ 4,300.

Thus, preventive maintenance policy is suitable for the firm.

Section – B

6. Choose the correct answer:

[6x1=6]

(i) A corporate strategy can be defined as:

- (a) A list of actions about operational planning and statement of organization structure and control system;
- (b) A statement of how to compete, directions of growth and method of assessing environment;
- (c) Abatement of organization's activities and allocation of resources;
- (d) A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives;
- (e) A statement of where and how the company will prefer to operate.

(ii) A strategic business unit (SUB) is defined as a division of an organization:

- (a) That help in the marketing operations;
- (b) That enable managers to have better control over the resources;
- (c) The help in the choice of technology;
- (d) that help in the allocation of scarce resources;
- (e) That help in identifying talents and potentials of people

(iii) Benchmarking is:

- (a) The analytical tool to identify high cost activities based on the 'Pareto Analysis'.
- (b) The search for industries best practices that lead to superior performance;
- (c) The simulation of cost reduction schemes that help to build commitment and improvement of actions;
- (d) The process of marketing and redesigning the way a typical company works;
- (e) The framework that earmarks a linkage with suppliers and customers;

- (iv) What are enduring statements of purpose that distinguish one business from other similar firms:
(a) Policies
(b) Mission statements
(c) Objectives
(d) Rules
(e) Nature of ownership
- (v) Indian Airlines decreasing the airfare on the Delhi – Mumbai sector following the introduction of the no frills airlines would be an example of
(a) Cost leadership
(b) Price leadership
(c) Product differentiate
(d) Focus
(e) Market retention
- (vi) Question mark in BCG Matrix is an investment, which
(a) Yields low current income but has bright growth prospects.
(b) Yields high current income and has bright growth prospects.
(c) Yields high current income and has bleak growth prospects.
(d) Yields low current income and has bleak growth prospects.

Answer:

- (6) (a) (i) (d) A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives;
(ii) (b) That enable managers to have better control over the resources;
(iii) (b) The search for industries best practices that lead to superior performance;
(iv) (b) Mission statements
(v) (b) Price leadership
(vi) (a) Yields low current income but has bright growth prospects.

Answer any one of the following Question

[1x12=12]

7. (a) What are differences between Vision and Mission? [5]
(b) Explain the objective of SWOT analysis and its advantages and criticism? [7]

Answer:

- (7) (a) There is a quote that 'great visionary can foresee the future in advance and take steps accordingly to be at forefront'.
So, we can say that:
(1) Vision provide a road map to company's future
(2) Vision indicates the kind of company management is trying to create for future.
(3) Vision specifies about company intention and capabilities to adapt to new technologies
(4) Vision also specifies management policies towards customers and societies.

The term 'mission' implies the fundamental and enduring objectives of an organization that set it apart from other organizations of similar nature. The mission is a general enduring statement of instruction of an organization.

Mission includes:

- A definition of products and services the organization provides.
- Technology used to provide these products and services.
- Types of markets.
- Customer need or requirement.
- Distinctive competencies.

(b) Objectives of SWOT analysis:

- (1) SWOT analysis involves a systematic analysis of the internal strengths and weaknesses of a firm (financial, technological, managerial) and of the external opportunities and threats in the firm's environment (changes in the markets, laws, technology and the actions of the competitors). This will provide a basis for evaluating the extent to which the firm is likely to achieve its various objectives and for identifying new products and market opportunity. It is an internal appraisal of a firm. The purpose of SWOT analysis will be to expose the strengths and weaknesses of the firm.
- (2) Further a SWOT Analysis will help in defining the strategic approach to be formulated that will fit in admirably with the environment.
- (3) An analysis of Opportunities and Threats is concerned with identifying profit-making opportunities in the business environment and for identifying threats - e.g., falling demand, new competition, government legislation etc., it is thus an external appraisal, strengths and weaknesses analysis.
- (4) Identification of shortcomings in skills or resources could lead to a planned acquisition programme or staff recruitment and training. Thus SWOT analysis helps in highlighting areas within the company, which are strong and which might be exploited more fully and weaknesses, where some defensive planning might be required to prevent the company from poor results.

Advantages:

The following may be termed as 'Opportunities' which should be timely utilised and availed of by the organisation gainfully:

- (i) Seasonal/climatical demand of products
- (ii) Global markets for the company's products/services (Export opportunities)
- (iii) Rural markets to explore and to penetrate
- (iv) To explore the markets in the undeveloped/under-developed/developing states/places
- (v) To avail of the incentives/concessions declared by Central and State Governments
- (vi) Diversifications opportunities
- (vii) Mergers/acquisition opportunities
- (viii) Good home market available due to boost in the economy
- (ix) Liberalised policies of the Government both at Centre as well as State level for the individual production and industrial developments.

Similar to opportunities, there may be threats too prevailing from time to time, which must be examined and necessary action taken to be free from these or to solve these prudently so that loss to the organisation may be minimum. The probable threats, which may arise or be faced by the organisation, are listed out as under:

Criticisms:

- (i) Globalisation
- (ii) Competition
- (iii) Price cutting war
- (iv) Free imports
- (v) Industrial unrest
- (vi) Political instability
- (vii) Quality thrusts
- (viii) High and adverse debt equity ratio
- (ix) Increase in financing cost
- (x) Economic slowdown due to international recession impact

In the above Para, details of:

- (i) Strengths
- (ii) Weaknesses
- (iii) Opportunities
- (iv) Threats

Each and every factor of the SWOT would be analysed critically to find out a best alternative out of various alternatives available.

- 8. (a) Discuss various stages in strategic planning. [6]**
(b) Define SBU. What are its merits & demerits? [6]

Answer:

- (8) (a) The stages in strategic planning are given below:

Stage I - Strategic Option Generations

At this stage, a variety of alternatives are considered, relating to the firm's product and markets, its competitors and so forth. Examples of strategies might be:

- (a) increase market share
- (b) penetration into international market
- (c) concentration on core competencies
- (d) acquisition or expansion etc.

Stage II - Strategic Options Evaluation

Each option is then examined on its merits.

- (a) does it increase existing strengths ?
- (b) does it alleviate existing weaknesses ?
- (c) is it suitable for the firm's existing position ?
- (d) is it acceptable to stakeholders ?

Stage III - Strategic Selection

It involves choosing between the alternative strategies. This process is strongly influenced by the values of the managers in selecting the strategies.

- (b) SBU groups similar divisions into "Strategic Business Units" and then delegate's authority and responsibility of each unit to a senior executive who is normally identified as CEO or MD of that SBU. It is an extension of Divisional structure.

SBU Structure

Big organisation like Unilever, etc have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc, and each is managed through separate unit head.

Advantages:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses

Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc, because each unit may work in it's own way to handle situations

(ii) High cost approach

9. Write a short note (any three) of the following:

[3x4=12]

- (a)** Strategic planning;
- (b)** Environment Analysis;
- (c)** BCG Matrix;
- (d)** Marketing mix.

Answer:

(9) (a) **Strategic Planning**

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

(b) **Environment Analysis**

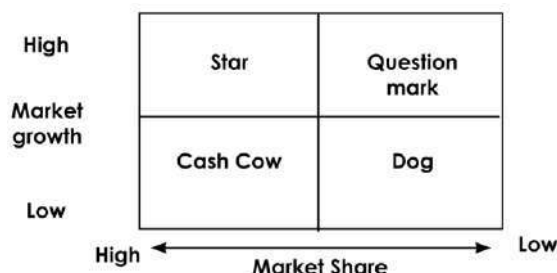
Environmental factors — both internal environment and external environment — are analysed to:

- (i) identify changes in the environment,
- (ii) identify present and future threats and opportunities, and
- (iii) assess critically it's own strengths and weaknesses.

Organisational environment encompasses all factors both inside and outside the organisation that can influence the organisation positively and negatively. Environmental factors may help in building a sustainable competitive advantage.

(c) **Boston Matrix:**

The Boston Consulting Group (BCG)'s matrix analyses 'products and businesses by market share and market growth.'



This growth/share matrix for the classification of products into cash cows, dogs, rising stars and question marks is known as the Boston classification for product-market strategy.

- (i) Stars are products with a high share of a high growth market. In the short term, these require capital expenditure, in excess of the cash they generate, in order to maintain their market position, but promise high returns in the future.
- (ii) In due course, however, stars will become cash cows, with a high share of a low-growth market. Cash cows need very little capital expenditure and generate high levels of cash income. The important strategic feature of cash cows is that they are already generating high cash returns, which can be used to finance the stars.
- (iii) Question marks are products in a high-growth market, but where they have a low market share. A decision needs to be taken about whether the products justify considerable capital expenditure in the hope of increasing their market share, or whether they should be allowed to 'die' quietly as they are squeezed out of the expanding market by rival products. Because considerable expenditure would be needed to turn a question mark into a star by building up market share, question marks will usually be poor cash generators and show a negative cash flow.
- (iv) Dogs are products with a low share of a low growth market. They may be ex-cash cows that have now fallen on hard times. Dogs should be allowed to die, or should be killed off. Although they will show only a modest net cash outflow, or even a modest net cash inflow, they are 'cash traps' which tie up funds and provide a poor return, on investment, and not enough to achieve the organisation's target rate of return.

(d) **Marketing mix**

Marketing mix is the pack of four sets of variables namely, product variables, price variables, promotion variables and place variable.

"Marketing Mix" refers to the appointment of effort, the combination, designing and integration of the elements of marketing into a programme or mix which, on the basis of an appraisal of the market forces will best achieve the objectives of an enterprise at a given time.

Kotler defines the marketing mix as the set of controllable variables and their levels that the firm uses to influence the target market. Such variables are:

- (i) Product
- (ii) Place
- (iii) Price and
- (iv) Promotion

In addition, for service-there are three more P's

They are:

- (i) People
- (ii) Processes and
- (iii) Physical evidence.

**Paper 9 – OPERATIONS MANAGEMENT
&
STRATEGIC MANAGEMENT**

Paper 9- OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Full Marks: 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – A

1. (a) Choose the correct answer: [1x10=10]

- (i) The lead-time is the time :
 - (a) To place orders for materials
 - (b) Time of receiving materials
 - (c) Time between receipt of material and using materials,
 - (d) Time between placing the order and receiving the materials

- (ii) Variety reduction is generally known as :
 - (a) Less varieties
 - (b) Simplification
 - (c) Reduced varieties
 - (d) None of the above

- (iii) To activity of specifying when to start the job and when to end the job is known as :
 - (a) Planning
 - (b) Scheduling
 - (c) Timing
 - (d) Follow-up

- (iv) Routine and Scheduling becomes relatively complicated in
 - (a) Job production
 - (b) Batch production
 - (c) Flow production
 - (d) Mass production

- (v) The scope of production planning and control is :
 - (a) Limited to production of products only
 - (b) Limited to production of services only
 - (c) Limited to production of services and products only
 - (d) Unlimited, can be applied to any type of activity

- (vi) The first stage in production planning is :
 - (a) Process Planning
 - (b) Factory planning
 - (c) Operating planning
 - (d) Layout planning

- (vii) One of the product examples for Line Layout is :
 - (a) Repair Workshop
 - (b) Welding Shop
 - (c) Engineering College
 - (d) Cement

(viii) Cost reduction can be achieved through :

- (a) Work sampling
- (b) Value analysis
- (c) Quality assurance
- (d) Supply chain management

(ix) Which of the following stages of Product Life Cycle does attribute beginning of substantial increase in Sales and Profits?

- (a) Introduction
- (b) Growth
- (c) Maturity
- (d) Decline

(x) Reliability and per unit cost of which of the following spares are less?

- (a) Regular spares
- (b) Insurance spares
- (c) Capital spares
- (d) Rotable spares

(b) Match the products in column-I with production centers in column -II: [1x6=6]

I	II
(A) Furniture	(a) Assembly line
(B) Hydro-electricity	(b) Refinery
(C) Television set	(c) Carpentry
(D) Cement	(d) Turbo-Alternator
(E) Aviation Fuel	(e) Rotary Kiln
(F) Tools	(f) Machine shop

(c) State whether the following statements are True or False:

[1x6=6]

- (i) A good materials handling system always consists of conveyors ()
- (ii) Increase in productivity leads to retrenchment of work force ()
- (iii) Project costs increase as the duration of the project increases ()
- (iv) Break-even analysis a management tool ()
- (v) There is a limit beyond which labour productivity cannot be improved ()
- (vi) Breakdown maintenance doesn't require use of standby machines ()

Answer:

1. (a) (i) (d)
 (ii) (b)
 (iii) (b)
 (iv) (b)
 (v) (d)
 (vi) (b)
 (vii) (d)
 (viii) (b)
 (ix) (b)
 (x) (a)

(b)

I	II
(A) Furniture	(c) Carpentry
(B) Hydro-electricity	(d) Turbo-Alternator
(C) Television set	(a) Assembly line
(D) Cement	(e) Rotary Kiln
(E) Aviation Fuel	(b) Refinery
(F) Tools	(f) Machine shop

- (c) (i) (F)
(ii) (T)
(iii) (T)
(iv) (T)
(v) (T)
(vi) (F)

Answer any three questions from the following:

[3x16=48]

2. (a) What is forecasting? What are its advantages? [8]

(b) M/s Kobo Bearings Ltd., is committed to supply 24,000 bearings per annum to M/s. Deluxe Fans on a steady daily basis. It is estimated that it costs 10 paise as inventory holding cost per bearing per month and that the setup cost per run of bearing manufacture is ₹ 324.

(i) What is the optimum run size for bearing manufacture?

(ii) What should be the interval between the consecutive Optimum runs?

(iii) Find out the minimum inventory holding cost. [8]

Answer:

2. (a) Forecasting is the process of making statements about events whose actual outcomes (typically) have not yet been observed.

A Forecast is a prediction of future events and their quantification for planning purposes. Forecasting involves the estimation of the trend in future variables sales, tastes or profit using both quantitative and judgment techniques whereas extrapolation is a purely statistical exercise. Forecasting includes the assessment of environmental changes and in this respect, forecasting assist in obtaining strategic fit.

The strategic environment of the firm consists of economic, political, legal, social and technological factors, which influence the ability of the organization to survive and make profits, examples of environmental variables with which a fit must be achieved include the following:

- (a) The changing tastes of the customers
- (b) Developments in the market demand for a product
- (c) The likely trend of interest and exchange rates.

Forecasting can be more than just a numerical exercise on estimated trends. Whilst trends in price, interest rates, market growth rates and margins will involve numbers, other forecast does not;

- (i) Value profiles are long range forecasts of consumers and social attitudes.
- (ii) Geopolitical forecasts consider changes in national economic power and can alert the firm to new markets or potential competitive threats.

After all, the forecast that 'the political situation is unstable' is not quantitative but it would be relevant.

The important role which Forecasting plays in strategic planning is therefore to forewarn managers of possible changes in environmental factors. The long-term nature of strategic change means that effective forecasting is necessary to given the organization time to adopt and obtain a good fit with its environment.

(b) (a) Optimum run size or Economic Batch Quantity (EBQ)

$$= \sqrt{\frac{2 \times \text{Annual Output} \times \text{Setup Cost}}{\text{Annual Cost of Carrying one unit}}} = \sqrt{\frac{2 \times 24000 \times 324}{0.10 \times 12}} = 3600 \text{ units}$$

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$$(b) \text{ Interval between two consecutive optimum runs} = \frac{\text{EBQ}}{\text{Monthly Output}} \times 3$$
$$= \frac{3600}{24000 \div 12} \times 30 = 54 \text{ Calendar days}$$

$$(c) \text{ Minimum inventory holding cost} = \text{Average inventory} \times \text{Annual carrying cost of one unit of inventory}$$
$$= (3600 \div 2) \times 0.10 \times 12 = ₹ 2,160.$$

3. (a) What does Product Design do? Discuss – Process design and selection. [6]

(b) A department works on 8 hours shift, 288 days a year and has the usage data of a machine, as given below:

Product	Annual Demand (units)	Processing time (standard time in hours)
A	325	5.0
B	450	4.0
C	550	6.0

Calculate:

(a) Processing time needed in hours to produce product A, B and C,

(b) Annual production capacity of one machine in standard hours, and

(c) Number of machines required. [10]

Answer:

3. (a) The activities and responsibilities of product design include the following:
- Translating customer needs and wants into product and service requirements (marketing).
 - Refining existing products (marketing).
 - Developing new products (marketing, product design and production).
 - Formulating quality goals (quality assurance, production).
 - Formulating cost targets (accounting).
 - Constructing and testing prototype (marketing, production).
 - Documenting specifications (product design).

Process Design is concerned with the overall sequences of operations required to achieve the product specifications. It specifies the type of work stations to be used, the machines and equipments necessary to carry out the operations. The sequence of operations are determined by (a) the nature of the product, (b) the materials used, (c) the quantities to be produced and (d) the existing physical layout of the plant.

The process design is concerned with the following:

- Characteristics of the product or service offered to the customers.
- Expected volume of output.
- Kinds of equipments and machines available in the firm.
- Whether equipments and machines should be of special purpose or general purpose.
- Cost of equipments and machines needed.
- Kind of labour skills available, amount of labour available and their wage rates.
- Expenditure to be incurred for manufacturing processes.
- Whether the process should be capital-intensive or labour-intensive.
- Make or buy decision.
- Method of handling materials economically.

(b) **Step 1:** Calculate the processing time needed in hours to produce product x, y and z in the quantities demanded using the standard time data.

Product	Annual demand (units)	Standard processing per unit (Hrs.)	Processing needed (Hrs.)
X	300	4.0	300 x 4 = 1200 Hrs.
Y	400	6.0	400 x 6 = 2400 Hrs.
Z	500	3.0	500 x 3 = 1500 Hrs.
			Total = 5100 Hrs

Step 2 : Annual production capacity of one machine in standard hours = 8 × 250 = 2000 hours per year

Step 3 : Number of machines required = $\frac{\text{Workload per year}}{\text{Production capacity per machine}} = \frac{5100}{2000} = 2.55$ machines = 3 machines.

4. (a) Priyanshu enterprise has three factories at locations A, B and C which supply three warehouses located at D, E and F. Monthly factory capacities are 10, 80 and 15 units respectively. Monthly warehouse requirements are 75, 20 and 50 units respectively. Unit shipping costs (in ₹) are given in the following table :

	To	D	E	F
	A	5	1	7
From	B	6	4	6
	C	3	2	5

The penalty costs for satisfying demand at the warehouses D, E and F are ₹ 5, ₹ 3 and ₹ 2 per unit respectively. Determine the optimum distribution for Priyanshu, using any of the known algorithms. [10]

- (b) A small retailer has studied the weekly receipts and payments over the past 200 weeks and has developed the following set of information: [6]

Weekly Receipts (₹)	Probability	Weekly Payments (₹)	Probability
3,000	0.20	4,000	0.30
5,000	0.30	6,000	0.40
7,000	0.40	8,000	0.20
12,000	0.10	10,000	0.10

Using the following set of random numbers, simulate the weekly pattern of receipts and payments for the 12 weeks of the next quarter, assuming further that the beginning bank balance is ₹ 8,000. what is the estimated balance at the end of the 12 weekly period? What is the highest weekly balance during the quarter? What is the average weekly balance for the quarter?

Answer:

4. (a)

	D	E	F		
A	5	1	7	10/0	4*
		10	200		
B	6	4	6	80/0	2/2/2
	60	10	10		
C	3	2	5	15/0	1/1/1
	15				
Dummy	5	3	2	40/0	1/1
D			40		
	75	20	50		
	60	10	10		
	0	0	0		
	2	1	3		
	2	1	3*		
	3*	2	1		

Since there are $m+n-1$ allocations optimality test can be performed.
 Since $\Delta_{ij} \geq 0$, the solution is optimum.

	D	E	F	U
A	5	1	7	0
	3	10	4	0
B	6	4	6	0
	60	10	10	
C	3	2	5	-3
	15	1	2	
Dummy	5	3	2	-4
D	3	3	40	
V	6	4	6	

		Quantity	Minimum Cost
A	E	10 x 1	10
	D	60 x 6	360
B	E	10 x 4	40
	F	10 x 6	60
C	D	15 x 3	45
Dummy	F	40 x 2	80
		145	₹ 595 (including Penalty cost of ₹ 80)

(b)

Range of random numbers							
Receipt (₹)	Probability	Cumulative probability	Range	Payments (₹)	Probability	Cumulative probability	Range
3000	0.20	0.20	0-19	4000	0.30	0.30	0-29
5000	0.30	0.50	20-49	6000	0.40	0.70	30-69
7000	0.40	0.90	50-89	8000	0.20	0.90	70-89
12000	0.10	1.00	90-99	10000	0.10	1.00	90-99

Simulation of Data for a period of 12 weeks					
Week	Random No. for receipt	Expected Receipt (₹)	Random No. for payment	Expected Payment (₹)	Week end Balance (₹)
Opening Balance					8000
1	03	3000	61	6000	5000 (8000 + 3000 - 6000)
2	91	12000	96	10000	7000
3	38	5000	30	6000	6000
4	55	7000	32	6000	7000
5	17	3000	03	4000	6000
6	46	5000	88	8000	3000
7	32	5000	48	6000	2000
8	43	5000	28	4000	3000
9	69	7000	88	8000	2000
10	72	7000	18	4000	5000
11	24	5000	71	8000	2000
12	22	5000	99	10000	(3000)

Estimated balance at the end of 12th week = ₹ (3,000)
 Highest balance = ₹ 7,000
 Average balance during the quarter = 45,000/12 = ₹ 3,750

5. (a) The following table gives data on normal time & cost and crash time & cost for a project.

Activity	Normal		Crash	
	Time (days)	Cost (₹)	Time (days)	Cost (₹)
1 - 2	6	600	4	1,000
1 - 3	4	600	2	2,000
2 - 4	5	500	3	1,500
2 - 5	3	450	1	650
3 - 4	6	900	4	2,000
4 - 6	8	800	4	3,000
5 - 6	4	400	2	1,000
6 - 7	3	450	2	800

The indirect cost per day is ₹100.

1. Draw the network and identify the critical path.
2. What are the normal project duration and associated cost? [8]

(b) A firm is using a machine whose purchase price is ₹15,000. The installation charges amount to ₹ 3,500 and the machine has a scrap value of only ₹1,500 because the firm has a monopoly of this type of work. The maintenance cost in various years is given in the following table: [8]

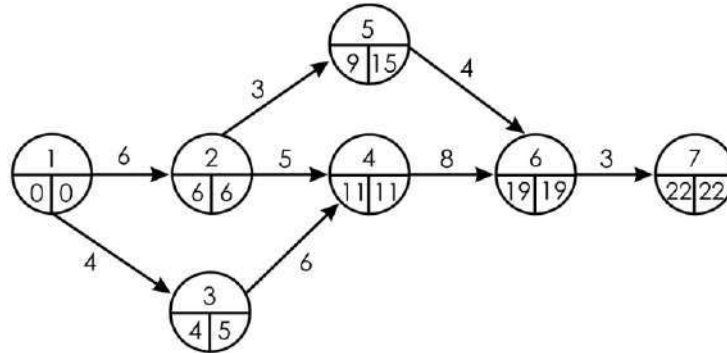
Year	1	2	3	4	5	6	7	8	9
Maintenance Cost (₹)	260	760	1100	1600	2200	3000	4100	4900	6100

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The firm wants to determine after how many years should the machine be replaced on economic considerations, assuming that the machine replacement can be done only at the year end.

Answer:

5. (a) (i) The network for normal activity times indicates a project time of 22 weeks with the critical path 1-2-4-6-7.



- (ii) Normal project duration is 22 weeks and the associated cost is as follows:

$$\begin{aligned} \text{Total cost} &= \text{Direct normal cost} + \text{Indirect cost for 22 weeks.} \\ &= 4,700 + 100 \times 22 = ₹ 6,900. \end{aligned}$$

- (b) Cost of machine, $C = ₹ 15,000 + ₹ 3,500 = ₹ 18,500$
Scrap value, $S = ₹ 1,500$.

Year	Maintenance Cost, M_1 (₹)	Cumulative Maintenance Cost, ΣM_1 (₹)	$C - S$ (₹)	Total Cost $T_{(n)}$ (₹)	Annual Cost $A_{(n)}$ (₹)
(i)	(ii)	(iii)	(iv)	(v) = (iii) + (iv)	(vi) = (v) / n
1	260	260	17,000	17,260	17,260
2	760	1,020	17,000	18,020	9,010
3	1,100	2,120	17,000	19,120	6,373
4	1,600	3,720	17,000	20,720	5,180
5	2,200	5,920	17,000	22,920	4,584
6	3,000	8,920	17,000	25,920	4,320
7	4,100	13,020	17,000	30,020	4,288*
8	4,900	17,920	17,000	34,920	4,365
9	6,100	24,020	17,000	41,020	4,557

Lowest average cost is ₹4,288 approx., which corresponds to $n = 7$ in above table. Thus machine needs to be replaced every 7th year.

Section – B

6. Choose the correct answer:

[6x1=6]

- (i) Benchmarking is :

- (a) The analytical tool to identifying high cost activities based on the 'Pareto Analysis'
- (b) The search for industries best practices that lead to superior performance
- (c) The simulation of cost reduction schemes that help to build commitment and improvement of actions
- (d) The process of marketing and redesigning the way a typical company works
- (e) The framework that earmarks a linkage with suppliers and customers

- (ii) Question mark in BCG Matrix is an investment, which :
- (a) Yields low current income but has bright growth prospects
 - (b) Yields high current income and has bright growth prospects
 - (c) Yields high current income and has bleak growth prospects
 - (d) Yields low current income and has bleak growth prospects
- (iii) Directional policy matrix is the same as :
- (a) the BCG model
 - (b) the 9 – cell GE matrix
 - (c) the life cycle portfolio analysis
 - (d) the PIMS matrix
 - (e) the 3x3 competitive positioning matrix
- (iv) For an entrepreneur :
- (a) Vision is before the mission
 - (b) Mission is before the vision
 - (c) Both are developed simultaneously
 - (d) Division or mission are un-important issue
 - (e) Profitability is most crucial
- (v) Indian Airlines decreasing the airfare on the Delhi – Mumbai sector following the introduction of the no frills airlines would be an example of
- (a) Cost leadership
 - (b) Price leadership
 - (c) Product differentiate
 - (d) Focus
 - (e) Market retention
- (vi) A product line is a group of product that
- (a) are closely related
 - (b) are marketed through the same channel
 - (c) perform a similar function for being sold to the same customers
 - (d) All of the above

Answer:

6. (a) (i) (b)
(ii) (a)
(iii) (b)
(iv) (a)
(v) (b)
(vi) (d)

Answer any one question from the following:

[1x12=12]

7. (a) What do you mean by strategy? Discuss its features.

[5]

(b) Discuss Contingency Planning & its seven steps?

[7]

Answer:

7. (a) **STRATEGY:**

Strategy is all about integrating organizational activities and utilizing and allocating the scarce resources within the organizational environment so as to meet the present objectives. While planning a strategy it is essential to consider that decisions are not taken in a vacuum and that any act taken by a firm is likely to be met by a reaction from those affected, competitors, customers, employees or suppliers.

Strategy can also be defined as knowledge of the goals, the uncertainty of events and the need to take into consideration the likely or actual behavior of others. Strategy is the outline of decisions in an organization that shows its objectives and goals, reduces the key policies, and plans for achieving these goals, and defines the business the company is to carry on, the type of economic and human organization it wants to be, and the contribution it plans to make to its shareholders, customers and society at large.

Features of Strategy:

- (i) Strategy is important to foresight, the uncertain events of firms/industries .
 - (ii) Strategy deals with long term developments rather than routine operations. For example innovations or new products, new methods of productions, or new markets to be developed in future.
 - (iii) Strategy is created to deal behavior of customers and competitors.
 - (iv) Strategy is a well defined roadmap of an organization. It defines the overall mission, vision and direction of an organization. The objective of a strategy is to maximize an organization's strengths and to minimize the strengths of the competitors.
- (b) Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected. Only high-priority areas require the insurance of contingency plans. Strategists cannot and should not try to cover all bases by planning for all possible contingencies. But in any case, contingency plans should be as simple as possible.

Steps in Contingency Planning

Robert Linnemam and Rajan Chandran have suggested that a seven step process as follows:

Step 1 - Identify the beneficial and unfavourable events that could possibly derail the strategy or strategies.

Step 2 - Specify trigger points. Calculate about when contingent events are likely to occur.

Step 3 - Assess the impact of each contingent event. Estimate the potential benefit or harm of each contingent event.

Step 4 - Develop contingency plans. Be sure that contingency plans are compatible with current strategy and are economically feasible.

Step 5 - Assess the counter impact of each contingency plan. That is, estimate how much each contingency plan will capitalize on or cancel out its associated contingent event. Doing this will quantify the potential value of each contingency plan.

Step 6 - Determine early warning signals for key contingency event. Monitor the early warning signals.

Step 7 - For contingent event with reliable early warning signals, develop advance action plans to take advantage of the available lead time.

8. (a) Discuss various stages in strategic planning. [6]

(b) Define SBU. What are its merits & demerits? [6]

Answer:

(8) (a) The stages in strategic planning are given below:

Stage I - Strategic Option Generations

At this stage, a variety of alternatives are considered, relating to the firm's product and markets, its competitors and so forth. Examples of strategies might be:

- (a) increase market share
- (b) penetration into international market

- (c) concentration on core competencies
- (d) acquisition or expansion etc.

Stage II - Strategic Options Evaluation

Each option is then examined on its merits.

- (a) does it increase existing strengths ?
- (b) does it alleviate existing weaknesses ?
- (c) is it suitable for the firm's existing position ?
- (d) is it acceptable to stakeholders ?

Stage III - Strategic Selection

It involves choosing between the alternative strategies. This process is strongly influenced by the values of the managers in selecting the strategies.

- (b) SBU groups similar divisions into "Strategic Business Units" and then delegate's authority and responsibility of each unit to a senior executive who is normally identified as CEO or MD of that SBU. It is an extension of Divisional structure.

SBU Structure

Big organisation like Unilever, etc have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc, and each is managed through separate unit head.

Advantages:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses

Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc, because each unit may work in it's own way to handle situations
- (ii) High cost approach

9. Write a short note on any of the following three questions:

[3x4=12]

- (a) SWOT Analysis;
- (b) BCG Matrix;
- (c) Strategic Planning;
- (d) Market Penetration Strategy.

Answer:

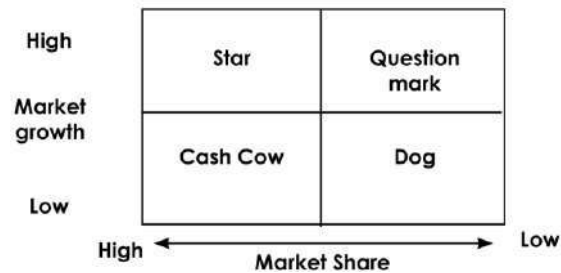
9. (a) Swot Analysis:

Gathering data about the general, operating, and internal environments provides the raw material from which to develop a picture of the organisational environment.

SWOT analysis refines this body of information by applying a general framework for understanding and managing the environment in which an organisation operates. (The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.) In many respects, the sophisticated ana-lytical techniques discussed throughout the text are further refinements of basic SWOT analysis. In addition, students have repeatedly told us that SWOT is an excellent way to begin a case analysis. SWOT analysis attempts to assess the internal strengths and weaknesses of an organisation and the opportunities and threats that it's external environment presents. SWOT seeks to isolate the major issues facing an organisation through careful analysis of each of these four elements. Managers can then formulate strategies to address key issues.

(b) Boston Matrix:

The Boston Consulting Group (BCG)'s matrix analyses 'products and businesses by market share and market growth.'



This growth/share matrix for the classification of products into cash cows, dogs, rising stars and question marks is known as the Boston classification for product-market strategy.

- (i) Stars are products with a high share of a high growth market. In the short term, these require capital expenditure, in excess of the cash they generate, in order to maintain their market position, but promise high returns in the future.
- (ii) In due course, however, stars will become cash cows, with a high share of a low-growth market. Cash cows need very little capital expenditure and generate high levels of cash income. The important strategic feature of cash cows is that they are already generating high cash returns, which can be used to finance the stars.
- (iii) Question marks are products in a high-growth market, but where they have a low market share. A decision needs to be taken about whether the products justify considerable capital expenditure in the hope of increasing their market share, or whether they should be allowed to 'die' quietly as they are squeezed out of the expanding market by rival products. Because considerable expenditure would be needed to turn a question mark into a star by building up market share, question marks will usually be poor cash generators and show a negative cash flow.
- (iv) Dogs are products with a low share of a low growth market. They may be ex-cash cows that have now fallen on hard times. Dogs should be allowed to die, or should be killed off. Although they will show only a modest net cash outflow, or even a modest net cash inflow, they are 'cash traps' which tie up funds and provide a poor return, on investment, and not enough to achieve the organisation's target rate of return.

(c) Strategic Planning

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

(d) Market Penetration Strategy:

		Products	
		Existing	New
Markets	Existing	Market penetration	Product development
	New	Market development	Diversification ➤ Related ➤ unrelated

Firm increases its sales in its present line of business. This can be accomplished by:

- (i) price reductions;
- (ii) increases in promotional and distribution support;
- (iii) acquisition of a rival in the same market;
- (iv) modest product refinements.

These strategies involve increasing the firm's investment in a product/market and so are generally only used in markets which are growing, and hence the investment may be recouped. In this respect the strategy is similar to invest to build and holding strategy as described by the Boston Consulting Group.

Paper 9 – Operations Management & Strategic Management

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Paper 9 – Operations Management & Strategic Management

Full Marks : 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – I: (Operations Management)

1. (a) Choose the most correct alternatives: [1×10=10]
- (i) The activity of specifying when to start the job and when to end the job is known as:
 - (a) Planning,
 - (b) Scheduling,
 - (c) Timing,
 - (d) Follow-up.
 - (ii) Routine and Scheduling becomes relatively complicated in
 - (a) Job production,
 - (b) Batch production,
 - (c) Flow production,
 - (d) Mass production
 - (iii) Conducting occasional check-ups of the products manufactured or assembled to ensure high quality of the production is known as:
 - (a) Planning
 - (b) Scheduling
 - (c) Inspection
 - (d) Routing
 - (iv) This aims at finding the best and most efficient way of using the available resources - men, materials, money and machinery:
 - (a) Time Study
 - (b) Work Study
 - (c) Method Study
 - (d) Job Evaluation
 - (v) The time by which an activity can be rescheduled without affecting the other activities - preceding or succeeding is called as
 - (a) Slack
 - (b) Independent Float
 - (c) Free Float
 - (d) Total Float
 - (vi) Which one of the following standards is associated with the "Quality Assurance in Final Inspection Test"?
 - (a) ISO 9001
 - (b) ISO 9002
 - (c) ISO 9003
 - (d) ISO 9004
 - (vii) The lead time is
 - (a) Time for placeholders for materials
 - (b) Time of receiving materials
 - (c) Time between receipt of material and using materials
 - (d) Time between placing the order and receiving the materials

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- (viii) Which of the following models deals with the physical movement of goods from different supply origins to a number of different demand destinations?
- (a) Simulation
 - (b) Transportation
 - (c) Lean operations
 - (d) Line balancing
- (ix) The recent trend in the Production/Operations management which suggests the use of minimal amount of resources to produce a high volume of high quality goods with some variety is referred to as:
- (a) SCM
 - (b) TQM
 - (c) Lean Production
 - (d) Just-In-Time
- (x) With reference to project management, identify which of the following statement is NOT correct?
- (a) Gantt chart is a principal tool used in scheduling and also in some methods of loading.
 - (b) Routing is the first step in the production planning.
 - (c) The cost of any activity is proportional to its time of completion.
 - (d) The free float can be calculated by subtracting EFT from EST.

(b) Match the terms in Column I with the relevant terms in Column II

[1×6=6]

Column I	Column II
(A) Furniture	(i) Assembly line
(B) Hydro-electricity	(ii) Job Evaluation
(C) Television set	(iii) Carpentry
(D) Cement	(iv) Turbo-alternator
(E) Aviation Fuel	(v) Rotary Kiln
(F) Ranking Method	(vi) Refinery

(c) State whether the following statements are True/False?

[1×4=4]

- (i) Merit Rating is used to determine the cost of a product ()
- (ii) Increase in productivity leads to retrenchment of work force ()
- (iii) Project costs increase as the duration of the project increases ()
- (iv) Job Evaluation is a systematic approach to ascertain the labour worth of a job ()
- (v) Production planning and control is essentially concerned with the control of Finished goods ()
- (vi) Breakdown maintenance doesn't require use of standby machines ()

Answer:

1. (a) (i) (b)
(ii) (b)
(iii) (c)
(iv) (b)
(v) (b)
(vi) (c)
(vii) (d)
(viii) (b)
(ix) (c)
(x) (d)

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(b)

Column I	Column II
(A) Furniture	(i) Carpentry
(B) Hydro-electricity	(ii) Turbo-alternator
(C) Television set	(iii) Assembly line
(D) Cement	(iv) Rotary Kiln
(E) Aviation Fuel	(v) Refinery
(F) Ranking Method	(vi) Job Evaluation

- (c) (i) (False)
(ii) (True)
(iii) (True)
(iv) (True)
(v) (False)
(vi) (False)

2. (a) Define forecasting. Why sales forecasting is the most important activity in the business? [6]

(b) An investigation into the use of scooters in 5 towns has resulted in the following data:
Population in town

Population in town (in lakhs)	(X)	4	6	7	10	13
No. of scooters	(Y)	4,400	6,600	5,700	8,000	10,300

Fit a linear regression of Y on X and estimate the number of scooters to be found in a town with a population of 16 lakhs. [10]

Answer:

2. (a) Forecasting means peeping into the future. As future is unknown and is anybody's guess but the business leaders in the past have evolved certain systematic and scientific methods to know the future by scientific analysis based on facts and possible consequences. Thus, this systematic method of probing the future is called forecasting.

All business and industrial activities revolve around the sale and its future planning. To know what a business will do we must know its future sales. All other activities depend upon the sales of the concern. Sales forecasting as a guiding factor for a firm because it enables the firm to concentrate its efforts to produce the required quantities, at the right time at reasonable price and of the right quality. Sales forecasting is the basis of planning the various activities i.e.; production activities, pricing policies, programme policies and strategies, personnel policies as to recruitment, transfer, promotion, training, wages etc.

(b)

Computation of trend value

Population (in lakhs) (X)	No. of scooters Demanded (Y)	Squares of Population (X ²)	Product of population and No. of scooters demanded (XY)
4	4,400	16	17,600
6	6,600	36	39,600
7	5,700	49	39,900
10	8,000	100	80,000
13	10,300	169	1,33,900
$\Sigma X = 40$	$\Sigma Y = 35,000$	$\Sigma X^2 = 370$	$\Sigma XY = 3,11,000$

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Regression equation of Y on X

$$Y = a + bX$$

To find the values of a and b we will have to solve the following two equations

$$\Sigma Y = na + b\Sigma X \quad \dots (i)$$

$$\Sigma XY = a\Sigma X + b\Sigma X^2 \quad \dots(ii)$$

By putting the values, we get

$$35,000 = 5a + 40b \quad \dots (iii)$$

$$3,11,000 = 40a + 370b \quad \dots (iv)$$

By multiplying equation no. (iii) by 8 putting as equation (v) we get,

$$2,80,000 = 40a + 320b \quad \dots (v)$$

By subtracting equation (v) from equation (iv), we get

$$31,000 = 50b$$

$$\text{or, } 50b = 31,000$$

$$\text{or, } b = 31000/50 = 620$$

By substituting the value of b in equation no. (iii), we get

$$35,000 = 5a + 40b$$

$$\text{or } 35,000 = 5a + 40 \times 620$$

$$\text{or } 35,000 = 5a + 24,800$$

$$\text{or } 10,200 = 5a$$

$$\text{or } a = 10200/5 = 2040$$

Now putting the values of a and b the required regression equation of Y on X, is

$$Y = a + bX \quad \text{or, } Y = 2040 + 620 X$$

$$\text{When } X = 16 \text{ lakhs then } Y = 2040 + 620 (16)$$

$$\text{or } Y = 2040 + 9920$$

$$\text{or } Y = 11,960$$

Hence, the expected demand of scooters for a town with a population of 16 lakhs will be 11,960 scooters.

3. (a) What does Product Design do? Discuss – Process design and selection. [6]

(b) Machine A costs of ₹ 80,000. Annual operating costs are ₹ 2,000 for the first year, and they increase by ₹ 15,000 every year (for example, in the fourth year the operating costs are ₹ 47,000). Determine the lease age at which to replace the machine. If the optimal replacement policy is followed; what will be the average yearly cost of operating and owning the machine? (Assume that the resale value of the machine is zero when replaced, and that future costs are not discounted.

(i) Another machine B costs ₹ 1,00,000. Annual operating cost for the first year is ₹ 4,000 and they increase by ₹ 7,000 every year. The firm has a machine of type A which is one year old. Should the firm replace it with B and if so, when?

(ii) Suppose the firm is just ready to replace the machine A with another machine of the same type, just then the firm gets and information that the machine B will become available in a year. What should the firm do? [10]

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Answer:

3. (a) The activities and responsibilities of product design include the following:

- (i) Translating customer needs and wants into product and service requirements (marketing).
- (ii) Refining existing products (marketing).
- (iii) Developing new products (marketing, product design and production).
- (iv) Formulating quality goals (quality assurance, production).
- (v) Formulating cost targets (accounting).
- (vi) Constructing and testing prototype (marketing, production).
- (vii) Documenting specifications (product design).

Process Design is concerned with the overall sequences of operations required to achieve the product specifications. It specifies the type of work stations to be used, the machines and equipments necessary to carry out the operations. The sequence of operations are determined by (a) the nature of the product, (b) the materials used, (c) the quantities to be produced and (d) the existing physical layout of the plant.

The process design is concerned with the following:

- (i) Characteristics of the product or service offered to the customers.
- (ii) Expected volume of output.
- (iii) Kinds of equipments and machines available in the firm.
- (iv) Whether equipments and machines should be of special purpose or general purpose.
- (v) Cost of equipments and machines needed.
- (vi) Kind of labour skills available, amount of labour available and their wage rates.
- (vii) Expenditure to be incurred for manufacturing processes.
- (viii) Whether the process should be capital-intensive or labour-intensive.
- (ix) Make or buy decision.
- (x) Method of handling materials economically.

(b) The operating cost of machine A in successive years are as follows:

Year	1	2	3	4	5
Operating Cost (₹)	2,000	17,000	32,000	47,000	62,000

Calculations for average cost of Machine A

Replacement at the end of year	Cumulative operating cost (in ₹)	Depreciation Cost (in ₹)	Total Cost (in ₹)	Average Cost per year (in ₹)
1	2,000	80,000	82,000	82,000
2	19,000	80,000	99,000	49,500
3	51,000	80,000	1,31,000	43,666
4	98,000	80,000	1,78,000	44,500
5	1,60,000	80,000	2,40,000	48,000

It is clear from the table that machine A should be replaced at the end of third year. The average yearly, cost of owning & operating machine A in this situation will be ₹ 43,666.

(i) The operating cost of machine B are as follows:

Year	1	2	3	4	5	6
Operating Cost (₹)	4,000	11,000	18,000	25,000	32,000	39,000

Calculations for average cost of Machine B

Replacement at the end of year	Cumulative operating cost (in ₹)	Depreciation Cost (in ₹)	Total Cost (in ₹)	Average Cost per year (in ₹)
1	4,000	1,00,000	1,40,000	1,04,000
2	15,000	1,00,000	1,15,000	57,500
3	33,000	1,00,000	1,33,000	44,333
4	88,000	1,00,000	1,58,000	39,500
5	90,000	1,00,000	1,90,000	38,000
6	1,29,000	1,00,000	2,29,000	38,166

It is clear from the above Table that if machine B is replaced after 5 years then its average cost per year is ₹ 38,000. Since the lowest average cost for machine B (₹ 38,000) is less than the lowest average cost for machine A (₹ 43,666), the machine A should be replaced by machine B. Now to find the time of replacement of Machine A by Machine B, we proceed as follows:

The machine A is replaced by machine B at the time (age), when its running cost of the next year exceed the lowest average yearly cost ₹ 38,000 of machine B. Further, the total cost of the machine A in the successive years are computed as follows:

Year	1	2	3	4	5
Total cost in the year (₹)	82,000	99,000 – 82,000 = 17,000	1,31,000 – 99,000 = 32,000	1,78,000 – 1,31,000 = 47,000	2,40,000 – 1,78,000 = 62,000

The running cost of fourth year of machine A is ₹ 47,000 which is more than the lowest average yearly cost ₹ 38,000 of machine B. therefore, the machine A should be replaced by machine B, when its age is 1 year. Since the machine A is one year old now, it should be replaced just now.

(ii) Install new machine now and replace it with machine B during the third year.

4. (a) **A farmer has a firm with 125 acres. He produces Carrot, Beetroot and Potato. Whatever he produces is fully sold in the market. He gets ₹ 5 per kg for carrot, ₹ 4 per kg for Beetroot and ₹ 5 per kg for potato. The average yield is 1500 kg for Carrot per acre, 1800 kg of Beetroot per acre and 1200 kg of potato per acre. To produce each 100 kg of Carrot and Beetroot and 80 kg of Potato, a sum of ₹ 12.50 has to be spent for manure. Labour required for each acre to raise the crop is 6 men – days for carrot and Potato each and 5 man-days for Beetroot. A total of 500 man days of labour of the rate of ₹ 40 per man – day are available. Formulate a LPP to maximize the farmer's total profit.** [10]

(b) Describe the objective of Time Study. [6]

Answer:

4. (a) Let X_1 , X_2 and X_3 be the number of acres allotted for cultivating carrot, beetroot and potato respectively. The profit from the produces is determined in the following manner -

Particulars per acre	Carrot	Beetroot	Potato
Selling Price	₹ 5 per Kg × 1500Kgs = ₹ 7500	₹ 4 per Kg. × 1800 Kgs. = ₹ 7200	₹ 5 per Kg × 1200 Kgs = ₹ 6000
Less: Manure Cost	1500 Kgs × ₹ 12.50/100 = ₹ 187.50	1800 Kgs × 12.50/100 = ₹ 225.00	1200 Kgs. × ₹ 12.50/80 = ₹ 187.50
Less: Labour Cost	₹ 40 × 6 = ₹ 240	₹ 40 × 5 = ₹ 200	₹ 40 × 6 = ₹ 240
Profit per acre	₹ 7072.50	₹ 6775	₹ 5572.50

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Maximize Profit $Z = 7072.50 X_1 + 6775 X_2 + 5572.5 X_3$

Subject to $X_1 + X_2 + X_3 \leq 125$ (Land availability)
 $6X_1 + 5X_2 + 6X_3 \leq 500$ (Man days availability)
 $X_1, X_2, X_3 \geq 0$ (Non-Negativity assumption)

(b) Time study is concerned with the determination of the amount of time required to perform a unit of work. It consists of the process of observing and recording the time required to perform each element of an operation so as to determine the reasonable time in which the work should be completed. Time study is defined by ILO as below 'Time study is a work measurement technique for recording the times and rates of working for the elements of a specified job carried out under specified conditions and for analyzing the data so as to obtain the time necessary for carrying out the job at a defined level of performance'.

Objective of time study:

The main objective is 'to determine by direct observation, the quantity of human work in a specified task and hence to establish the standard time, within which an average worker working at a normal pace should complete the task using a specified method'.

The other objectives are:

- (i) To furnish a basis of comparison for determining operating effectiveness.
- (ii) To set labour standard for satisfactory performance.
- (iii) To compare alternative methods in method study in order to select the best method.
- (iv) To determine standard costs.
- (v) To determine equipment and labour requirements.
- (vi) To determine basic times/normal times.
- (vii) To determine the number of machines an operator can handle.
- (viii) To balance the work of operators in production or assembly lines.
- (ix) To provide a basis for setting piece rate or incentive wages.
- (x) To set the completion schedules for individual operations or jobs.

5. (a) Draw the network for the following activities and find critical path and total duration of project.

Activity	Duration (months)	Activity	Duration (months)
1-2	2.5	4-5	2.0
2-3	2.5	5-6	3.0
2-4	1.5	6-7	1.5
3-4	1.0	5-7	1.5
3-5	1.0		

[8]

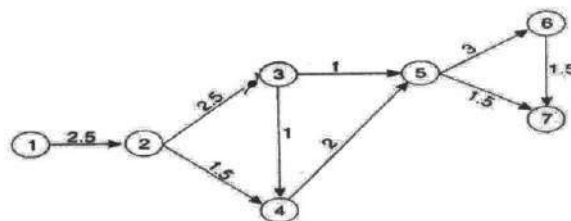
(b) Product A has a Mean Time Between Failures (MTBF) of 30 hours and has a Mean Time to Repairs (MTTR) of 5 hours. Product B has a MTBF of 40 hours and has a MTTR of 2 hours.

- (i) Which product has the higher reliability?
- (ii) Which product has greater maintainability?
- (iii) Which product has greater availability?

[8]

Answer:

5. (a)



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Paths	Duration
1-2-3-5-6-7	$2.5+2.5+1+3+1.5 = 10.5$
1-2-3-5-7	$2.5+2.5+1+1.5 = 7.50$
1-2-3-4-5-6-7	$2.5+2.5+1+2+3+1.5 = 12.5$ (Critical Path)
1-2-3-4-5-7	$2.5+2.5+1+2+1.5 = 9.5$
1-2-4-5-7	$2.5+1.5+2+1.5 = 7.5$
1-2-4-5-6-7	$2.5+1.5+2+3+1.5 = 10.5$

- (b) (i) Product B, with higher MTBF (i.e., 40 hours) than Product A (i.e., 30 hours), is more reliable since it has lesser change failure during servicing.
- (ii) By MTTR we mean the time taken to repair a machine and put it into operation. Thus Product B, with lesser MTTR (i.e., 2 hours) than Product A (i.e., 5 hours), has greater maintainability.
- (iii) Availability of a machine/product = $\frac{MTBF}{MTBF+MTTR}$
Therefore, availability of Product A = $\frac{30}{30+5} = \frac{30}{35} = 85.714\%$
Availability of product B = $\frac{40}{40+2} = \frac{40}{42} = 95.238\%$
Hence, Product B has more availability.

Section – II: (Strategic Management)

6. Choose the correct answer from the given alternatives:

[1×6=6]

- (i) A strategic business unit (SUB) is defined as a division of an organisation:
- (a) That help in the marketing operation;
 - (b) That enable managers to have better control over the resources;
 - (c) That help in the choice of technology;
 - (d) That help in the allocation of scarce resources;
 - (e) That help in identifying talents and potentials of people.
- (ii) The essential ingredients of Business Process Re-engineering are:
- (a) Continuous improvements of products, processes and technologies.
 - (b) Advanced planning in the areas of technologies, processes and strategic partnerships etc.
 - (c) Fundamental rethinking and radical redesign of business process to achieve dramatic results.
 - (d) Generation, comparison and evolution of many ideas to find out one worthy of development.
 - (e) Identification and selection of layouts most suited for products and processes.
- (iii) Matrix structure
- (a) Structural grouping is geographic
 - (b) Simultaneous combination of similar activities on the basis of function
 - (c) Adopts parts of both functional and divisional structures at the same level of management
 - (d) Creates a dual chain of command
- (iv) The conditional of Low share, Negative growth and negative cash flow indicates -
- (a) Dogs.
 - (b) Dodos.
 - (c) Donkey.
 - (d) Dinosaurs.

- (v) Mckinsey's 7-s framework consists of:
- (a) Structure, strategy, software, skills, styles, staff and supervision
 - (b) Structure, strategy, systems, skills, styles, syndication and shared values.
 - (c) Structure, strategy, systems, skills, steering power, styles and shared values.
 - (d) Structure, strategy, staff, skills, systems, shared values, super ordinate goal.
 - (e) None of the above.
- (vi) A product line is a group of product that
- (a) are closely related
 - (b) are marketed through the same channel
 - (c) performance a similar function for being sold to the same customers
 - (d) all of the above

Answer:

6. (i) (b)
(ii) (c)
(iii) (d)
(iv) (b)
(v) (d)
(vi) (d)

Answer any one question form the following:

7. (a) What do you mean by Strategies? State its features.

(b) Discuss contingency planning & its seven steps.

[6+6]

Answer:

7. (a) Strategy is all about integrating organizational activities and utilizing and allocating the scarce resources within the organizational environment so as to meet the present objectives. While planning a strategy it is essential to consider that decisions are not taken in a vacuum and that any act taken by a firm is likely to be met by a reaction from those affected, competitors, customers, employees or suppliers.

Strategy can also be defined as knowledge of the goals, the uncertainty of events and the need to take into consideration the likely or actual behavior of others. Strategy is the outline of decisions in an organization that shows its objectives and goals, reduces the key policies, and plans for achieving these goals, and defines the business the company is to carry on, the type of economic and human organization it wants to be, and the contribution it plans to make to its shareholders, customers and society at large.

Features of Strategy:

- (i) Strategy is important to foresight, the uncertain events of firms/industries.
- (ii) Strategy deals with long term developments rather than routine operations. For example innovations or new products, new methods of productions, or new markets to be developed in future.
- (iii) Strategy is created to deal behavior of customers and competitors.
- (iv) Strategy is a well defined roadmap of an organization. It defines the overall mission, vision and direction of an organization. The objective of a strategy is to maximize an organization's strengths and to minimize the strengths of the competitors.

- (b) Contingency plans can be defined as alternative plans that can be put into effect if certain key events do not occur as expected. Only high-priority areas require the insurance of contingency plans. Strategists cannot and should not try to cover all bases by planning for all possible contingencies. But in any case, contingency plans should be as simple as possible.

Steps in Contingency Planning

Robert Linnemam and Rajan Chandran have suggested that a seven step process as follows:

Step 1 - Identify the beneficial and unfavourable events that could possibly derail the strategy or strategies.

Step 2 - Specify trigger points. Calculate about when contingent events are likely to occur.

Step 3 - Assess the impact of each contingent event. Estimate the potential benefit or harm of each contingent event.

Step 4 - Develop contingency plans. Be sure that contingency plans are compatible with current strategy and are economically feasible.

Step 5 - Assess the counter impact of each contingency plan. That is, estimate how much each contingency plan will capitalize on or cancel out its associated contingent event. Doing this will quantify the potential value of each contingency plan.

Step 6 - Determine early warning signals for key contingency event. Monitor the early warning signals.

Step 7 - For contingent event with reliable early warning signals, develop advance action plans to take advantage of the available lead time.

8. (a) Discuss the differences in Strategic Management & Strategic Planning.

(b) Define SBU. What are its merits & demerits?

[6+6]

Answer:

8. (a) The basic difference between Strategic management and Strategic planning are as follows:

Strategic Management	Strategic Planning
1. It is focused on producing strategic results; new markets; new products; new technologies etc.	1. It is focused on making optimal strategic decisions
2. It is management by results.	2. It is management by plans
3. It is an organizational action process	3. It is an analytical process
4. It broadens focus to include psychological, sociological and political variables.	4. It is focused on business, economic and technological variables
5. It is about choosing things to do and also about the people who will do them.	5. It is about choosing things to do

- (b) SBU groups similar divisions into "Strategic Business Units" and then delegate's authority and responsibility of each unit to a senior executive who is normally identified as CEO or MD of that SBU. It is an extension of Divisional structure.

SBU Structure

Big organisation like Unilever, etc have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc, and each is managed through separate unit head.

Advantages:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses

Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc, because each unit may work in it's own way to handle situations
- (ii) High cost approach

9. Write short notes on any three of the following four questions:

[4×3=12]

- (a) PEST Framework;**
- (b) Approaches in Strategic Planning;**
- (c) SWOT Analysis;**
- (d) Plant location.**

Answer:

- 9. (a)** PEST analysis refers to Political, Economical, Social, and Technological factors which manipulate the business environment. SWOT analysis refers to Strengths, Weaknesses, Opportunity and Threats. These factors are prime determinants of strategic planning. Without SWOT and PEST analysis companies might fail to achieve desired goals.

PEST Analysis looks at external factors and is primarily used for market research. It is used as an alternative to SWOT analysis:

- (i) Political – These are the external factors that influence the business environment. Government decisions and policies affect a firm's position and structure, Tax laws, monetary and fiscal policies as well as reforms of labor and workforce, all influence companies in future. These factors are important and need to be managed in order to overcome uncertainty.
- (ii) Economical – Economical factors are the most important since it impacts business in the long run. Inflation, interest rates, economic growth and demand/supply trends are to be considered and analyzed effectively before planning and implementing. Economic factors affect both consumers and enterprises.
- (iii) Social – Social factors involve the trends of population, domestic markets, cultural trends and demographics. These factors help businesses assess the market and improve their products/service accordingly.
- (iv) Technological – This analyses the technology trends and advancements in business environment, innovations and advancements lowers barriers to entry plus decreased production levels as it results in unemployment. This includes research and development activity, automation and incentives.

- (i) It presents a business' standing and position, i.e. whether it is weak or strong
- (ii) It informs about both internal and external factors that affect a firm's success and/or failure
- (iii) It helps firms assess the report and take counter measures for improvement and analyzing threats
- (iv) It forecasts the future and sheds light on the current situation
- (v) Evaluates business environment and allows firms to make strategic decisions
- (vi) Prevents future failure and creates a system of continuous success
- (vii) Provides companies with a reality check on their performance and shortcoming
- (viii) Enables firms to understand the economy and market and expand
- (ix) Provides a mechanism to identify threats and opportunities
- (x) Enables companies to learn about markets and enter new markets nationally or globally.

(b) Approaches in Strategic Planning

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

(c) SWOT Analysis:

Gathering data about the general, operating, and internal environments provides the raw material from which to develop a picture of the organisational environment.

SWOT analysis refines this body of information by applying a general framework for understanding and managing the environment in which an organisation operates. (The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.) In many respects, the sophisticated analytical techniques discussed throughout the text are further refinements of basic SWOT analysis. In addition, students have repeatedly told us that SWOT is an excellent way to begin a case analysis. SWOT analysis attempts to assess the internal strengths and weaknesses of an organisation and the opportunities and threats that it's external environment presents. SWOT seeks to isolate the major issues facing an organisation through careful analysis of each of these four elements. Managers can then formulate strategies to address key issues.

(d) Plant Location:

Plant location is essentially an investment decision having long-term significance and implied economic effects. A good decision plays off; a bad decision can cause grim financial difficulties. Once a plant is acquired, it is a permanent site that cannot readily be sold. The management may also contemplate relocation of the plant when business expansion and advanced technology require additional facilities to serve new market areas, to produce new products, or simply to replace the old, obsolete plants to increase the company's production capacity.

Before a location for a plant is sought, long range forecasts should be made anticipating the future needs of the company. These should be based on the company's expansion policy, the anticipated diversification of products, the trends in market demand, geographical distribution, material and labour supply, and any other foreseeable influences. Thus, plant location decisions require intensive study of economic and socio-political circumstances.

The accuracy of forecasting is essential regarding rising demand and anticipated sales increases. Miscalculation in this respect may post serious problems before the company can occupy the new facilities once built and expand the new facilities subsequently due to land and environmental constraints.

The selection of an appropriate plant site calls for location study of the region in which the factory is to be situated, the community in which it should be placed and finally, the exact site in the city or countryside.

Paper 9 – Operations Management & Strategic Management

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Paper 9 – Operations Management & Strategic Management

Full Marks : 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – I : (Operations Management)

1. (a) Choose the most correct alternatives: [1×10=10]
- (i) The activity of specifying when to start the job and when to end the job is known as:
 - (A) Planning,
 - (B) Scheduling,
 - (C) Timing,
 - (D) Follow-up.

 - (ii) In an organization, the Production Planning and Control department comes under
 - (A) Planning department,
 - (B) Manufacturing department,
 - (C) personnel department,
 - (D) R&D department

 - (iii) In Production by service, the product undergoes the changes in:
 - (a) Shape and size of the surface,
 - (b) Shape of the surface only,
 - (c) Size of the surface only,
 - (d) Chemical and Mechanical properties.

 - (iv) Which of the following stages of Product Life cycle does attribute beginning of substantial increase in Sales and Profits?
 - (A) Introduction
 - (B) Growth
 - (C) Maturity
 - (D) Decline

 - (v) In an organisation the production planning and control department comes under:
 - (a) Planning department,
 - (b) Manufacturing department,
 - (c) Personal department,
 - (d) R & D department.

 - (vi) Reliability and per unit cost of which of the following spares are less?
 - (a) Regular spares
 - (b) Insurance spares
 - (c) Capital spares
 - (d) Rotable spares

 - (vii) Issuing necessary orders, and taking necessary steps to ensure that the time targets set in the schedules are effectively achieved is known as:
 - (a) Routing,
 - (b) Dispatching,
 - (c) Scheduling,
 - (d) Inspection.

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(viii) Preventive maintenance is useful in reducing:

- (a) Inspection Cost,
- (b) Shutdown Cost,
- (c) Cost of pre-mature replacement,
- (d) Set-up cost of machine

(ix) Which one is NOT an index of productivity?

- (a) Man-hour output
- (b) Productivity ratio
- (c) TQM
- (d) Use of Financial Ratios

(x) Which of the following stages of Product Life Cycle does attribute beginning of substantial increase in Sales and Profits?

- (a) Introduction.
- (b) Growth.
- (c) Maturity.
- (d) Decline.

(b) Match the terms in Column I with the relevant terms in Column II

[1×5=5]

Column I	Column II
(A) Inventory Control	(i) Turbo-Alternator
(B) Network Analysis	(ii) Crashing
(C) Aviation Fuel	(iii) Value Analysis
(D) Hydro-electricity	(iv) Stock Level
(E) Improvement in productivity	(v) Refinery

(c) State whether the following statements are True or False?

[1×6=6]

- (i) A Productivity Index is a device of expressing the ratio between outputs and the inputs of the resources numerically. ()
- (ii) It is desirable to conduct work measurement after method study. ()
- (iii) Increase in productivity leads to retrenchment of work force. ()
- (iv) The term "aesthetics" which appeals to the human sense does not add value to the product. ()
- (v) In general short term forecasting will be more useful in production planning. ()
- (vi) Production planning and control is essentially concerned with the control of finished goods. ()

Answer:

- 1. (a) (i) (b)
- (ii) (b)
- (iii) (d)
- (iv) (b)
- (v) (b)
- (vi) (a)
- (vii) (b)
- (viii) (b)
- (ix) (c)
- (x) (b)

(b)

Column I	Column II
(A) Inventory Control	(iv) Stock Level
(B) Network Analysis	(ii) Crashing
(C) Aviation Fuel	(v) Refinery
(D) Hydro-electricity	(i) Turbo-Alternator
(E) Improvement in productivity	(iii) Value Analysis

- (c) (i) (True)
(ii) (True)
(iii) (False)
(iv) (False)
(v) (True)
(vi) (False)

2. (a) What are the characteristics of modern operation function? [6]

(b) (i) A workshop operates on 2 shifts of 8 hours per day. It has 10 machines. It works for 5 days in a week. Machine utilization is 90% and the efficiency of the machines is 85%. Calculate the designed/rated capacity of the workshop in standard hours.

(ii) An assembly line of an item A has the following output in a 10 week period:

Week No	Standard hours produced
1	350
2	375
3	380
4	400
5	300
6	325
7	340
8	370
9	390
10	350

Calculate the demonstrated capacity of the assembly line per week. [10]

Answer:

2. (a) Characteristics of Modern Operation Function:

The production management of today presents certain characteristics which make it look totally different from what it was during the past. Specifically, today's production system is characterised by at least four features.

1. Manufacturing as Competitive Advantage

In the past production was considered to be like any other function in the organisation. Where demand was high and production capacities were inadequate, the concern was to somehow muster all inputs and use them to produce goods which would be grabbed by market. But today's scenario is contrasting. Plants have excess capacities, competition is mounting and firms look and gain competitive advantage to survive and succeed. Interestingly, production system offers vast scope to gain competitive edge and firms intend to exploit the potential. Total Quality Management (TQM), Time-Based Competition, Business Process Re-engineering (BPRE), Just-in-Time (JIT), Focused Factory, Flexible Manufacturing Systems (FMS), Computer Integrated Manufacturing (CIM), and The Virtual Corporation are but only some techniques which the companies are employing to gain competitive advantage.

2. Services Orientation

As was stated earlier, service sector is gaining greater relevance these days. The production system, therefore, needs to be organised keeping in mind the peculiar requirements of the service component. The entire manufacturing needs to be geared to serve (i) intangible and perishable nature of the services, (ii) constant interaction with clients or customers, (iii) small volumes of production to serve local markets, and (iv) need to locate facilities to serve local markets. There is increased presence of professionals on the production, instead of technicians and engineers.

3. Disappearance of Smokestacks Protective labour legislation, environmental movement and gradual emergence of knowledge based organisations have brought total transformation in the production system. Today's factories are aesthetically designed and built, environment friendly - in fact, they are homes away from homes. Going to factory everyday is no more excruciating experience, it is like holidaying at a scenic spot. A visit to ABB, L & T or Smith Kline and Beecham should convince the reader about the transformation that has taken place in the wealth creation system.

4. Small has Become Beautiful It was E.F. Schumacher who, in his famous book Small is Beautiful, opposed giant organisations and increased specialisation. He advocated, instead, intermediate technology based on smaller working units, community ownership, and regional workplaces utilising local labour and resources. For him, small was beautiful. Businessmen, all over the world, did not believe in Schumacher's philosophy. Inspired by economies of scale, industrialists went in for huge organisations and mass production systems.

(b) (i) Rated capacity of the workshop = No. of shifts × No. of hour's in each shift × No. of days / Week × No. of Machines × Utilization factor × Efficiency

$$= 2 \times 8 \times 5 \times 10 \times 0.90 \times 0.85$$

$$= 612 \text{ standards hour per week.}$$

(ii) Demonstrated capacity is the average of the total standard hours produced over a number of periods.
 Total number of weeks = 10
 Total standard hours produced = 3,580 standard hours.
 Average per week = 3,580/10 = 358 standard hours.

3. (a) Linear Programming tools can be used in Management Application - Explain. [6]

(b) Solve the following assignment problem and obtain the minimum cost at which all the jobs can be performed.

Machinist	Job (Cost in '00 ₹)				
	1	2	3	4	5
A	25	18	32	20	21
B	34	25	21	12	17
C	20	17	20	32	16
D	20	28	20	16	27

[10]

Answer:

3. (a) Management Application of Linear Programming Tools

- (a) Portfolio Selection.
- (b) Financial Mix Strategy.
- (c) Profit Planning.
- (d) Media Selection.
- (e) Travelling Salesmen Problem.
- (f) Determination of equitable salaries.
- (g) Staffing problem.

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- (b) This problem is unbalanced since number of jobs is 5 while the number of workers is 4. We first balance it by introducing a dummy worker E, as shown Table in below:

Table: Balancing the Assignment Problem

Worker	Job				
	1	2	3	4	5
A	25	18	32	20	21
B	34	25	21	12	17
C	20	17	20	32	16
D	20	28	20	16	27
E	0	0	0	0	0

Obtain reduce cost values by subtracting the minimum value in each row from every cell in the row. This Table is given in below:

Table: Reduced Cost Table 1

Worker	Job				
	1	2	3	4	5
A	7	0	14	2	3
B	22	13	9	0	5
C	4	1	4	16	0
D	4	12	4	0	11
E	0	0	0	0	0

Since there is at least one zero in each row and column, we test it for optimality. Accordingly, lines are drawn. All zeros are covered by 4 lines, which is less than 5 (the order of the given matrix). Hence, we proceed to improve the solution. The least uncovered value is 4. Subtracting from every uncovered value and adding it to every value lying at the intersection of lines, we get the revised values as shown in Table.

Table: Reduced Cost Table 2

Worker	Job				
	1	2	3	4	5
A	7	0	14	6	3
B	18	9	5	0	1
C	4	1	4	20	0
D	0	8	4	0	7
E	0	0	0	4	0

The solution given in above table is optimal since the number of lines covering zeros matches with the order of the matrix. We can, therefore, proceed to make assignments. To begin with, since each of the columns has multiple zeros, we cannot start making assignments considering columns and have, therefore, to look through rows. The first row has a single zero. Thus, we make assignment A-2 and cross out zero at E-2. Further, the second and the third rows have one zero each. We make assignments B-4 and C-5, and cross out zeros at D-4 and E-5. Now, both the rows left have two zeros each and so have both the columns. This indicates existence of multiple optimal solutions. To obtain the solutions, we select zeros arbitrarily and proceed as discussed below:

- (i) Select the zero at D-1, make assignment and cross out zeros at D-3 and E-1 (as both, worker D and job, 1, are not available any more). Next, assign worker E to job 3, corresponding to the only zero left. Evidently, selecting the zero at E-3 initially would have the effect of making some assignments.
- (ii) Select the zero at D = 3, make assignment and cross out zeros at D-1 and E-3. Next, make assignment of the only zero left at E-1. Obviously, selecting the zero at E-1 making assignment in the first place would lead to the same assignments.

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To conclude, the problem has two optimal solutions as given below:

Solution 1		('00 ₹) Cost	Solution 2		('00 ₹) Cost
Worker	Job		Worker	Job	
A	2	18	A	2	18
B	4	12	B	4	12
C	5	16	C	5	16
D	1	20	D	3	20
Job Left	3		Job Left	1	
Total		66	Total		66

4. (a) The following jobs have to be shipped a week from now (week has 5 working days):

Job	A	B	C	D	E	F
Number of day's work remaining	2	4	7	6	5	3

Sequence the jobs according to priority established by (a) least slack rule (b) critical ratio rule. [8]

- (b) A company manufactures around 150 mopeds. The daily production varies from 146 to 154 depending upon the availability of raw materials and other working conditions.

Production per day	Probability
146	0.04
147	0.09
148	0.12
149	0.14
150	0.11
151	0.10
152	0.20
153	0.12
154	0.08

The finished mopeds are transported in a specially arranged lorry accommodating only 150 mopeds. Using following random numbers 80, 81, 76, 75, 64, 43, 18, 26, 10, 12, 65, 68, 69, 61, 57, simulate the process to find out:

- (i) What will be the average number of mopeds waiting in the factory?
 (ii) What will be the average number of empty spaces on the lorry? [8]

Answer:

4. (a) Calculation of slack:

Number of days unit due date is 5 days for all jobs

Job	Slack	(days)
A	5 - 2	=3
B	5 - 4	=1
C	5 - 7	=(-2)
D	5 - 6	=(-1)
E	5 - 5	=0
F	5 - 3	=2

Sequence:

C	D	E	B	F	A
-2	-1	0	1	2	3

Critical ratio = (Due Date - Date Now) / Lead Time Remaining
 = (DD - DN) / LTR
 = Available Time / Operation Time

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Critical ratio for job A = $5/2 = 2.5$
 Critical ratio for job B = $5/4 = 1.25$
 Critical ratio for job C = $5/7 = 0.71$
 Critical ratio for job D = $5/6 = 0.83$
 Critical ratio for job E = $5/5 = 1.0$
 Critical ratio for job A = $5/3 = 1.67$

Job having least critical ratio is given the first priority and so on.

Sequence:	C	D	E	B	F	A
Critical Ratio:	0.71	0.83	1.0	1.25	1.67	2.5

- (b) (i) As a first step, we allocate random numbers 00-99 in proportion to the probabilities associated with the production of scooters per day, as shown in table

Table: Allocation of Random Numbers

Production per day	Probability	Cumulative Probability	Random Number Interval
146	0.04	0.04	00-03
147	0.09	0.13	04-12
148	0.12	0.25	13-24
149	0.14	0.39	25-38
150	0.11	0.50	39-49
151	0.10	0.60	50-59
152	0.20	0.80	60-79
153	0.12	0.92	80-91
154	0.08	1.00	92-99

Based on the given random numbers, we may simulate the production per day as shown in Table. Along with, the number of scooters waiting or number of empty spaces in the lorry for each day are indicated.

Table: Simulation Worksheet

Sl. No.	Random Number	Production	No. of Scooters waiting for space	No. of empty spaces in lorry
1	80	153	3	0
2	81	153	3	0
3	76	152	2	0
4	75	152	2	0
5	64	152	2	0
6	43	150	0	0
7	18	148	0	2
8	26	149	0	1
9	10	147	0	3
10	12	147	0	3
11	65	152	2	0
12	68	152	2	0
13	69	152	2	0
14	61	152	2	0
15	57	151	1	0
		Total	21	9

Average number of scooters waiting for space in the lorry = Total No. of scooters waiting for Space / Total number of days = $21/15 = 1.4$

- (ii) Average Number of empty spaces in the lorry = $9/15 = 0.6$.

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5. (a) Project with the following data is to be implemented. Draw the network and find the critical path.

Activity	Predecessor	Duration (days)	Cost (day)(₹)
A	--	2	50
B	--	4	50
C	A	1	40
D	B	2	100
E	A, B	3	100
F	E	2	60

[8]

- (i) What is the minimum duration of the project?
 (ii) Draw a Gantt chart for early start schedule.
 (iii) Determine the peak requirement money and day on which it occurs above schedule.

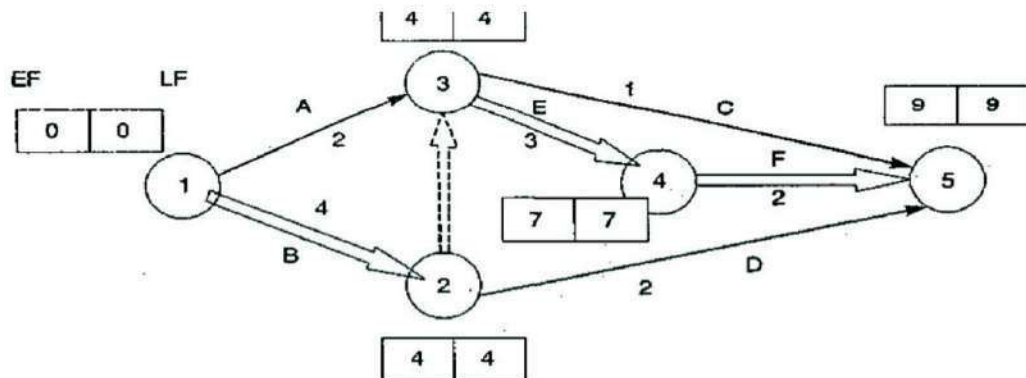
- (b) Assume that at a bank teller window the customers arrive in their cars at the average rate of twenty per hour according to a poisson distribution. Assume also that the bank teller spends an average of two minutes per customer to complete a service, and the service time is exponentially distributed. Customers, who arrive from an infinite population, are served on a first-come-first served basis, and there is no limit to possible queue length.

- (i) What is the expected waiting time in the system per customer?
 (ii) What is the mean number of customers waiting in the system?
 (iii) What is the probability of zero customers in the system?
 (iv) What value is the utilization factor?

[8]

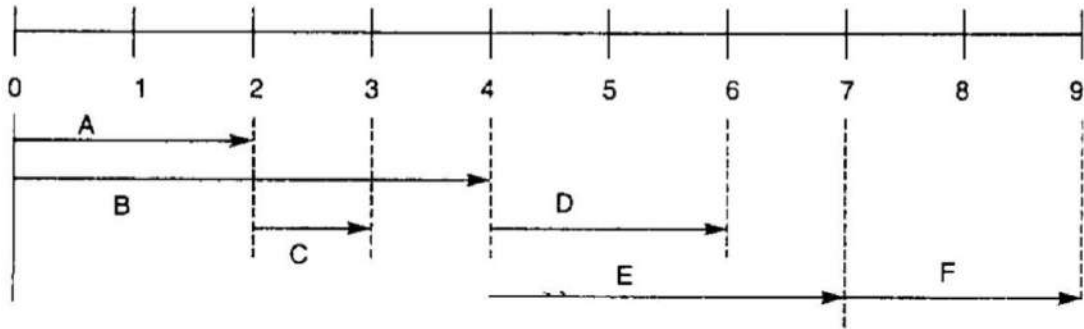
Answer:

5. (a)



Critical Path 1-2-3-4-5
 Minimum time = 9

Activity	t	EX(EF - t)	EF	LS (LF - t)	LF	Event Slack (LS - ES) (LF - EF)	On Critical Path
A	2	0	2	2	4	2	No
B	4	0	4	0	4	0	Yes
C	1	4	5	8	9	4	No
D	2	4	6	7	9	3	No
E	3	4	7	4	7	0	Yes
F	2	7	9	7	9	0	Yes



- (b) Here, arrival rate $\lambda = 20$ customers/hour,
Service rate $\mu = 30$ Customers / hour
Thus, $p = \lambda / \mu = 20/30 = 2/3$
- (i) Expected waiting time in the system per customer,
 $W_s = 1/(\lambda - \mu) = 1/(30 - 20) = 1/10$ hour or 6 minutes
- (ii) Mean number of customers waiting in the system,
 $L_q = p^2/(1 - p) = (2/3)^2/(1 - 2/3) = 4/3$
- (iii) Probability of zero customers in the system.
 $P(0) = 1 - p = 1 - 2/3 = 1/3$
- (iv) Utilization factor, $p = 2/3$.

Section – II: (Strategic Management)

6. Choose the correct answer from the given alternatives:

[1×6=6]

- (i) Successful 'differential strategy' allows a company to
(A) Gain buyer loyalty to its brands
(B) Charge too high a price premium
(C) Have product quality that exceeds buyers' needs
(D) Depend only on intrinsic product attributes.
- (ii) For an actor in Bollywood, his outstanding performance would be a /an
(A) Asset
(B) Strategic Asset
(C) Core competency
(D) Capability.
- (iii) A Strategic Business Unit (SBU) is defined as a division of an organization:
(A) That help in the marketing operations
(B) That enable managers to have better control over the resources
(C) The help in the choice of technology
(D) That help in the allocation of scarce resources
(E) That help in identifying talents and potentials of people
- (iv) Intensity of competition is _____ in low return industries
(A) low.
(B) non-existent.
(C) high.
(D) not important dependent on industry nature.

- (v) The strategy of the TATA group in India could be viewed as a good example of
(A) Conglomerate diversification
(B) Market development
(C) Cost Leadership
(D) Concentric diversification
- (vi) Blue Ocean Strategy is concerned with
(A) moving into new market with new products
(B) creating a new market places where there is no competition
(C) developments of products and markets in order to ensure survival
(D) making the product unique in terms of attributes

Answer:

6. (i) (A)
(ii) (C)
(iii) (B)
(iv) (C)
(v) (A)
(vi) (B)

Answer any one question form the following:

7. (a) Discuss about “Product Development Strategy”.
- (b) Enlist the advantage of strategic Management. [6+6]

Answer:

7. (a) Product Development Strategy:

This involves extending the product range available to the firm's existing markets. These products may be obtained by:

- (i) investment in the research and development of additional products;
- (ii) acquisition of rights to produce someone else's product;
- (iii) buying-in the product and 'badging' it;
- (iv) joint development with owners of another product who need access to the firm's distribution channels or brands.

The critical factor to the success of this strategy is the profitability of the customer group for which the products are being developed. Also the firm's present competitive advantages in serving the market must confer on to the new good. These can include:

- (i) customer information that allows accurate targeting;
- (ii) established distribution channels;
- (iii) a brand which can be credibly applied to the new product.

(b) The Advantages of Strategic Management

- Discharges Board Responsibility The first reason that most organizations state for having a strategic management process is that it discharges the responsibility of the Board of Directors.

- Forces an Objective Assessment
Strategic management provides a discipline that enables the board and senior management to actually take a step back from the day-to-day business to think about the future of the organization. Without this discipline, the organization can become solely consumed with working through the next issue or problem without consideration of the larger picture.
- Provides a Framework for Decision-Making
Strategy provides a framework within which all staff can make day-to-day operational decisions and understand that those decisions are all moving the organization in a single direction.
- Supports Understanding & Buy-In
Allowing the board and staff participation in the strategic discussion enables them to better understand the direction, why that direction was chosen, and the associated benefits. For some people simply knowing is enough; for many people, to gain their full support requires them to understand.
- Enables Measurement of Progress
A strategic management process forces an organization to set objectives and measures of success. The setting of measures of success requires that the organization first determine what is critical to its ongoing success and then forces the establishment of objectives and keeps these critical measures in front of the board and senior management.

8. (a) What are the areas to keep in mind while framing strategy to motivate employees?

(b) Discuss about "Types of Strategic Control System".

[6+6]

Answer:

- 8. (a)** While designing strategy to motivate employees, the management must bear in mind the following cardinal principles:
- (a) All reasonably healthy adults have a considerable reservoir of potential energy. Differences in the total amount of potential energy are important determinants of motivation.
 - (b) All adults have a number of basic motives which can be thought of as values or outlet that channel and regulate the flow of potential energy from this reservoir.
 - (c) Most adults within a given socio-cultural system may have the same set of motives or energy outlets that channel and regulate the flow of potential energy from this reservoir.
 - (d) Actualisation of motive depends on specific situation in which a person finds himself.
 - (e) Certain characteristics of a situation arouse or trigger different motives, opening different values or outlets. Each motive or energy outlet is responsive to a different set of situational characteristics.
 - (f) Each motive leads to a different pattern of behaviour.
 - (g) By changing the nature of the situational characteristics or stimuli, different motives are aroused or actualised resulting in the emerging of distinct different patterns of behaviour.

(b) Types of Strategic Control Systems:

- **Personal Control**

It is the desire to shape and influence the behaviour of a person in a face to face interaction in order to achieve the organisation's goals. Direct supervision is the most common form of personal control as it helps in identifying the problems faced by subordinates and better man management. Personal control may also come from group of peers when people work in teams. Here personal control is all about possibility of learning to occur and competencies to develop.

- **Output control**

This system involves the estimation and forecasting of appropriate performance goals for each unit/division, department and employees and then measure the actual performance relative to these goals. It is often observed that the organisation's reward system is linked to performance on these goals. It can therefore be concluded that the output control system also provides an incentive structure for motivating employees at all levels of the organisation.

- **Behaviour control**

The establishment of a comprehensive system of rules and procedures to direct the actions or behaviour of divisions, functions and individuals is called behaviour control. The main purpose of having behaviour control is not to specify goals but to standardise the way of reaching them. It is felt that if rules are standardised then outcomes are predictable. It is of utmost importance that the management reviews behaviour controls over time. The rules that have been established tend to increase over time leading to inflexibility to react to the changing environment thereby adversely affecting the organisation's competitive advantage.

9. Write short notes on any three of the following four questions:

[4×3=12]

(a) Strategic Management Framework;

(b) Mc Kinsey's 7 –s Frame work;

(c) Marketing Mix;

(d) Theory X and Theory Y.

Answer:

9. (a) Strategic Management Framework:

The basic framework of strategic management involves five stages:

Stage 1: In this stage, organisation analyse about their present situation in terms of their Strengths, Weaknesses, Opportunities and Threats.

Stage 2: In this stage, organisations setup their missions, goals and objectives by analysing where they want to go in future.

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Stage 3: In this stage organisation analyses various strategic alternatives to achieve their goals and objectives. The alternatives are analysed in terms of what business portfolio/ product mix to adopt, expansion, merger, acquisition and divestment options etc are analysed to achieve the goals.

Stage 4: In this organisations select the best suitable alternatives in line with their SWOT analysis.

Stage 5: This is implementation stage in which organisation implement and execute the selected alternatives to achieve their strategic goals and objectives.

Stage 1: Where are we now? Analysis of present situation

Stage 2: Where we want to go? Setting goals and objectives for future

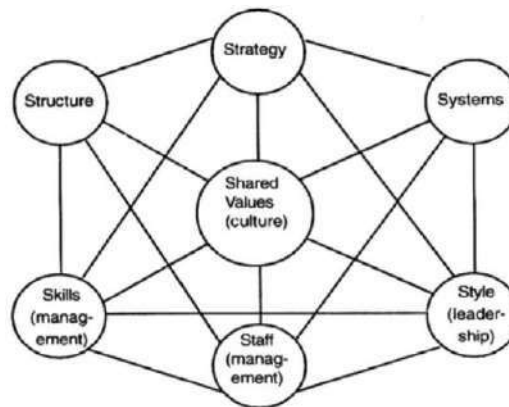
Stage 3: Analyses of various alternatives to achieve the goals and objectives

Stage 4: Selecting best alternatives in line with strengths of organisation

Stage 5: Implementing and executing the selected alternatives and monitoring of the same overtimes

(b) Mc Kinsey's 7 –s Frame work;

Strategy is dependent on many variables – Internal as well as external. All factors are interrelated.



The Mckinsey Company, a well known management consultancy firm in the United States, towards the end of 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills and super ordinate goals. A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.

Strategy: A set of decisions and actions aimed at gaining a sustainable competitive advantage

- Structure: The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- Systems: The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- Style: How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- Staff: How companies develop employees and shape basic values.

- (c)** Marketing mix is the pack of four sets of variables namely, product variables, price variables, promotion variables and place variable.

Marketing Mix refers to the appointment of effort, the combination, designing and integration of the elements of marketing into a programme or mix which, on the basis of an appraisal of the market forces will best achieve the objectives of an enterprise at a given time.

Kotler defines the marketing mix as the set of controllable variables and their levels that the firm uses to influence the target market. Such variables are:

- (i) Product
- (ii) Place
- (iii) Price and
- (iv) Promotion In addition, for service-there are three more P's

They are:

- (i) People
- (ii) Processes and
- (iii) Physical evidence.

- (d) Theory X and Theory Y:** Another motivation strategy involves manager's assumptions about the nature of people. Douglas McGregor identified two sets of assumptions. According to him, Theory X involves negative assumptions that managers often use as the basis for dealing with people. Theory Y represents positive assumptions which managers strive to use. The basic rationale for using Theory Y rather than Theory X in most situations is that managerial activities reflect Theory X assumptions. As such, the activities based on Theory Y assumptions generally are more successful in motivating organisation people than those based on Theory X assumptions.

Paper 9 – Operations Management & Strategic Management

Paper 9 – Operations Management & Strategic Management

Full Marks : 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – I: (Operations Management)

1. (a) Choose the most correct alternatives:

[1×10=10]

(i) Application of technology or process to the raw material to add use value is known as:

- (a) Product,
- (b) Production,
- (c) Application of technology,
- (d) Combination of technology and process.

(ii) In Process Planning we plan:

- (a) Different machines required,
- (b) Different operations required,
- (c) We plan the flow of material in each department,
- (d) We design the product.

(iii) Example of production by disintegration is

- (a) Automobile,
- (b) Locomotive,
- (c) Crude oil,
- (d) Mineral water.

(iv) This aims at finding the best and most efficient way of using the available resources - men, materials, money and machinery:

- (a) Time Study
- (b) Work Study
- (c) Method Study
- (d) Job Evaluation

- (v) Long range forecasting is useful in
- (a) Plan for Research and Development,
 - (b) To Schedule jobs in production,
 - (c) In purchasing the material to meet the present production demand,
 - (d) To assess manpower required in the coming month.
- (vi) Which one of the following standards is associated with the "Quality Assurance in Final Inspection Test"?
- (a) ISO 9001
 - (b) ISO 9002
 - (c) ISO 9003
 - (d) ISO 9004
- (vii) Regularly occurring periodic fluctuations are known as:
- (a) Regular trend,
 - (b) Random element,
 - (c) Seasonal component,
 - (d) Trend.
- (viii) In Operation Planning:
- (a) The planner plans each operation to be done at work centers and the sequences of operations,
 - (b) Decide the tools to be used to perform the operations,
 - (c) Decide the machine to be used to perform the operation,
 - (d) Decide the materials to be used to produce the product.
- (ix) One of the important charts used in Programme control is:
- (a) Material chart,
 - (b) Gantt chart,
 - (c) Route chart,
 - (d) Inspection chart.
- (x) The act of releasing the production documents to production department is known as:
- (a) Routing,
 - (b) Scheduling,
 - (c) Expediting,
 - (d) Dispatching.

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(b) Match the terms in Column I with the relevant terms in Column II

[1×6=6]

Column I	Column II
(A) Furniture	(i) Assembly line
(B) Tools	(ii) Method study
(C) Television set	(iii) Carpentry
(D) Cement	(iv) Machine shop
(E) Aviation Fuel	(v) Rotary Kiln
(F) Motion Economy	(vi) Refinery

(c) State whether the following statements are True/False?

[1×6=6]

- (i) Merit Rating is used to determine the cost of a product ()
- (ii) Increase in productivity leads to retrenchment of work force ()
- (iii) Project costs increase as the duration of the project increases ()
- (iv) Job Evaluation is a systematic approach to ascertain the labour worth of a job ()
- (v) Production planning and control is essentially concerned with the control of Finished goods ()
- (vi) Breakdown maintenance doesn't require use of standby machines ()

Answer:

1. (a) (i) (b) Production
(ii) (c) We plan the flow of material in each department
(iii) (c) Crude oil
(iv) (b) Work Study
(v) (c) In purchasing the material to meet the present production demand
(vi) (c) ISO 9003
(vii) (c) Seasonal component
(viii) (a) The planner plans each operation to be done at work centers and the sequences of operations,
(ix) (b) Gantt chart
(x) (d) Dispatching

(b)

Column I	Column II
(A) Furniture	(i) Carpentry
(B) Tools	(ii) Machine shop
(C) Television set	(iii) Assembly line
(D) Cement	(iv) Rotary Kiln
(E) Aviation Fuel	(v) Refinery
(F) Motion Economy	(vi) Method Study

- (c) (i) (False)
- (ii) (False)
- (iii) (True)
- (iv) (True)
- (v) (False)
- (vi) (False)

Answer any *three* questions form the following:

2. (a) Define plant layout. What are the factors influencing layout choices? [6]
- (b) The monthly requirement of raw material for a company is 3000 units. The carrying cost is estimated to be 20% of the purchase price per unit, in addition to ₹ 2 per unit. The purchase price of raw material is ₹ 20 per unit. The ordering is ₹ 25 per order.
- (i) You are required to find EOQ.
 - (ii) What is the total cost when the company gets a concession of 5% on the purchase price if it orders 3000 units or more but less than 6000 units per month. [4+6]

Answer:

2. (a) Plant Layout, also known as layout of facility refers to the configuration of departments, work-centres and equipment and machinery with focus on the flow of materials or work through the production system.
- Plant layout or facility layout means planning for location of all machines, equipments, utilities, work stations, customer service areas, material storage areas, tool servicing areas, tool cribs, aisles, rest rooms, lunch rooms, coffee/tea bays, offices, and computer rooms and also planning for the patterns of flow of materials and people around, into and within the buildings.

Factors influencing layout choices:

Primarily the layout of a plant is influenced by the relationship among materials, machinery and men. Other factors influencing layout are type of product, type of workers, the type of industry, management policies etc.

Some of these factors are discussed in detailed below:

- **Location:** The size and type of the site selected for the plant, influences the type of buildings (single story or multi story) which in turn influences the layout design. Also, the location of the plant determines the mode of transportation from and into the plant (such as by goods trains, truck, or ships) and the layout should provide facilities for mode of transport used. Also, the layout should provide for storage of fuel, raw materials, future expansion needs, power generation requirements etc.
- **Machinery and Equipments:** The type of product, the volume of production, type of processes and management policy on technology, determines the type of machines and equipments to be installed
- **Managerial Policies:** regarding volume of production, provision for future expansion, extent of automation, make-or-buy decisions, speed of delivery of goods to customers,

purchasing and inventory policies and personnel policies influence the plant layout design.

- **Materials:** Plant layout includes provision for storage and handling of raw materials, supplies and components used in production. The type of storage areas, racks, handling equipments such as cranes, trolleys, conveyors or pipelines etc., used - all depend on the type of materials used - such as solid, liquid, light, heavy, bulky, big, small etc.
- **Product:** The type of product i.e., whether the product is light or heavy, big or small, liquid or solid etc., it influences the type of layout. For example, Ship building, Aircraft assembly, Locomotive assembly etc., requires a layout type different from that needed to produce refrigerators, cars, scooters, television sets, soaps, detergents, soft drinks etc. The manufacturing process equipments and machines used and the processing steps largely depend on the nature of the product and hence the layout design depends, very much on the product.

(b) We are given that,

$$D = 3,000 \times 12 = 36,000 \text{ units per annum}$$

$$S = ₹ 25$$

$$C = 2 + 20\% \text{ of } ₹ 20 \\ = 2 + 4 = ₹ 6$$

$$\begin{aligned} \text{(i) EOQ} &= \sqrt{\frac{2DS}{C}} \\ &= \sqrt{\frac{2 \times 36,000 \times 25}{6}} \\ &= \sqrt{3,00,000} \\ &= 548 \text{ units app.} \end{aligned}$$

Total cost = Ordering Cost + Cost of raw material + Storage cost

$$\begin{aligned} &= \left(\frac{36,000}{548} \times 25 \right) + (36,000 \times 20) + \left(\frac{548}{2} \times 6 \right) \\ &= ₹ 1,642.33 + 7,20,000 + 1,644 \\ &= ₹ 7,23,286 \end{aligned}$$

- (ii) When the company has an option to order between 3000 and 6000 units, the EOQ should be calculated with a reduction in price by 5% (due to concession)

The purchase price = 95% of ₹ 20
= ₹ 19.

$$D = 36,000 \text{ units per annum}$$

$$S = ₹ 25$$

$$\begin{aligned} C &= 2 + 20\% \text{ of } 19 \\ &= 2 + 3.80 \\ &= ₹ 5.80 \end{aligned}$$

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2 \times 36,000 \times 25}{5.80}} \\ &= \sqrt{\frac{18,00,000}{5.80}} = 557 \text{ units app.} \end{aligned}$$

$$\begin{aligned} \text{Total cost} &= \left(\frac{36,000}{557} \times 25 \right) + (36,000 \times 19) + \left(\frac{557}{2} \times 5.80 \right) \\ &= ₹ 1,615.79 + 6,84,000 + 1,615.30 \\ &= ₹ 6,87,231.09 \end{aligned}$$

3. (a) What does Product Design do? Discuss – Process design and selection. [6]
- (b) Machine A costs of ₹ 80,000. Annual operating costs are ₹ 2,000 for the first year, and they increase by ₹ 15,000 every year (for example, in the fourth year the operating costs are ₹ 47,000). Determine the lease age at which to replace the machine. If the optimal replacement policy is followed; what will be the average yearly cost of operating and owning the machine? (Assume that the resale value of the machine is zero when replaced, and that future costs are not discounted.)
- (i) Another machine B costs ₹ 1,00,000. Annual operating cost for the first year is ₹ 4,000 and they increase by ₹ 7,000 every year. The firm has a machine of type A which is one year old. Should the firm replace it with B and if so, when?
- (ii) Suppose the firm is just ready to replace the machine A with another machine of the same type, just then the firm gets and information that the machine B will become available in a year. What should the firm do? [10]

Answer:

3. (a) The activities and responsibilities of product design include the following:
- Translating customer needs and wants into product and service requirements (marketing).
 - Refining existing products (marketing).
 - Developing new products (marketing, product design and production).
 - Formulating quality goals (quality assurance, production).
 - Formulating cost targets (accounting).
 - Constructing and testing prototype (marketing, production).
 - Documenting specifications (product design).

Process Design is concerned with the overall sequences of operations required to achieve the product specifications. It specifies the type of work stations to be used, the machines and equipments necessary to carry out the operations. The sequence of operations are determined by (a) the nature of the product, (b) the materials used, (c) the quantities to be produced and (d) the existing physical layout of the plant.

The process design is concerned with the following:

- Characteristics of the product or service offered to the customers.

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- (ii) Expected volume of output.
- (iii) Kinds of equipments and machines available in the firm.
- (iv) Whether equipments and machines should be of special purpose or general purpose.
- (v) Cost of equipments and machines needed.
- (vi) Kind of labour skills available, amount of labour available and their wage rates.
- (vii) Expenditure to be incurred for manufacturing processes.
- (viii) Whether the process should be capital-intensive or labour-intensive.
- (ix) Make or buy decision.
- (x) Method of handling materials economically.

(b) The operating cost of machine A in successive years are as follows:

Year	1	2	3	4	5
Operating Cost (₹)	2,000	17,000	32,000	47,000	62,000

Calculations for average cost of Machine A

Replacement at the end of year	Cumulative operating cost (in ₹)	Depreciation Cost (in ₹)	Total Cost (in ₹)	Average Cost per year (in ₹)
1	2,000	80,000	82,000	82,000
2	19,000	80,000	99,000	49,500
3	51,000	80,000	1,31,000	43,666
4	98,000	80,000	1,78,000	44,500
5	1,60,000	80,000	2,40,000	48,000

It is clear from the table that machine A should be replaced at the end of third year. The average yearly, cost of owning & operating machine A in this situation will be ₹ 43,666.

(i) The operating cost of machine B are as follows:

Year	1	2	3	4	5	6
Operating Cost (₹)	4,000	11,000	18,000	25,000	32,000	39,000

Calculations for average cost of Machine B

Replacement at the end of year	Cumulative operating cost (in ₹)	Depreciation Cost (in ₹)	Total Cost (in ₹)	Average Cost per year (in ₹)
1	4,000	1,00,000	1,40,000	1,04,000
2	15,000	1,00,000	1,15,000	57,500
3	33,000	1,00,000	1,33,000	44,333
4	88,000	1,00,000	1,58,000	39,500
5	90,000	1,00,000	1,90,000	38,000
6	1,29,000	1,00,000	2,29,000	38,166

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It is clear from the above Table that if machine B is replaced after 5 years then its average cost per year is ₹ 38,000. Since the lowest average cost for machine B (₹38,000) is less than the lowest average cost for machine A (₹ 43,666), the machine A should be replaced by machine B. Now to find the time of replacement of Machine A by Machine B, we proceed as follows:

The machine A is replaced by machine B at the time (age), when its running cost of the next year exceed the lowest average yearly cost ₹ 38,000 of machine B. Further, the total cost of the machine A in the successive years are computed as follows:

Year	1	2	3	4	5
Total cost in the year (₹)	82,000	99,000 – 82,000 = 17,000	1,31,000 – 99,000 = 32,000	1,78,000 – 1,31,000 = 47,000	2,40,000 – 1,78,000 = 62,000

The running cost of fourth year of machine A is ₹ 47,000 which is more than the lowest average yearly cost ₹ 38,000 of machine B. therefore, the machine A should be replaced by machine B, when its age is 1 year. Since the machine A is one year old now, it should be replaced just now.

Install new machine now and replace it with machine B during the third year.

4. (a) Without standby equipment, a shutdown will cost ₹ 200 a day. It is estimated that an average of 2.5 days a year can be lost due to shutdowns. A standby machine can be purchased for ₹ 4,000 with an economic life of 10 years and ₹ 500 salvage value at that data. Its annual costs including 2.5 days of actual operation would be ₹ 100. Make a choice. [6]
- (b) Describe the objective of Time Study. [6]
- (c) What are the elements of lean production? [4]

Answer:

4. (a) Annual cost of shutdown = $200 \times 2.5 = ₹ 500$

Annual cost of standby equipment

$$\text{Depreciation} = \frac{4,000 - 5,000}{10} = ₹ 350$$

$$\text{Opening cost} = ₹ 100$$

$$\text{Total} \quad \underline{₹ 450}$$

Therefore, standby equipment is preferable.

- (b) Time study is concerned with the determination of the amount of time required to perform a unit of work. It consists of the process of observing and recording the time required to perform each element of an operation so as to determine the reasonable time in which the work should be completed. Time study is defined by ILO as below 'Time study is a work measurement technique for recording the times and rates of working for the elements of a specified job carried out under specified conditions and for analyzing

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the data so as to obtain the time necessary for carrying out the job at a defined level of performance'.

Objective of time study:

The main objective is 'to determine by direct observation, the quantity of human work in a specified task and hence to establish the standard time, within which an average worker working at a normal pace should complete the task using a specified method'.

The other objectives are:

- (i) To furnish a basis of comparison for determining operating effectiveness.
- (ii) To set labour standard for satisfactory performance.
- (iii) To compare alternative methods in method study in order to select the best method.
- (iv) To determine standard costs.
- (v) To determine equipment and labour requirements.
- (vi) To determine basic times/normal times.
- (vii) To determine the number of machines an operator can handle.
- (viii) To balance the work of operators in production or assembly lines.
- (ix) To provide a basis for setting piece rate or incentive wages.
- (x) To set the completion schedules for individual operations or jobs.

(c) The elements of lean production are:

- (i) To consider the organisation in terms of supply chain of value streams that extends from suppliers of raw materials, through transformation to the final customer.
- (ii) To organise workers in teams and to have everyone in the organisation conscious of his or her work.
- (iii) To produce products of perfect quality and to have continuous quality improvement as a goal.
- (iv) To organise the operation by product or cellular manufacturing, rather than using a functional or process lay-out.
- (v) To operate the facility in a just-in-time mode.

5. (a) Draw the network for the following activities and find critical path and total duration of project.

Activity	Duration (months)	Activity	Duration (months)
1-2	2.5	4-5	2.0
2-3	2.5	5-6	3.0
2-4	1.5	6-7	1.5
3-4	1.0	5-7	1.5
3-5	1.0		

[8]

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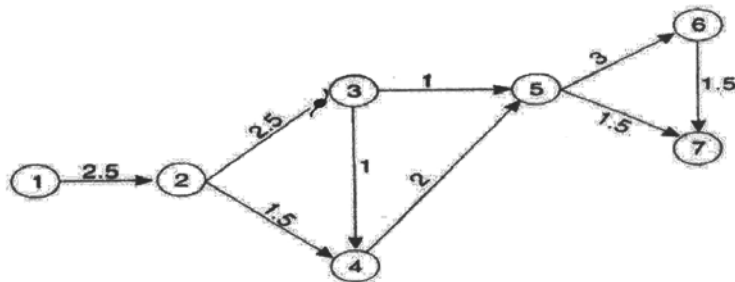
- (b) A public transport system is experiencing the following number of breakdowns for months over the past 2 years in their new fleet of vehicles:

Number of breakdowns	0	1	2	3	4
Number of months this occurred	2	8	10	3	1

Each break down costs the firm an average of ₹ 2,800. For a cost of ₹ 1,500 per month, preventive maintenance can be carried out to limit the break-downs to an average of one per month. Which policy is suitable for the firm? [8]

Answer:

5. (a)



Paths	Duration
1-2-3-5-6-7	$2.5+2.5+1+3+1.5 = 10.5$
1-2-3-5-7	$2.5+2.5+1+1.5 = 7.50$
1-2-3-4-5-6-7	$2.5+2.5+1+2+3+1.5 = 12.5$ (Critical Path)
1-2-3-4-5-7	$2.5+2.5+1+2+1.5 = 9.5$
1-2-4-5-7	$2.5+1.5+2+1.5 = 7.5$
1-2-4-5-6-7	$2.5+1.5+2+3+1.5 = 10.5$

- (b) Converting the frequencies to a probability distribution and determining the expected cost/month of breakdowns we get:

No. of breakdowns (X)	Frequency in months (FX)	Frequency in per cen P(X)	Expected value X.P(X)
0	2	0.083	0
1	8	0.333	0.333
2	10	0.417	0.834
3	3	0.125	0.375
4	1	0.042	0.168
Total			1.710

Breakdown cost per months

$$\begin{aligned}\text{Expected} &= \left(\frac{1.71 \text{ breakdowns}}{\text{month}} \right) \left(\frac{\text{₹ } 2,800}{\text{breakdown}} \right) \\ &= \frac{\text{₹ } 4,788}{\text{month}}\end{aligned}$$

Preventive maintenance cost per month

Average cost of one breakdown/month = ₹ 2,800

Maintenance contract cost/month = ₹ 1,500

Total ₹ 4,300

Thus, preventive maintenance policy is suitable for the firm.

Section – II: (Strategic Management)

6. Choose the correct answer from the given alternatives:

[1×6=6]

(i) Business Process Re-engineering is

- (a) Eliminating loss-making process;
- (b) Redesigning operational processes;
- (c) Redesigning the product and services;
- (d) Recruiting the process engineers.

(ii) Strategic choice makes a statement about the corporate strategy as well as business strategy:

- (a) They are one and the same;
- (b) One is an external planning and another resources planning statement;
- (c) Corporate strategy is a general statement and business strategy defines how a SBU shall operate;
- (d) Both states certain course of action – one for the total unit and another for a particular business agent;
- (e) One refers to the whole business and another helps in the formulation of marketing decisions.

(iii) Benchmarking is:

- (a) The analytical tool to identify high cost activities based on the 'Pareto Analysis'.
- (b) The search for industries best practices that lead to superior performance;
- (c) The simulation of cost reduction schemes that help to build commitment and improvement of actions;

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- (d) The process of marketing and redesigning the way a typical company works;
 - (e) The framework that earmarks a linkage with suppliers and customers.
- (iv) The conditional of Low share, Negative growth and negative cash flow indicates -
- (a) Dogs.
 - (b) Dodos.
 - (c) Donkey.
 - (d) Dinosaurs.
- (v) Offensive strategy is a strategy:
- (a) For small companies that consider offensive attacks in the market.
 - (b) For those companies that search for new inventory opportunities to create competitive advantage.
 - (c) For the market leader who should attack the competitor by introducing new products that make existing ones obsolete.
 - (d) For those companies who are strong in the market but not leaders and might capture a market share from the leader.
 - (e) None of the above.
- (vi) A strategic business unit (SUB) is defined as a division of an organization:
- (a) That help in the marketing operation;
 - (b) That enable managers to have better control over the resources;
 - (c) That help in the choice of technology;
 - (d) That help in the allocation of scarce resources;
 - (e) That help in identifying talents and potentials of people.

Answer:

6. (i) (b) Redesigning operational processes.
- (ii) (c) Strategic choice makes a statement about the corporate strategy as well as business strategy : the former refers to the whole business while the latter helps in the formulation of marketing and other decisions.
- (iii) (b) The search for industries best practices that lead to superior performance.
- (iv) (b) Dodos
- (v) (d) For those companies who are strong in the market but not leaders and might capture a market share from the leader.
- (vi) (d) A strategic business unit (SBU) is defined as a division of an organization: that enable managers to have better control over the resources.

Answer any two question form the following:

7. (a) Discuss the advantages of Strategic Management?

(b) Discuss "Strategic levels in the organizations"

[6+6]

Answer:

(a) The Advantages of Strategic Management

- **Discharges Board Responsibility**

The first reason that most organizations state for having a strategic management process is that it discharges the responsibility of the Board of Directors.

- **Forces an Objective Assessment**

Strategic management provides a discipline that enables the board and senior management to actually take a step back from the day-to-day business to think about the future of the organization. Without this discipline, the organization can become solely consumed with working through the next issue or problem without consideration of the larger picture.

- **Provides a Framework for Decision-Making**

Strategy provides a framework within which all staff can make day-to-day operational decisions and understand that those decisions are all moving the organization in a single direction. It is not possible (nor realistic or appropriate) for the board to know all the decisions the executive director will have to make, nor is it possible (nor realistic or practical) for the executive director to know all the decisions the staff will make. Strategy provides a vision of the future, confirms the purpose and values of an organization, sets objectives, clarifies threats and opportunities, determines methods to leverage strengths, and mitigate weaknesses (at a minimum). As such, it sets a framework and clear boundaries within which decisions can be made. The cumulative effect of these decisions (which can add up to thousands over the year) can have a significant impact on the success of the organization. Providing a framework within which the executive director and staff can make these decisions helps them better focus their efforts on those things that will best support the organization's success.

- **Supports Understanding & Buy-In**

Allowing the board and staff participation in the strategic discussion enables them to better understand the direction, why that direction was chosen, and the associated benefits. For some people simply knowing is enough; for many people, to gain their full support requires them to understand.

- **Enables Measurement of Progress**

A strategic management process forces an organization to set objectives and measures of success. The setting of measures of success requires that the organization first determine what is critical to its ongoing success and then forces the establishment of objectives and keeps these critical measures in front of the board and senior management.

- **Provides an Organizational Perspective**

Addressing operational issues rarely looks at the whole organization and the interrelatedness of its varying components. Strategic management takes an organizational perspective and looks at all the components and the interrelationship between those components in order to develop a strategy that is optimal for the whole organization and not a single component.

(b) There are primarily three levels of strategies in the organisation.

1. Corporate Level
2. Business Level
3. Functional Level

1. Corporate Level:

The corporate level of management consists of the chief executive officer (CEO), other senior executives, the board of directors, and corporate staff. These individuals occupy the top-committee of decision making within the organisation. The CEO is the principal general manager. In consultation with other senior executives, the role of corporate-level managers is to oversee the development of strategies for the whole organisation. This role includes defining the mission and goals of the organisation, determining what businesses it should be in, allocating resources among the different businesses, formulating and implementing strategies that span individual businesses, and providing leadership for the organisation. For example, strategies formed for Unilever Limited would be at corporate level.

2. Business Level:

A business unit is a self-contained division (with its own functions-for example, finance, purchasing, production, and marketing departments) that provides a product or service for a particular market. The principal general manager at the business level, or the business-level manager, is the head of the division. The strategic role of these managers is to translate the general statements of direction and intent that come from the corporate level into concrete strategies for individual businesses. Thus, whereas corporate-level general managers are concerned with strategies that span individual businesses, business-level general managers are concerned with strategies that are specific to a particular business. At GE, a major corporate goal is to be first or second in every business in which the corporation competes. Then the general managers in each division work out for their business the details of a strategy that is consistent with this objective. For example, strategies formed for Kwality Walls, a subsidiary of Unilever Limited would be at business level.

3. Functional Level:

Functional-level managers are responsible for the specific business functions or operations (human resources, purchasing, product development, customer service, and so on) that constitute a company or one of its divisions. Thus, a functional manager's sphere of responsibility is generally confined to one organisational activity, whereas general managers oversee the operation of a whole company or division. Although they are not responsible for the overall performance of the organisation, functional managers nevertheless have a major strategic role: to develop functional strategies in their area that help fulfill the strategic objectives set by business & corporate-level general managers. Moreover, functional managers provide most of the information that makes it possible for business & corporate-level general managers to, formulate realistic and attainable strategies. Indeed,

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because they are closer to the customer than the typical general manager is, functional managers themselves may generate important ideas that subsequently may become major strategies for the company. Thus, it is important for general managers to listen closely to the ideas of their functional managers. An equally great responsibility for managers at the operational level is strategy implementation: the execution of corporate and business-level plans. For example, strategies formed for employee retention by HR manager at Kwalify Walls would be at functional level.

8. (a) Discuss the differences in Strategic Management & Strategic Planning.

(b) Define SBU. What are its merits & demerits?

[6+6]

Answer:

(a) The basic difference between Strategic management and Strategic planning are as follows:

Strategic Management	Strategic Planning
1. It is focused on producing strategic results; new markets; new products; new technologies etc.	1. It is focused on making optimal strategic decisions
2. It is management by results.	2. It is management by plans
3. It is an organizational action process	3. It is an analytical process
4. It broadens focus to include psychological, sociological and political variables.	4. It is focused on business, economic and technological variables
5. It is about choosing things to do and also about the people who will do them.	5. It is about choosing things to do

(b) SBU groups similar divisions into "Strategic Business Units" and then delegate's authority and responsibility of each unit to a senior executive who is normally identified as CEO or MD of that SBU. It is an extension of Divisional structure.

SBU Structure

Big organisation like Unilever, etc have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc, and each is managed through separate unit head.

Advantages:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses

Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc, because each unit may work in it's own way to handle situations
- (ii) High cost approach

9. Write short notes on any *three* of the following four questions:

[4×3=12]

- (a) Structural Driver's of Change;
- (b) Approaches in Strategic Planning;
- (c) SWOT Analysis;
- (d) Plant location.

Answer:

(a) Structural Drivers of Change are forces likely to affect the structure of an industry, sector or market. The following are some of the factors

- **Increasing convergence of markets**

In some markets the customers' needs and preferences are becoming more similar. As some markets globalise, those operating in such markets become global customers and may search for suppliers. Moreover marketing policies needs to be developed all over again.

- **Cost advantage of global operations**

This benefit might accrue to industries that operate in large volume, standardised production and enjoy economies of scale. In order to realise location economies businesses search globally for low cost operations and enjoying competitive edge.

- **Activities and policies of the governments**

The government policies and activities have also resulted in influencing the globalisation of industry. The moves towards free trade and technical standardisation of many products between countries have resulted in increasing competition.

- **Global competition**

It is the global competition that acts as a driver to globalisation. It may be mentioned that high level of import and export between countries increse interaction between competitors on a more global scale. The interdependence of companies across the world promotes global trade.

(b) **Approaches in Strategic Planning**

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.

- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

(c) SWOT Analysis:

Gathering data about the general, operating, and internal environments provides the raw material from which to develop a picture of the organisational environment.

SWOT analysis refines this body of information by applying a general framework for understanding and managing the environment in which an organisation operates. (The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.) In many respects, the sophisticated analytical techniques discussed throughout the text are further refinements of basic SWOT analysis. In addition, students have repeatedly told us that SWOT is an excellent way to begin a case analysis. SWOT analysis attempts to assess the internal strengths and weaknesses of an organisation and the opportunities and threats that its external environment presents. SWOT seeks to isolate the major issues facing an organisation through careful analysis of each of these four elements. Managers can then formulate strategies to address key issues.

(d) Plant Location:

Plant location is essentially an investment decision having long-term significance and implied economic effects. A good decision plays off; a bad decision can cause grim financial difficulties. Once a plant is acquired, it is a permanent site that cannot readily be sold. The management may also contemplate relocation of the plant when business expansion and advanced technology require additional facilities to serve new market areas, to produce new products, or simply to replace the old, obsolete plants to increase the company's production capacity.

Before a location for a plant is sought, long range forecasts should be made anticipating the future needs of the company. These should be based on the company's expansion policy, the anticipated diversification of products, the trends in market demand, geographical distribution, material and labour supply, and any other foreseeable influences. Thus, plant location decisions require intensive study of economic and socio-political circumstances.

The accuracy of forecasting is essential regarding rising demand and anticipated sales increases. Miscalculation in this respect may post serious problems before the company can occupy the new facilities once built and expand the new facilities subsequently due to land and environmental constraints.

The selection of an appropriate plant site calls for location study of the region in which the factory is to be situated, the community in which it should be placed and finally, the exact site in the city or countryside.

Paper 9 – Operations Management & Strategic Management

Paper 9 – Operations Management & Strategic Management

Full Marks : 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – I : (Operations Management)

1. (a) Choose the most correct alternatives:

[1×10=10]

(i) The starting point of Production cycle is:

- (A) Product design,
- (B) Production planning,
- (C) Routing,
- (D) Market research.

(ii) The act of assessing the future and make provisions for it is known as:

- (A) Planning,
- (B) Assessment,
- (C) Forecasting,
- (D) Scheduling.

(iii) In Production by service, the product undergoes the changes in:

- (a) Shape and size of the surface,
- (b) Shape of the surface only,
- (c) Size of the surface only,
- (d) Chemical and Mechanical properties.

(iv) Which of the following aims at finding the best and most efficient way of using the available resources — men, materials, money and machinery?

- (A) Method Study,
- (B) Work Study,
- (C) Time Study,
- (D) Motion Study.

(v) Most suitable layout for continuous production is:

- (a) Process layout,
- (b) Line layout,
- (c) Group Technology,
- (d) Matrix layout.

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- (vi) Reliability and per unit cost of which of the following spares are less?
- (a) Regular spares
 - (b) Insurance spares
 - (c) Capital spares
 - (d) Rotable spares
- (vii) Issuing necessary orders, and taking necessary steps to ensure that the time targets set in the schedules are effectively achieved is known as:
- (a) Routing,
 - (b) Dispatching,
 - (c) Scheduling,
 - (d) Inspection.
- (viii) Preventive maintenance is useful in reducing:
- (a) Inspection Cost,
 - (b) Shutdown Cost,
 - (c) Cost of pre-mature replacement,
 - (d) Set-up cost of machine
- (ix) MRP stands for:
- (a) Material Requirement Planning,
 - (b) Material Recording Planning,
 - (c) Material Requisition Procedure
 - (d) Material Recording Procedure.
- (x) Which one of the following standards is associated with the "Quality Assurance in Design, Production, Installation and Servicing"?
- (a) ISO 9001
 - (b) ISO 9002
 - (c) ISO 9003
 - (d) ISO 9004

(b) Match the terms in Column I with the relevant terms in Column II

[1×6=6]

Column I	Column II
(A) Inventory Control	(i) Turbo-Alternator
(B) TQM focus	(ii) Network Analysis
(C) Aviation Fuel	(iii) Examination of Human work
(D) Hydro-electricity	(iv) Customer Satisfaction
(E) Work Study	(v) Refinery
(F) Systematic Quantitative structural approach to the problem of managing a project through to successful completion	(vi) Stock Level

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- (c) State whether the following statements are True or False? [1×6=6]
- (i) A Productivity Index is a device of expressing the ratio between outputs and the inputs of the resources numerically. ()
 - (ii) The Linear Programming problem has two basic parts: the objective function and the constraint set. ()
 - (iii) Increase in productivity leads to retrenchment of work force. ()
 - (iv) The term "aesthetics" which appeals to the human sense does not add value to the product. ()
 - (v) PERT is designed for repetitive projects, whereas CPM is suitable for non-repetitive projects. ()
 - (vi) Production planning and control is essentially concerned with the control of finished goods. ()

Answer:

1. (a) (i) (d) Market Research
 (ii) (c) Forecasting
 (iii) (d) Chemical and Mechanical properties
 (iv) (b) Work Study
 (v) (b) Line layout
 (vi) (a) Regular spares
 (vii) (b) Dispatching
 (viii) (b) Shutdown Cost
 (ix) (a) Material Requirement Planning
 (x) (a) ISO 9001

(b)

Column I	Column II
(A) Inventory Control	(vi) Stock Level
(B) TQM focus	(iv) Customer Satisfaction
(C) Aviation Fuel	(v) Refinery
(D) Hydro-electricity	(i) Turbo-Alternator
(E) Work Study	(iii) Examination of Human work
(F) Systematic Quantitative structural approach to the problem of managing a project through to successful completion	(ii) Network Analysis

- (c) (i) (True)
 (ii) (True)
 (iii) (False)

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(iv) (False)

(v) (False)

(vi) (False)

Answer any *three* questions form the following:

2. (a) What are the importance of a layout?

[6]

(b) (i) A workshop operates on 2 shifts of 8 hours per day. It has 10 machines. It works for 5 days in a week. Machine utilization is 90% and the efficiency of the machines is 85%. Calculate the designed/rated capacity of the workshop in standard hours.

(ii) The present layout is shown in the figure. The manager of the department is intending to interchange the departments C and F in the present layout. The handling frequencies between the departments is given. All the departments are of the same size and configuration. The material handling cost per unit length travel between departments is same. What will be the effect of interchange of departments C and F in the layout?

A	C	E
B	D	F

From / To	A	B	C	D	E	F
A	-	0	90	160	50	0
B	-	-	70	0	100	130
C	-	-	-	20	0	0
D	-	-	-	-	180	10
E	-	-	-	-	-	40
F	-	-	-	-	-	-

[10]

Answer:

2. (a) Importance of layout:

The importance of a layout can be described as under:

- **Avoidance of Bottlenecks:** Bottlenecks refer to any, place in a production process where materials tend to pile up or produced at rates of speed less rapid than the previous or subsequent operations. Bottlenecks are caused by inadequate machine capacity, inadequate storage space or low speed on the part of the operators. The results of bottlenecks are delays in production schedules, congestion, accidents and wastage of floor area. All these may be overcome with an efficient layout.
- **Avoidance of Unnecessary and Costly Changes:** A planned layout avoids frequent changes which are difficult and costly. The incorporation of flexibility elements in the layout would help in the avoidance of revisions.
- **Better Production Control:** Production control is concerned with the production of a product of the right type at the right time and at reasonable cost. A good plant layout is a requisite of good production control and provides the plant control officers with a systematic basis upon which to build organisation and procedures.

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- **Better Supervision:** A good plant layout ensures better supervision in two ways: (a) Determining the number of workers to be handled by a supervisor and (b) Enabling the supervisor to get a full view of the entire plant at one glance. A good plant layout is, therefore, the first step in good supervision.
- **Economies in Handling:** Nearly 30 per cent to 40 per cent of the manufacturing costs are accounted for by materials handling. Every effort should, therefore, be made to cut down this cost. Long distance movements should be avoided and specific handling operations must be eliminated.
- **Effective Use of Available Area:** Every unit of the plant area is valuable, especially in urban areas. Efforts should therefore, be made to make use of the available area by planning the layout properly.
- **Improved Employee Morale:** Employee morale is achieved when workers are cheerful and confident. This state of mental condition is vital to the success of any organisation. Morale depends on better working conditions; better employee facilities; reduced number of accidents; and increased earnings.
- **Improved Quality Control:** Timely execution of orders will be meaningful when the quality of the output is not below expectations. To ensure quality, inspection should be conducted at different stages of manufacture. An ideal layout provides ample space to carryout inspection to ensure better quality control.
- **Improved Utilisation of Labour:** A good plant layout is one of the factors in effective utilisation of labour. It makes possible individual operations, the process and flow of materials handling in such a way that the time of each worker is effectively spent on productive operations.
- **Minimisation of Production Delays:** Repeat order and new customers will be the result of prompt execution of orders. Every management should try to keep to the delivery schedules by minimising delays in production.
- **Minimum Equipment Investment:** Investment on equipment can be minimised by planned machine balance and location, minimum handling distances, by the installation of general purpose machines and by planned machine loading. A good plant layout provides all these advantages.

(b) (i) Rated capacity of the workshop = No. of shifts × No. of hour's in each shift × No. of days / Week × No. of Machines × Utilization factor × Efficiency

$$= 2 \times 8 \times 5 \times 10 \times 0.90 \times 0.85$$

$$= 612 \text{ standards hour per week.}$$

(ii) The distance matrix of the present layout :

From / To	A	B	C	D	E	F
A		1	1	2	2	3
B			2	1	3	2
C				1	1	2
D					2	1
E						1
F						-

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Computation of total cost matrix (combining the inter departmental material handling frequencies and distance matrix.

From / To	A	B	C	D	E	F	Total
A		0	90	320	100	0	510
B			140	0	300	260	700
C				20	0	0	20
D					360	10	370
E						40	40
F							-
Total							1,640

If the departments are interchanged, the layout will be represented as shown below.

A	F	E
B	D	C

The distance matrix and the cost matrix are represented as shown.

From / To	A	B	C	D	E	F
A		1	3	2	2	1
B			2	1	3	2
C				1	1	2
D					2	1
E						1
F						

Total cost matrix for the modified layout.

From / To	A	B	C	D	E	F	Total
A	-	0	270	320	100	0	690
B			140	0	300	260	700
C				20	0	0	20
D					360	10	370
E						40	40
F							-
Total							1,820

The interchange of departments C and F increases the total material handling cost. Thus, it is not a desirable modification.

3. (a) Linear Programming tools can be used in Management Application - Explain. [6]
- (b) After observing heavy congestion of customers over a period of time in a petrol station, Mr. Petro has decided to set up a petrol pump facility on his own in a nearby site. He has compiled statistics relating to the potential customer arrival pattern and service pattern as given below. He has also decided to evaluate the operations by the using the simulation technique.

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Arrivals		Service	
Inter-arrival time (minutes)	Probability	Service time (minutes)	Probability
2	0-22	4	0-28
4	0-30	4	0-40
6	0-24	8	0-22
8	0-24	10	0-10

[10]

Assume:

- (i) The clock starts at 8 : 0 hours.
- (ii) Only one pump is set up.
- (iii) The following 12 Random Numbers are to be used to depict the customer arrival pattern:
78, 26, 94, 08, 46, 63, 18, 35, 59, 12, 97 and 82
- (iv) The following 12 Random Numbers are to be used to depict the service pattern:
44, 21, 73, 96, 63, 35, 57, 31, 84, 24, 05 and 37

You are required to find out the

- (i) probability of the pump being idle, and
- (ii) average time spent by a customer waiting in queue.

Answer:

3. (a) Management Application of Linear Programming Tools

- (a) Portfolio Selection.
- (b) Financial Mix Strategy.
- (c) Profit Planning.
- (d) Media Selection.
- (e) Travelling Salesmen Problem.
- (f) Determination of equitable salaries.
- (g) Staffing problem.

(b)

Minutes	Inter -arrival lime			Minutes	Service time		
	Probability	Cumulative probability	Range		Probability	Cumulative probability	Range
2	0.22	0.22	00-21	4	0.28	0.28	00-17
4	0.30	0.52	22-51	6	0.40	0.68	28-67
6	0.24	0.76	52-75	8	0.22	0.90	68-89
8	0.24	1.00	76-99	10	0.10	1.00	90-99

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Sl. No	Random No. for inter arrival	Inter arrival time	Entry lime in queue	Service start time	Random no for service	Service lime	Service end time	Waiting Time of customer	Idle time
1	78	8	8.08	8.08	44	6	8.14	-	8
2	26	4	8.12	8.14	21	4	8.18	2	-9
3	94	8	8.20	8.22	73	8	8.30	-	-
4	08	2	8.22	8.30	96	10	8.40	8	-
5	46	4	8.26	8.40	63	6	8.46	14	-
6	63	6	8.32	8.46	35	6	8.52	14	-
7	18	2	8.34	8.52	57	6	8.58	18	-
8	35	4	8.38	8.58	31	6	9.04	20	-
9	59	6	8.44	9.04	84	8	9.12	20	-
10	12	0	8.46	9.12	24	4	9.16	26	-
11	97	8	8.54	9.16	05	4	9.20	22	-
12	82	8	9.02	9.20	37	6	9.26	18	10
	Total time							162	10

Average waiting time spent by the customer = $162/12 = 13.5$ minutes
 Probability of idle time of petrol station = $10/86 = 0.1163$

4. (a) A captain of a cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows:

		Batting Position				
		III	IV	V	VI	VII
Batsmen	A	40	40	35	25	50
	B	42	30	16	25	27
	C	50	48	40	60	50
	D	20	19	20	18	25
	E	58	60	59	55	53

Make the assignment so that the expected total average runs scored by these batsmen are maximum. [8]

- (b) An airline is planning to open a satellite ticket desk in a new shopping plaza, staffed by one ticket agent. It is estimated that requests for tickets and information will average 15 per hour, and requests will have a Poisson distribution. Service time is assumed to be exponentially distributed. Previous experience with similar satellite operations suggests that mean service time should average about three minutes per request.

Determine each of the following:

- System utilization.
- Percentage of time the server (agent) will be idle.
- The expected number of customers waiting to be served.
- The average time customers will spend in the system.

[8]

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Answer:

- (a) This is a problem of Maximisation. To solve it using Assignment technique it has to be converted to a Minimisation problem by forming a Relative Loss Matrix.

	Batting Position				
Batsman	III	IV	V	VI	VII
A	40	40	35	25	50
B	42	30	16	25	27
C	50	48	40	60	50
D	20	19	20	18	25
E	58	60	59	55	53

Relative Loss Matrix*

	Batting Position				
Batsman	III	IV	V	VI	VII
A	20	20	25	35	10
B	18	30	44	35	33
C	10	12	20	0	10
D	40	41	40	42	35
E	2	0	1	5	7

* This matrix is formed by subtracting all the elements of the given matrix from the highest element (60) of it.

Row Operation Matrix

	Batting Position				
Batsman	III	IV	V	VI	VII
A	10	10	15	25	0
B	0	12	26	17	15
C	10	12	20	0	10
D	5	6	5	7	0
E	2	0	1	5	7

Column Operation Matrix

Batting Position \ Batsman	III	IV	V	VI	VII
A	10	10	14	25	0
B	0	12	25	17	15
C	10	12	19	0	10
D	5	6	4	7	0
E	2	0	0	5	7

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Minimum no. of horizontal and vertical straight lines to cover all the zeros = 4 ≠ Order of the matrix(5). So the solution is non optimal.

Improved Matrix

Batsman	Batting Position				
	III	IV	V	VI	VII
A	10	6	10	25	0
B	0	8	21	17	15
C	10	8	15	0	10
D	5	2	0	7	1
E	5	0	1	9	11

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 5 = Order of the matrix.

So the solution is optimal.

Optimal Assignment

Batsman	Batting Position	Average runs scored
A	VII	50
B	III	42
C	VI	60
D	V	20
E	IV	60
Total =		232

Expected maximum total runs = 232

(b) Arrival Rate = $\lambda = 15$ customers per hour

Service Rate = $\mu = \frac{1}{\text{Service time}} = \frac{1 \text{ customer}}{3 \text{ minutes}} \times 60 \text{ minutes per hour} = 20$ customers per hour

a. System Utilisation = $\rho = \frac{\lambda}{M\mu} = \frac{15}{1(20)} = 0.75$

b. Percentage of time the server will be idle = $1 - \rho = 1 - 0.75 = 0.25$, or 25 percent

c. Expected no. of customers waiting to be served $L_q = \frac{\lambda}{\mu(\mu - \lambda)} = \frac{225}{20(20 - 15)} = \frac{225}{(20 \times 5)} = \frac{225}{100} = 2.25$ customers

d. Average time customers will spend in the system = $w_s = \frac{L_q}{\lambda} + \frac{1}{\mu} = \frac{2.25}{15} + \frac{1}{20} = 0.20$ hours, or 12 minute

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5. (a) Draw the network for the following activities and find critical path and total duration of the project.

Activity	Duration (months)
1-2	3
2-3	4
2-4	2
3-4	3
4-5	4
5-6	3
5-7	5
6-8	2
7-8	4
8-9	5

[3+2+3=8]

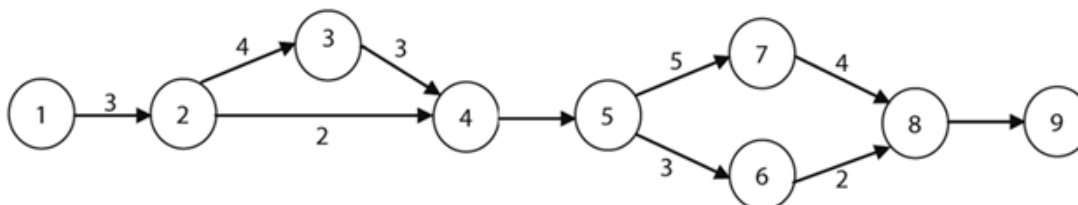
- (b) PQR company has kept records of breakdowns of its machines for 300 days work year as shown below:

No. of breakdown	Frequency in days
0	40
1	150
2	70
3	30
4	10
300	

The firm estimates that each breakdown costs ₹ 650 and is considering adopting a preventive maintenance program which would cost ₹ 200 per day and limit the number of breakdown to an average of one per day. What is the expected annual savings from preventive maintenance program? [8]

Answer:

- (a) Net work diagram



Paths	Duration (months)
1-2-3-4-5-7-8-9	3+4+3+4+5+4+5=28 (Critical Path)
1-2-3-4-5-6-8-9	3+4+3+4+3+2+5=24
1-2-4-5-7-8-9	3+2+4+5+4+5=23
1-2-4-5-6-8-9	3+2+4+3+2+5=19

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(b) Step 1 : To determine the expected number of breakdowns per year:

No. of breakdowns (x)	Frequency of breakdowns in days i.e, f(x)	Probability distribution of breakdowns P(x)	Expected value of breakdowns X P(x)
0	40	$40/300 = 0.133$	Nil
1	150	$150/300 = 0.500$	0.500
2	70	$70/300 = 0.233$	0.466
3	30	$30/300 = 0.100$	0.300
4	10	$10/300 = 0.033$	0.132
Total	300	1.000	1.400

Step 2 :

Total no. of breakdowns per day = 1.40

Cost of breakdown per day = $1.40 \times 650 = ₹ 910$

Cost of preventive maintenance programme per day = ₹ 200 + ₹ 650 = ₹ 850

Expected annual savings from the preventive maintenance programme = $(910 - 850) \times 300$ days
= $60 \times 300 = ₹ 18,000$

Section – II: (Strategic Management)

6. Choose the correct answer from the given alternatives:

[1×6=6]

(i) For an entrepreneur

- (A) mission is before the vision
- (B) vision is before the mission
- (C) both are developed simultaneously
- (D) profitability is most crucial

(ii) Marketing Research Studies are undertaken:

- (A) to understand product-price relationships.
- (B) to measure brand loyalty of a class of consumers.
- (C) to predict market potential of a product on a future date.
- (D) All of the above.

(iii) For an actor in Bollywood, his outstanding performance would be a /an

- (A) Asset
- (B) Strategic Asset
- (C) Core competency
- (D) Capability.

- (iv) Intensity of competition is _____ in low return industries
- (A) low.
 - (B) non-existent.
 - (C) high.
 - (D) not important dependent on industry nature.
- (v) A company's actual strategy is
- (A) mostly hidden to outside view and is known only to top-level managers.
 - (B) partly proactive and partly reactive to changing circumstances.
 - (C) typically planned well in advance and usually deviates little from the planned set of actions and business approaches because of the risks of making on-the-spot changes.
 - (D) mostly a function of the strategies being used by rival companies (particularly those companies that are industry leaders).
- (vi) Blue Ocean Strategy is concerned with
- (A) moving into new market with new products
 - (B) creating a new market places where there is no competition
 - (C) developments of products and markets in order to ensure survival
 - (D) making the product unique in terms of attributes

Answer:

6. (i) (B)
(ii) (D)
(iii) (C)
(iv) (C)
(v) (B)
(vi) (B)

Answer any two question form the following:

7. (a) Enlist the advantage of strategic Management
- (b) In SWOT analysis, list the threats that may occur in business. What step is necessary if a threat does arise? [6+6]

Answer:

- (a) The Advantages of Strategic Management
- Discharges Board Responsibility The first reason that most organizations state for having a strategic management process is that it discharges the responsibility of the Board of Directors.

- Forces an Objective Assessment
Strategic management provides a discipline that enables the board and senior management to actually take a step back from the day-to-day business to think about the future of the organization. Without this discipline, the organization can become solely consumed with working through the next issue or problem without consideration of the larger picture.
- Provides a Framework for Decision-Making
Strategy provides a framework within which all staff can make day-to-day operational decisions and understand that those decisions are all moving the organization in a single direction.
- Supports Understanding & Buy-In
Allowing the board and staff participation in the strategic discussion enables them to better understand the direction, why that direction was chosen, and the associated benefits. For some people simply knowing is enough; for many people, to gain their full support requires them to understand.
- Enables Measurement of Progress
A strategic management process forces an organization to set objectives and measures of success. The setting of measures of success requires that the organization first determine what is critical to its ongoing success and then forces the establishment of objectives and keeps these critical measures in front of the board and senior management.

(b) Threats:

- (i) Globalisation
- (ii) Competition
- (iii) Price cutting war
- (iv) Free imports
- (v) Industrial unrest
- (vi) Political instability
- (vii) Quality thrusts
- (viii) High and adverse debt equity ratio
- (ix) Increase in financing cost
- (x) Economic slowdown due to international recession impact

Each and every threat of the SWOT would be analysed critically to find out a best alternative out of various alternatives available.

Each such threat as and when arises must be examined and necessary action taken to be free from these or to solve these prudently so that loss to the organisation may be minimum.

8. (a) Discuss the approaches in Strategic Planning.

(b) Discuss about "Types of Strategic Control System".

[6+6]

Answer:

(a) Approaches in Strategic Planning

It is important to operate a planning process which will not only produce realistic and potentially rewarding plans but will also secure the support of all those involved in implementing them. There are three approaches that can be adopted to strategic planning:

- (i) A top-down process, in which managers are given targets to achieve which they pass on down the line.
- (ii) A bottom-up process, in which functional and line managers in conjunction with their staff submit plans, targets and budgets for approval by higher authority.
- (iii) An iterative process, which involves both the top-down and bottom-up setting of targets. There is a to-and-from movement between different levels until agreement is reached. However, this agreement will have to be consistent with the overall mission, objectives and priorities and will have to be made within the context of the financial resources available to the organization. The iterative approach, which involves the maximum number of people, is the one most likely to deliver worthwhile and acceptable strategic plans.

(b) Types of Strategic Control Systems:

- **Personal Control**

It is the desire to shape and influence the behaviour of a person in a face to face interaction in order to achieve the organisation's goals. Direct supervision is the most common form of personal control as it helps in identifying the problems faced by subordinates and better man management. Personal control may also come from group of peers when people work in teams. Here personal control is all about possibility of learning to occur and competencies to develop.

- **Output control**

This system involves the estimation and forecasting of appropriate performance goals for each unit/division, department and employees and then measure the actual performance relative to these goals. It is often observed that the organisation's reward system is linked to performance on these goals. It can therefore be concluded that the output control system also provides an incentive structure for motivating employees at all levels of the organisation.

- **Behaviour control**

The establishment of a comprehensive system of rules and procedures to direct the actions or behaviour of divisions, functions and individuals is called behaviour control. The main purpose of having behaviour control is not to specify goals but to standardise the way of reaching them. It is felt that if rules are standardised then outcomes are predictable. It is of utmost importance that the management reviews behaviour controls over time. The rules that have been established tend to increase over time leading to inflexibility to react to the changing environment thereby adversely affecting the organisation's competitive advantage.

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9. Write short notes on any three of the following four questions:

[4×3=12]

- (a) Related Diversification;
- (b) Mc Kinsey's 7 –s Frame work;
- (c) Importance of Strategic Management
- (d) Theory X and Theory Y.

Answer:

(a) Related Diversification

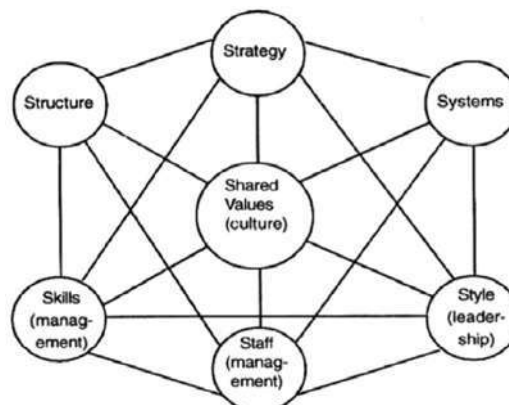
Related diversification

Here there is some relationship, and therefore potential synergy, between the firm's existing business and the new product/market space:

- (i) Concentric diversification means that there is a technological similarity between the industries which means that the firm is able to leverage its technical know-how to gain some advantage.
- (ii) Vertical integration means that the firm is moving along the value system of its existing industry towards its customers (forward vertical integration) or towards its suppliers (backward vertical integration). The benefits of this are assumed to be:
 - Taking over the profit margin presently enjoyed by suppliers or distributors;
 - Securing a demand for the product or a supply of key inputs;
 - Better synchronization of the value system;
 - Reduction in buyer or supplier power.

(b) Mc Kinsey's 7 –s Frame work;

Strategy is dependent on many variables – Internal as well as external. All factors are interrelated.



The McKinsey Company, a well-known management consultancy firm in the United States, towards the end of the 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best-run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills and superordinate goals.

A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.

Strategy: A set of decisions and actions aimed at gaining a sustainable competitive advantage

- Structure: The organisation chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- Systems: The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- Style: How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.
- Staff: How companies develop employees and shape basic values.

(c) Importance of Strategic Management:

- (i) Discover organisation strengths and weaknesses
- (ii) Identify the available opportunities and possible threats
- (iii) Discover the objectives and goals in line with organisations strengths and available opportunities
- (iv) Implement changes to overcome weaknesses and manage the threats.
- (v) Provide vision/mission or direction to future of organisations
- (vi) Build a dynamic and strong organisation
- (v) Help to achieve growing and stable organisation.

(d) Theory X and Theory Y: Another motivation strategy involves manager's assumptions about the nature of people. Douglas McGregor identified two sets of assumptions. According to him, Theory X involves negative assumptions that managers often use as the basis for dealing with people. Theory Y represents positive assumptions which managers strive to use. The basic rationale for using Theory Y rather than Theory X in most situations is that managerial activities reflect Theory X assumptions. As such, the activities based on Theory Y assumptions generally are more successful in motivating organisation people than those based on Theory X assumptions.

**Paper 9- OPERATIONS MANAGEMENT & STRATEGIC
MANAGEMENT**

Paper 9- Operations Management and Strategic Management

Full Marks: 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – I : [Operations Management]

1. a) Choose the correct answer from the given four alternatives. [1x10=10]

(i) To decide work load for men and machines:

- (a) Medium range forecasting is used,
- (b) Short term forecasting is used,
- (c) Long range forecasting is used,
- (d) A combination of long range and medium range forecasting is used

(ii) Most suitable layout for Continuous production is:

- (a) Line layout,
- (b) Process Layout,
- (c) Group technology,
- (d) Matrix layout.

(iii) Generally in continuous production the production is carried out to:

- (a) Customer's order,
- (b) Government orders only,
- (c) For stock and supply,
- (d) Few rich customers

(iv) The cycle time, selected in balancing a line must be:

- (a) Must be greater than the smallest time element given in the problem,
- (b) Must be less than the highest time element given in the problem,
- (c) Must be slightly greater than the highest time element given in the problem,
- (d) Left to the choice of the problem solver.

(v) The difference between product system and project system is:

- (a) Project system the equipment and machinery are fixed where as in product system they are movable,
- (b) In Product system the machinery and equipment are fixed and in project system they are not fixed,
- (c) Project system produces only standardized products and product system produces only unstandardised products,
- (d) Products cannot be stocked whereas projects can be stocked.

(vi) In an organisation the production planning and control department comes under :

- (a) Planning department
- (b) Manufacturing department
- (c) Personal department
- (d) R & D department

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 1

(vii) In general, medium range forecasting period will be approximately:

- (a) 5 to 10 Years,
- (b) 2 to 3 days,
- (c) 3 to 6 months,
- (d) 10 to 20 years

(viii) The method used in scheduling a project is:

- (a) A schedule of breakdown of orders,
- (b) Outline Master Programme,
- (c) PERT & CPM,
- (d) Schedule for large and integrated work.

(ix) Z-chart can be used to show:

- (a) Process used in production,
- (b) Quality level of the product,
- (c) Both the plan and the performance, and deviation from the plan,
- (d) To show cost structure of the product.

(x) One of the aims of loading is:

- (a) To finish the job as early as possible,
- (b) To minimise the material utilisation,
- (c) To improve the quality of product,
- (d) To keep operator idle time, material waiting time and ancillary machine time at minimum.

(b) Match the following:

[6×1=6]

	Column 'A'		Column 'B'
a.	Materials Requirement Planning	i.	Quality Control
b.	Programme Evaluation and Review Technique	ii.	Cost Control
c.	Average Outgoing Quality	iii.	Product mix determination
d.	Methods Time measurement	iv.	Inventory management
e.	Linear Programming	v.	Project planning
f.	Value Analysis	vi.	Work measurement

(c) State whether the following statements are True/False.

1×6=6

- (i) It is desirable to conduct work measurement after Method study.
- (ii) In carrying out Job Evaluation studies, point system is the best method.
- (iii) If the total float value is zero, it means the resources are just sufficient to complete the activity without delay.
- (iv) Incentives are substitute for lower wages.
- (v) Personnel Manager has nothing to do with productivity. It is the job of Technical Personnel.
- (vi) Ranking is one of the Job Evaluation Techniques.

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 1

Answer:

1. (a) (i) (b) Short term forecasting is used,
(ii) (a) Line layout
(iii) (c) For stock and supply
(iv) (c) Must be slightly greater than the highest time element given in the problem
(v) (b) In Product system the machinery and equipment are fixed and in project system are not fixed.
(vi) (b) Manufacturing department
(vii) (c) 3 to 6 months
(viii) (c) PERT & CPM
(ix) (c) Both the plan and the performance, and deviation from the plan
(x) (d) To keep operator idle time, material waiting time and ancillary machine time at minimum.

(b)

	Column 'A'		Column 'B'
a.	Materials Requirement Planning	iv.	Inventory management
b.	Programme Evaluation and Review Technique	v.	Project planning
c.	Average Outgoing Quality	i.	Quality Control
d.	Methods Time measurement	vi.	Work measurement
e.	Linear Programming	iii.	Product mix determination
f.	Value Analysis	ii.	Cost Control

- (c) (i) (T)
(ii) (T)
(iii) (T)
(iv) (F)
(v) (F)
(vi) (T)

[Answer any three questions from the following]

2. (a) Discuss some recent trends in operations management.

(b) An investigation into the demand for colour TV sets in 5 towns has resulted in the following data:

Population of the town(in lakhs)	X:	5	7	8	11	14
No of TV sets demanded(in thousands)	Y:	9	13	11	15	19

Fit a linear regression of Y on X and estimate the demand for CTV sets for two towns with population of 10 lakhs and 20 lakhs. 6+10=16

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 1

Answer:

2. (a) Recent trends in production/operations management relate to global competition and the impact it has on manufacturing firms. Some of the recent trends are:
1. **Global Market Place:** Globalisation of business has compelled many manufacturing firms to have operations in many countries where they have certain economic advantage. This has resulted in a steep increase in the level of competition among manufacturing firms throughout the world.
 2. **Production/Operations Strategy:** More and more firms are recognising the importance of production/ operations strategy for the overall success of their business and the necessity for relating it to their overall business strategy.
 3. **Total Quality Management (TQM):** TQM approach has been adopted by many firms to achieve customer satisfaction by a never-ending quest for improving the quality of goods and services.
 4. **Flexibility:** The ability to adapt quickly to changes in volume of demand, in the product mix demanded, and in product design or in delivery schedules, has become a major competitive strategy and a competitive advantage to the firms. This is sometimes called as agile manufacturing.
 5. **Time Reduction:** Reduction of manufacturing cycle time and speed to market for a new product provide competitive edge to a firm over other firms. When companies can provide products at the same price and quality, quicker delivery (short lead times) provide one firm competitive edge over the other.
 6. **Technology:** Advances in technology have led to a vast array of new products, new processes and new materials and components. Automation, computerisation, information and communication technologies have revolutionised the way companies operate. Technological changes in products and processes can have great impact on competitiveness and quality, if the advanced technology is carefully integrated into the existing system.

(b) Computation of trend values

Population (in lakhs)	Sales of CTV (in thousands)	Squares of the population	Product of population and sales of colour TV
X	Y	X ²	XY
5	9	25	45
7	13	49	91
8	11	64	88
11	15	121	165
14	19	196	266
$\Sigma X = 45$	$\Sigma y = 67$	$\Sigma X^2 = 455$	$\Sigma XY = 655$

Regression equation of Y on X

$$Y = a + bX$$

To find the values of a and b, the following two equations are to be solved

$$\Sigma Y = na + b\Sigma X \dots (i)$$

$$\Sigma XY = a\Sigma X + b\Sigma X^2 \dots (ii)$$

By putting the values we get

$$67 = 5a + 45b \dots \text{(iii)}$$

$$655 = 45a + 455b \dots \text{(iv)}$$

Multiplying equation (iii) by 9 and putting it as no. (v) we get,

$$603 = 45a + 405b \dots \text{(v)}$$

By deducting equation (v) from equation (iv); we get $52 = 50b$

$$b = 52 / 50 = 1.04$$

By putting the value of b in equation (iii), we get

$$\text{we get } 67 = 5a + 45 \times 1.04$$

$$\text{or, } 67 = 5a + 46.80$$

$$\text{or, } 67 - 46.80 = 5a$$

$$\text{or, } 5a = 20.20$$

$$\text{or, } a = 20.20 / 5$$

$$\text{or } a = 4.04$$

Now by putting the values of a and b the required regression equation of Y on X, is

$$Y = a + bX \text{ or, } Y = 4.04 + 1.04X$$

When X = 10 lakhs than $Y = 4.04 + 1.04 (10)$

or, $Y = 4.04 + 10.40$ or 14.44 thousand CTV sets.

Similarly for town having population of 20 lakhs, by putting the value of X = 20 lakhs in regression equation

$$Y = 4.04 + 1.04 (20)$$

$$= 4.04 + 20.80 = 24.84 \text{ thousands CTV sets.}$$

Hence expected demand for CTV for two towns will be 14.44 thousand and 24.84 thousand CTV sets.

3. (a) Discuss the stages of product life cycle.

(b) What is TQM? What are the underlying principles in TQM?

8+8=16

Answer:

3. (a) Products, like men, are mortal. They flourish for a time, then decline and die. The life cycle of a product has many points of similarity with the human life cycle. A product is born, grows lustily, attains a dynamic maturity, then enters its declining years. The stages taken together are referred, to as "the product life cycle". This life cycle of the product comprises of four stages: Introduction, Growth, Maturity and Decline.

The **introduction stage** is preceded by 'production planning and development'. This period requires greater investment. This investment should be gradually recouped as the sales pick up. The concept of life cycle would give the management an idea as to the time within which the original investment could be recouped.

After testing, a product enters the introduction stage and the product will then become available in the national market. Sales would begin gradually as potential buyers come to know about the product through advertising and other selling techniques. But the profits will be low as part of the investment is to be recouped besides heavy expenditure on selling.

In the **growth stage**, both sales and profits will begin to increase. It is here that similar other new products begin to appear in the market as substitutes and offer competition. The management, therefore, should try to change its approach by changing its strategy from "buy my product" to "try my product". At the end of this stage, the distribution arrangement is likely to get completed and the prices, if necessary, are reduced a little.

The third stage is the **maturity stage**. During this stage the manufacturers introduce new models or adopt methods such as trading-in, etc., to promote the sale of their brands with a view to retaining their position in the market. The number of buyers will continue to grow, but more slowly. In economic terms this is the stage where supply exceeds demand. Some of the promotional efforts may lengthen the span of this stage but they will not offer a permanent solution.

At the final stage of **decline**, profit margins touch a low level, competition becomes severe and customers start using newer and better products. It is here that the story of a product ends-a natural but hard end.

The above discussion concentrates only on the life cycle of a product, beginning with its introduction into the market (i.e., post-marketing). But a series of processes are to be undertaken by the management prior to the introduction of a product. The diagram given above is presented in an enlarged form to incorporate the pre-introduction (or pre-marketing) stages also.

(b) TQM is a philosophy that involves everyone in an organisation in a continual effort to improve quality and achieve customer satisfaction. TQM is Japanese approach to quality. The term TQM refers to a quest-for quality in an organization. TQM is a process that underlines three philosophies. One is never-ending push to improve, which is referred to as continuous improvement; the second is the involvement of every employee in the organization and the third is the goal for customer satisfaction, which means meeting or exceeding customer expectations. It often focuses on benchmarking world-class standards, product and service design and purchasing.

Underlying Principles in TQM:

1. Strive for quality in all things (Total Quality)
2. The customer is the creation of quality
3. Improve the process or systems by which products are produced
4. Quality improvement is continuous, never ending activity (continuous improvement - Kaizen)
5. Worker involvement is essential
6. Ground decisions and actions on knowledge
7. Encourage team work and cooperation.

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 1

4. (a) Four jobs can be processed on four different machines, with one job on one machine. Resulting profits vary with assignments. They are given below:

		MACHINES			
		A	B	C	D
JOBS	I	42	35	28	21
	II	30	25	20	15
	III	30	25	20	15
	IV	24	20	16	12

Find the optimum assignment of jobs to machines and the corresponding profit.

- (b) A Small retailer has studied the weekly receipts and payments over the past 200 weeks and has developed the following set of information:

Weekly Receipts (₹)	Probability	Weekly Payments (₹)	Probability
3,000	0.20	4,000	0.30
5,000	0.30	6,000	0.40
7,000	0.40	8,000	0.20
12,000	0.10	10,000	0.10

Using the following set of random numbers, simulate the weekly pattern of receipts and payments for the 12 weeks of the next quarter, assuming further that the beginning bank balance is ₹ 8000. What is the estimated balance at the end of the 12 weekly period? What is the highest weekly balance during the quarter? What is the average weekly balance for the quarter?

Random Numbers

For Receipts	03	91	38	55	17	46	32	43	69	72	24	22
For Payments	61	96	30	32	03	88	48	28	88	18	71	99

According to the given information, the random number interval is assigned to both the receipts and the payments. 8+8=16

Answer:

4. (a) Relative Loss Matrix

M/cs \ jobs	A	B	C	D
I	0	7	14	21
II	12	17	22	27
III	12	17	22	27
IV	18	22	26	30

As this is a problem of Maximisation, the same is converted to one of Minimisation by firming a Relative Loss Matrix where all the elements of the given matrix are subtracted from the highest element of the matrix (which is 42 in this case)

Matrix after Row Operation

M/cs \ Jobs	A	B	C	D
I	0	7	14	21
II	0	5	10	15
III	0	5	10	15
IV	0	4	8	12

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 1

Matrix after Column Operation

M/cs \ Jobs	A	B	C	D
I	0	3	6	9
II	0	1	2	3
III	0	1	2	3
IV	0	0	0	0

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 2 \neq Order of the matrix (4) So the solution is non optimal.

Improved Matrix (Non Optimal)

M/cs \ Jobs	A	B	C	D
I	0	2	5	8
II	0	0	1	2
III	0	0	1	2
IV	1	0	0	0

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 3 \neq Order of the matrix (4) So the solution is non optimal.

Further Improved Matrix [Optimal Solution (i)]

M/cs \ Jobs	A	B	C	D
I	0	2	4	7
II	0	0	1	1
III	0	0	0	1
IV	2	1	0	0

Here minimum no. of horizontal and vertical straight lines to cover all the zeros = 4 = Order of the matrix. So the solution is optimal.

Assignment as per Solution (i)			Assignment as per Solution (ii)		
Jobs	M/cs	Profit(₹)	Jobs	M/cs	Profit(₹)
I	A	42	I	A	42
II	B	25	II	B	20
III	C	20	III	C	25
IV	D	12	IV	D	12
Total	-	₹99	Total	-	₹99

Further Improved Matrix (Optimal Solution-ii)

M/cs \ Jobs	A	B	C	D
I	0	2	4	7
II	0	0	0	1
III	0	0	0	1

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 1

IV	2	1	0	0
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(b)

Range of random numbers							
Receipt (₹)	Probability	Cumulative Probability	Range	Payments (₹)	Probability	Cumulative probability	Range
3,000	0.20	0.20	00-19	4,000	0.30	0.30	00-29
5,000	0.30	0.50	20-49	6,000	0.40	0.70	30-69
7,000	0.40	0.90	50-89	8,000	0.20	0.90	70-89
12,000	0.10	1.00	90-99	10,000	0.10	1.00	90-99

Simulation of Data for a period of 12 weeks					
Week	Random No. for receipt	Expected Receipt (₹)	Random No. for payment	Expected Payment (₹)	Week end Balance (₹)
Opening Balance					8,000
1	03	3,000	61	6,000	5,000 (8000+3000-6000)
2	91	12,000	96	10,000	7,000
3	38	5,000	30	6,000	6,000
4	55	7,000	32	6,000	7,000
5	17	3,000	03	4,000	6,000
6	46	5,000	88	8,000	3,000
7	32	5,000	48	6,000	2,000
8	43	5,000	28	4,000	3,000
9	69	7,000	88	8,000	2,000
10	72	7,000	18	4,000	5,000
11	24	5,000	71	8,000	2,000
12	22	5,000	99	10,000	(3,000)

Estimated balance at the end of 12th week = ₹ (3,000)

Highest balance = ₹ 7,000

Average balance during the quarter = $45,000/12 = ₹ 3,750$

5. (a) A project has the following time schedule

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Time (months)	2	2	1	4	8	5	3	1	5	4	3

Construct a PERT network and compute

- Critical path and its duration
- Total float for each activity

Also, find the minimum number of cranes the project must have for its activities 2-5, 3-7, 5-8 and 8-9 without delaying the project given that one crane is sufficient to carry out the work involved in each activity if taken care of individually.

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 1

(b) A firm is using a machine whose purchase price is ₹ 15,000. The installation charges amount to ₹ 3,500 and the machine has a scrap value of only ₹ 1,500 because the firm has a monopoly of this type of work. The maintenance cost in various years is given in the following table:

Year	1	2	3	4	5	6	7	8	9
Maintenance Cost(₹)	260	760	1,100	1,600	2,200	3,000	4,100	4,900	6,100

The firm wants to determine after how many years should the machine be replaced on economic considerations, assuming that the machine replacement can be done only at the year end. 9+7=16

Answer:

5. (a) Steps:

1. Moving forward, find EF times (choosing the Maximum at activity intersection)
2. Maximum EF = LF = Critical Path Time.
3. Return path find LF (Choosing the Minimum at activity intersection)
4. Note LF, EF from network (except activity intersections)

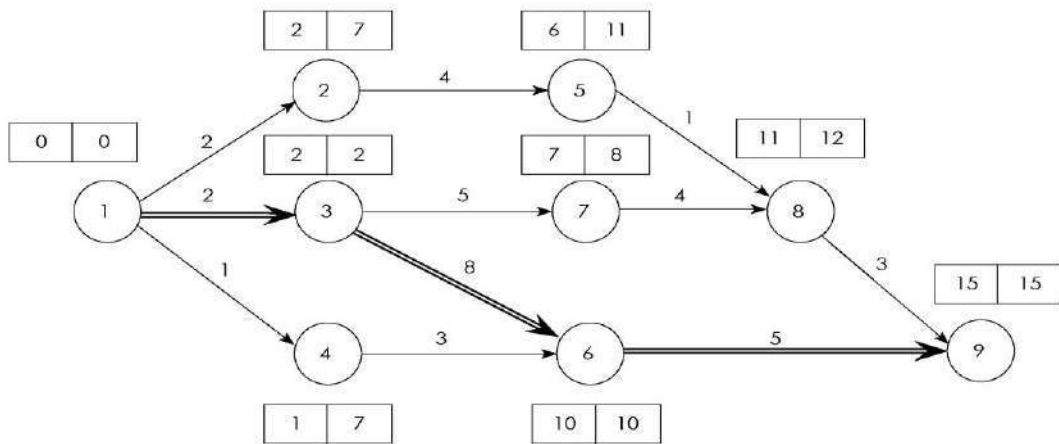


Table: Activity Relationship

Activity	Duration Months (t _{ij})	Earliest Start (ES _{ij})	Earliest Finish (EF _{ij} = ES _{ij} + t _{ij})	Latest Start (LS _{ij} = LF _{ij} - t _{ij})	Latest Finish (LF _{ij})	Total Float (TF _{ij} = LS _{ij} + ES _{ij} = LE _{ij} - EF _{ij})
1-2	2	0	2	5	7	5
1-3	2	0	2	0	2	0
1-4	1	0	1	6	7	6
2-5	4	2	6	7	11	5
3-6	8	2	10	2	10	0
3-7	5	2	7	3	8	1
4-6	3	1	4	7	10	6
5-8	1	6	7	11	12	5
6-9	5	10	15	10	15	0

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 1

7-8	4	7	11	8	12	1
8-9	3	11	14	12	15	1

Critical path is 1-3-6-9 with duration 15 months

(b) Cost of machine, $C = ₹ 15,000 + ₹ 3,500 = ₹ 18,500$

Scrap value, $S = ₹ 1,500$.

Year	Maintenance Cost, M1 (₹)	Cumulative Maintenance Cost, $\Sigma M1$ (₹)	Cost of Machine – Scrap Value (₹)	Total Cost T(n) (₹)	Annual Cost A(n) (₹)
(i)	(ii)	(iii)	(iv)	(v)=(iii)+(iv)	(vi)=(v)/n
1	260	260	17,000	17,260	17,260
2	760	1,020	17,000	18,020	9,010
3	1,100	2,120	17,000	19,120	6,373
4	1,600	3,720	17,000	20,720	5,180
5	2,200	5,920	17,000	22,920	4,584
6	3,000	8,920	17,000	25,920	4,320
7	4,100	13,020	17,000	30,020	4,288*
8	4,900	17,920	17,000	34,920	4,365
9	6,100	24,020	17,000	41,020	4,557

Lowest average cost is ₹ 4,288 approx., which corresponds to $n = 7$ in above table. Thus machine needs to be replaced every 7th year.

Section – II: (Strategic Management)

6. Choose the correct answer from the given alternatives: 1x6=6

- (i) The essential ingredients of Business Process Re-engineering are:
- (a) Continuous improvements of products, processes and technologies.
 - (b) Advanced planning in the areas of technologies, processes and strategic partnerships etc.
 - (c) Fundamental rethinking and radical redesign of business process to achieve dramatic results.
 - (d) Generation, comparison and evolution of many ideas to find out one worthy of development.
 - (e) Identification and selection of layouts most suited for products and processes
- (ii) Innovation strategy is:
- (a) defensive strategy
 - (b) offensive strategy
 - (c) responding to or anticipating customer and market demands
 - (d) guerrilla strategy
 - (e) harvesting strategy
- (iii) The Product Market matrix comprising of Strategies of Penetration, Market Development Product Development and Diversification was first formulated by

- (a) Ansoff
- (b) Drucker
- (c) Porter
- (d) Andrews
- (e) Prahlad

(iv) Outsourcing is the

- (a) Spinning off of a value-creating activity to create a new firm
- (b) Selling of a value-creating activity to other firms
- (c) Purchase of a value-creating activity from an external supplier
- (d) Use of computers to obtain value-creating data from the Internet

(v) Successful 'differential strategy' allows a company to

- (a) Gain buyer loyalty to its brands
- (b) Charge too high a price premium
- (c) Have product quality that exceeds buyers' needs
- (d) Depend only on intrinsic product attributes.

(vi) Risk Management Strategies are

- (a) Avoid Risk, Reduce Risk, Retain Risk, Combine Risk
- (b) Transfer Risk, Share Risk and Hedge Risk
- (c) Both (A) and (B)
- (d) None of the above.

Answer:

6. (i) (c) Fundamental rethinking and radical redesign of business process to achieve dramatic results.
(ii) (c) responding to or anticipating customer and market demands
(iii) (a) Ansoff
(iv) (c) Purchase of a value-creating activity from an external supplier
(v) (a) Gain buyer loyalty to its brands
(vi) (c) Both (A) and (B)

[Answer any two questions from the following]

7. (a) Discuss the major steps in Strategic Management Process.

(b) Enumerate some Corporate Weaknesses.

[6+6=12]

Answer:

7. (a) Steps of Strategic Management Process:

Step 1: Identifying Defining Business Mission, Purpose and Objectives: Identifying or defining an organisation's existing mission, purpose and objectives is the logical starting point as they lay foundation for strategic management. Every organisation has a mission, purpose and objectives, even if these elements are not consciously designed, written & communicated. These elements relate the organisation with the society and states that it has to achieve for itself and to the society.

Step 2: Environmental Analysis: Environmental factors — both internal environment and external environment — are analysed to:

- (i) identify changes in the environment,
- (ii) identify present and future threats and opportunities, and
- (iii) assess critically it's own strengths and weaknesses.

Organisational environment encompasses all factors both inside and outside the organisation that can influence the organisation positively and negatively. Environmental factors may help in building a sustainable competitive advantage.

Step 3: Revise Organisational Direction: A thorough analysis of organisation's environment pinpoints it's strengths, weaknesses, opportunities and threats (SWOT). This can often help management to reaffirm or revise it's organisational direction.

Step 4: Strategic Alternatives and Choice: Many alternative strategies are formulated based on possible options and in the light of organisational analysis and environmental appraisal. Alternative strategies will be ranked based on the SWOT analysis. The best strategy out of the alternatives will be chosen.

The steps from identification of business mission, purpose and objectives of alternative strategies and choice can be grouped into the broad step of strategy formulation.

Step 5: Strategy Implementation: The fifth step of strategic management process is the implementation of strategy. The logically developed strategy is to be put into action. The organisation can not reap the benefits of strategic management, unless the strategy is effectively implemented.

The managers should have clear vision and idea about the competitor's strategy, organisation's culture, handling change, skills of the managers-in-charge of implementation and the like. The progress from the stage of identification of business mission, purpose and objectives to the stage of achieving desired performance must overcome many obstacles.

Step 6: Strategic Evaluation and Control: The final step of strategic management process is strategic evaluation and control. It focuses on monitoring and evaluating the strategic management process in order to improve it and ensure that it functions properly. The managers must understand the process of strategic control and the role of strategic audit to perform the task of control successfully.

(b) Corporate Weaknesses:

Similar to Corporate strengths, there may be corporate weaknesses too. These may be enumerated as under:

- (i) Under-utilisation of capacity due to economic slump
- (ii) High debt burden in the capital structure
- (iii) Poor product-mix
- (iv) Lack of managerial strengths
- (v) Industrial unrest
- (vi) Technology gap
- (vii) Demand gap
- (viii) Poor infrastructures
- (ix) Raw materials source at a distance
- (x) Lack of latest information technology
- (xi) Competition war

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 1

(xii) Global threats

8. (a) State the basic differences between strategic management and strategic planning.

(b) State the various advantages and disadvantages of Matrix Organisation Structure.

[4+8=12]

Answer:

8. (a) The basic difference between Strategic management and Strategic planning are as follows:

Strategic Management	Strategic Planning
1.It is focused on producing strategic results; new markets; new products; new technologies etc.	1.It is focused on making optimal strategic decisions.
2. It is management by results.	2.It is management by plans.
3. It is an organizational action process.	3. It is an analytical process.
4. It broadens focus to include psychological, sociological and political variables.	4.It is focused on business, economic and technological variables.

(b) Advantages of Matrix Organisation Structure:

- (i) Useful for some specific industries like Information Technology, Healthcare etc.
- (ii) Employee can see visible results of their efforts
- (iii) Remove barrier to communications
- (iv) Managing projects are easy
- (v) Effective structures when environment is very dynamic

Disadvantages of Matrix Organisation Structure:

- (i) Complex structure as this contains both vertical and horizontal flow of information
- (ii) High cost approach due to more management positions
- (iii) Dual lines of authority
- (iv) Conflicts arises in the allocation of resources

9. Write short notes on any three of the following:

[4x3=12]

(a) Need for Production Strategy.

(b) Hybrid Organization in Strategy Implementation

(c) General Model Stages in BPR

(d) Strategic Planning and Long Range Planning

Answer:

9. (a) Need for a Production Strategy:

The key to successful survival of an enterprise as an independent unit is how efficiently production activity is managed. The two major factors that contribute to business

failures are obsolescence of the product line and excessive production costs. These factors themselves have been the outcome of ineffective production planning.

Production strategy plays crucial role in shaping the ultimate success of a firm. Being based on objective analysis of external environmental forces and corporate strengths and weaknesses, it enables an organisation to make optimal decisions regarding product, production capacity, and plant location, choice of machine and equipment and maintenance of existing facilities. Constant review of manufacturing plan aids in maintaining proper balance of capital investment in plant, equipment and inventory, personnel commitment, efficient operation of the production system by bringing in flexibility and versatility in response to schedule fluctuations, product mix and variations in raw material and quality control, and ensures effective material handling and planning of facilities.

Within the corporate structure, production strategy helps in maintaining full co-ordination with marketing and engineering functions to formulate plans to improve products and services. It calls upon management to keep in constant touch with finance and personnel to achieve the optimal use of assets, cost control, recruitment of suitable production personnel and management of labour disputes and negotiations.

(b) Hybrid Organization in Strategy Implementation:

The successful implementation of Strategy requires an effective organization structure. Organizational structure means the framework in which the organization defines how tasks are divided, resources are deployed and departments are co-ordinated.

A single type of structural design is not always sufficient to meet the requirements of strategy. When this occurs, one opinion is to mix and blend the basic organizations forms, matching structure to strategy, requirement by requirement, and unit by unit, Hybrid structure is a form of departmentalization that adopts parts of both functional and divisional structures at the same level of management.

The major potential advantage of the hybrid structures is that the combination may allow the firm to gain the advantages offered by the primary structure while at least diminishing the impact of the disadvantages.

(c) General Model Stages in BPR:

The Envision stage: the company reviews the existing strategy and business processes and based on that review business processes for improvement are targeted and IT opportunities are identified.

The Initiation stage: project teams are assigned, performance goals, project planning and employee notification are set.

The Diagnosis stage: documentation of processes and sub-processes takes place in terms of process attributes (activities, resources, communication, roles, IT and costs).

The Redesign stage: new process design is developed by devising process design alternatives and through brainstorming and creativity techniques.

The Reconstruction stage: management technique changes occur to ensure smooth migration to the new process responsibilities and human resource roles.

The Evaluation stage: the new process is monitored to determine if goals are met and examine total quality programs.

(d) Strategic Planning and Long Range Planning:

Long range planning is a systematic and formalized process concerned with directing and controlling future operations of an enterprise towards desired objectives for periods spreading generally over 5 or more years. It provides an opportunity to management to anticipate future problems and have got more flexibility in framing the long-range plans.

The basic divergence between strategic planning and long-range planning lies in the difference in the assumption regarding the future environment of an organisation. In case of long-range planning current knowledge about future conditions is known with certainty that can be relied upon by executives. Accordingly, the course of action for achievement of organisational goals is drawn on the basis of this knowledge. In long range planning the future is forecasted through extrapolation of the historical growth.

On the contrary, strategic planning assumes that an organisation must be ready to respond to a dynamic environment and future environmental conditions are not known with perfect certainty. Thus, there is a need to emphasise and understand how the environment assumed is changing. Accordingly, the issue of developing courses of action in response to these changes will have to be taken up. Here, a number of alternatives are generated for several situations for the future. In case of strategic planning, the firm tries to identify opportunities, threats and trends based on which the future prospects are analysed.

**Paper 9- OPERATIONS MANAGEMENT & STRATEGIC
MANAGEMENT**

Paper 9- Operations Management and Strategic Management

Full Marks: 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – I : [Operations Management]

1. (a) Choose the correct answer from the given four alternatives. [1x10=10]

(i) The material handling cost per unit of product in Continuous production is:

- (a) Highest compared to other systems,
- (b) Lower than other systems,
- (c) Negligible,
- (d) Cannot say.

(ii) The desired objective of Production and Operations Management is:

- (a) Use cheap machinery to produce,
- (b) To train unskilled workers to manufacture goods perfectly,
- (c) Optimal utilisation of available resources,
- (d) To earn good profits.

(iii) In aggregate planning, one of the methods in modification of demand is:

- (a) Differential Pricing,
- (b) Lay off of employees,
- (c) Over time working,
- (d) Sub contracting.

(iv) In a CPM/PERT network a dummy activity is necessary when

- (a) two activities have the same starting node
- (b) two activities have the same ending node
- (c) a node does not actually connect to another node
- (d) two activities share the same starting and ending node

(v) Fixing the flow lines of materials in production is known as:

- (a) Scheduling,
- (b) Loading,
- (c) Planning,
- (d) Routing.

(vi) Preferred numbers are used to:

- (a) To determine the number of varieties that are to be manufactured,
- (b) To the test the design of the product,
- (c) To ascertain the quality level of the product,
- (d) To evaluate the production cost.

(vii) When work centers are used in optimal sequence to do the jobs, we can:

- (a) Minimise the set up time,
- (b) Minimise operation time,
- (c) Minimise the breakdown of machines,
- (d) Minimise the utility of facility.

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 2

(viii) Which one of the following standards is associated with the "Quality Assurance in Production and Installation"?

- (a) ISO 9001
- (b) ISO 9002
- (c) ISO 9003
- (d) ISO 9004

(ix) The time horizon selected for forecasting depends on:

- (a) The salability of the product,
- (b) The selling capacity of Salesman,
- (c) Purpose for which forecast is made,
- (d) Time required for production cycle

(x) In Continuous manufacturing system, we need:

- (a) General purpose machines and Skilled labours,
- (b) Special machine tools and highly skilled labours,
- (c) Semi automatic machines and unskilled labours,
- (d) General purpose machines and unskilled labours.

(b) Match the following:

[6×1=6]

	Column 'A'		Column 'B'
a.	Normal Curve	i.	Project Funding
b.	Stock level	ii.	Capacity planning
c.	Short Run Average Cost	iii.	Job Evaluation
d.	Industrial Finance Corporation of India	iv.	Statistical Quality Control
e.	Ranking Method	v.	Value Analysis
f.	Improvement in productivity	vi.	Inventory Control

(c) State whether the following statements are True/False.

1×6=6

- (i) EOQ formula does not consider storage cost.
- (ii) Results available from work sampling study is 100% accurate.
- (iii) In a Network Analysis, a job for which the slack time is zero is known as non-critical job.
- (iv) Z chart is a chart used in Programme Control.
- (v) When demand does not exist in the market, we should start Production Incentives.
- (vi) It is justified to consider the effect of working condition both in Work Measurement and Job-Evaluation.

Answer:

1. (a) (i) (b) Lower than other systems
- (ii) (c) Optimal utilisation of available resources
- (iii) (a) Differential Pricing
- (iv) (d) two activities share the same starting and ending node
- (v) (d) Routing
- (vi) (a) To determine the number of varieties that are to be manufactured
- (vii) (a) Minimise the set up time
- (viii) (b) ISO 9002
- (ix) (c) Purpose for which forecast is made
- (x) (b) Special machine tools and highly skilled labours

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 2

(b)

	Column 'A'		Column 'B'
a.	Normal Curve	iv.	Statistical Quality Control
b.	Stock level	vi.	Inventory Control
c.	Short Run Average Cost	ii.	Capacity planning
d.	Industrial Finance Corporation of India	i.	Project Funding
e.	Ranking Method	iii.	Job Evaluation
f.	Improvement in productivity	v.	Value Analysis

- (c) (i) (F)
(ii) (F)
(iii) (F)
(iv) (T)
(v) (F)
(vi) (T)

[Answer any three questions from the following]

2. (a) What is operations management? Discuss the objectives of operations management.

(b) A manager has to decide about the number of machines to be purchased. He has three options i.e., purchasing one, or two or three machines. The data are given below:

Number of machine	Annual fixed cost	Corresponding range of output
One	₹12,000	0 to 300
Two	₹15,000	301 to 600
Three	₹21,000	601 to 900

Variable cost is ₹20 per unit and revenue is ₹50 per unit

(a) Determine the break-even point for each range

(b) If projected demand is between 600 and 650 units, how many machines should the manager purchase? [6+10=16]

Answer:

2. (a) Operations management is the management of that part of an organization that is responsible for producing goods and/or services. Operations Management concerns with the conversion of inputs into outputs, using physical resources, so as to provide the desired utilities to the customer while meeting the other organizational objectives of effectiveness, efficiency and adoptability.

OBJECTIVES OF OPERATIONS MANAGEMENT

Objectives of operations management can be categorised into (i) Customer service and (ii) Resource utilisation.

(i) Customer service

The first objective is the customer service which means the service for the satisfaction of customer wants. Customer service is therefore a key objective of operations management.

The Operations Management must provide something to a specification which can satisfy the customer in terms of cost and timing. Thus, primary objective can be satisfied by providing the 'right thing at the right price at the right time'.

(ii) Resource Utilization

Another major objective is to utilize resources for the satisfaction of customer wants effectively, i.e., customer service must be provided with the achievement of effective operations through efficient use of resources. Inefficient use of resources or inadequate customer service leads to commercial failure of an operating system.

Operations management is concerned essentially with the utilization of resources, i.e., obtaining maximum effect from resources or minimizing their loss, under utilization or waste. The extent of the utilization of the resources' potential might be expressed in terms of the proportion of available time used or occupied, space utilization, levels of activity, etc. Each measure indicates the extent to which the potential or capacity of such resources is utilized. This is referred as the objective of resource utilization.

Operations management is also concerned with the achievement of both satisfactory customer service and resource utilization. An improvement in one will often give rise to deterioration in the other. Often both cannot be maximized, and hence a satisfactory performance must be achieved on both objectives. All the activities of operations management must be tackled with these two objectives in mind, and many of the problems will be faced by operations managers because of this conflict. Hence, operations managers must attempt to balance these basic objectives.

(b) (i) Break-even point

Let Q be the breakeven point.

FC = Fixed cost, R = Revenue per unit, VC = Variable cost

At, BEP, TR = FC + TVC

or, Revenue p.u \times Q = FC + VC p.u. \times Q

Q (R - VC) = FC

Q = FC / R - VC

Let Q1 be the break-even-point for one machine option

Then, $Q_1 = 12000 / (50 - 20) = 12000 / 30 = 400$ units

(Not within the range of 0 to 300)

Let Q2 be the break-even-point for two machines option.

Then, $Q_2 = 15000 / (50 - 20) = 15000 / 30 = 500$ units

(within the range of 301 to 600)

Let Q3 be the break-even-point for three machines option.

Then, $Q_3 = 21000 / (50 - 20) = 21000 / 30 = 700$ units

(within the range of 601 to 900)

(ii) The projected demand is between 600 to 650 units.

The breakeven point for single machine option (i.e., 400 units) is not feasible because it exceeds the range of volume that can be produced with one machine (i.e., 0 to 300).

Also, the breakeven point for 3 machines is 700 units which is more than the upper limit of projected demand of 600 to 650 units and hence not feasible. For 2 machines option the break even volume is 500 units and volume range is 301 to 600.

Hence, the demand of 600 can be met with 2 machines and profit is earned because the production volume of 600 is more than the break even volume of 500. If the manager wants to produce 650 units with 3 machines, there will be loss because the break even volume with three machines is 700 units. Hence, the manager would choose two machines and produce 600 units.

3. (a) Discuss the characteristics of a good product design.

(b) How technological development affects industrial productivity?

[9+7=16]

Answer:

3. (a) Characteristics of Good Product Design

A good product design must ensure the following:

- (i) Function or performance:** The function or performance is what the customer expects the product to do to solve his/her problem or offer certain benefits leading to satisfaction. For example, a customer for a motor bike expects the bike to start with a few kicks on the kick peddle and also expects some other functional aspects such as pick-up, maximum speed, engine power and fuel consumption etc.
- (ii) Appearance or aesthetics:** This includes the style, colour, look, feel, etc. which appeals to the human sense and adds value to the product.
- (iii) Reliability:** This refers to the length of time a product can be used before it fails. In other words, reliability is the probability that a product will function for a specific time period without failure.
- (iv) Maintainability:** Refers to the restoration of a product once it has failed. High degree of maintainability is desired so that the product can be restored (repaired) to be used within a short time after it breaks down. This is also known as serviceability.
- (v) Availability:** This refers to the continuity of service to the customer. A product is available for use when it is in an operational state. Availability is a combination of reliability and maintainability. High reliability and maintainability ensures high availability.
- (vi) Productibility:** This refers to the ease of manufacture with minimum cost (economic production). This is ensured in product design by proper specification of tolerances, use of materials that can be easily processed and also use of economical processes and equipments to produce the product quickly and at a cheaper cost.
- (vii) Simplification:** This refers to the elimination of the complex features so that the intended function is performed with reduced costs, higher quality or more customer satisfaction. A simplified design has fewer parts which can be manufactured and assembled with less time and cost. "
- (viii) Standardisation:** Refers to the design activity that reduces variety among a group of products or parts. For example, group technology items have standardised design which calls for similar manufacturing process steps to be followed. Standard designs lead to variety reduction and results in economies of scale due

to high volume of production of standard products. However, standardised designs may lead to reduced choices for customers.

(ix) Specification: A specification is a detailed description of a material, part or product, including physical measures such as dimensions, volume, weight, surface finish etc. These specifications indicate tolerances on physical measures which provide production department with precise information about the characteristics of products to be produced and the processes and production equipments to be used to achieve the specified tolerances (acceptable variations).

Interchangeability of parts in products produced in large volumes (mass production and flow-line production) is provided by appropriate specification of tolerances to facilitate the desired fit between parts which are assembled together.

(x) Safety: The product must be safe to the user and should not cause any accident while using or should not cause any health hazard to the user. Safety in storage, handling and usage must be ensured by the designer and a proper package has to be provided to avoid damage during transportation and storage of the product. For example, a pharmaceutical product while used by the patient, should not cause some other side effect threatening the user.

(b) Technical factors including the degree of mechanisation, technical know-how, raw materials, layout and the methods and techniques of work determine the level of technological development in any industry. The principal factors in technological development affecting productivity are:

(a) **The Size of the Plant:** The size of the plant and the capacity utilisation has direct bearing on productivity. Production below or above the optimum level will be uneconomical and will tend towards lower level of productivity.

(b) **Research and Development:** Investment in research and development may yield better method of work and better design and quality of products.

(c) **Plant and Job Layout:** The arrangement of machines and positions in the plant and the set-up of the work-bench of an individual worker will determine, how economically and efficiently production will be carried out.

(d) **Machine and Equipment Design:** Whether the design of machinery and equipment is modern and in keeping with the limitations and capacities of the workers will also determine the production efficiency and level of productivity.

(e) **Production Processes:** Advanced production processes involving the use of modern integrated and automatic machinery and semi-processed materials have been known to help in raising levels of productivity.

(f) **Power, Raw Materials etc.** Improved quality of raw materials and increased use of power have a favourable effect on productivity.

(g) **Scientific Management Techniques:** Scientific management techniques such as better planning of work, simplification of methods, time and motion study, emphasis for reduced wastage and spoilage have positive effects on productivity.

4. (a) Priyanshu enterprise has three factories at locations A, B and C which supply three warehouses located at D,E and F. Monthly factory capacities are 10,80 and 15 units respectively. Monthly warehouse requirements are 75, 20 and 50 units respectively. Unit shipping costs (in ₹) are given in the following table:

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 2

	To	D	E	F
	A	5	1	7
From	B	6	4	6
	C	3	2	5

The penalty costs for not satisfying demand at the warehouses D, E and F are ₹ 5, ₹ 3 and ₹ 2 per unit respectively. Determine the optimum distribution for Priyanshu, using any of the known algorithms.

(b) As a tool service centre the arrival rate is two per hour and the service potential is three per hour. Simple queue conditions exist.

The hourly wage paid to the attendant at the service centre is ₹1.50 per hour and the hourly cost of a machinist away from his work is ₹4.

Calculate:

- (i) The average number of machinists being served or waiting to be served at any given time.
- (ii) The average time a machinist spends waiting for service.
- (iii) The total cost of operating the system for an eight – hour day.
- (iv) The cost of the system if there were two attendants working together as a team, each paid ₹1.50 per hour and each able to service on average 2 per hour.

[10+6=16]

Answer:

4. (a) Here total monthly capacity of Factories A, B & C = 10 + 80 + 15 = 105 units
 Also total monthly requirement of Warehouses D, E & F = 75 + 20 + 50 = 145 units
 So supply ≠ Demand i.e. the problem is unbalanced. To make it balanced, we introduce a Dummy Factory having monthly capacity = 145 – 105 = 40 units and unit cost of transportation to any warehouse from this Dummy is taken to be zero.

Sharing Initial Basic Feasible Solution (Optimal)

Warehouse Factory		D	E	F	Capacity	Row Penalties			Row Nos. (u_i)	
						1	2	3		
A		2	5	1	7	10	4	4*	–	$u_1 = -3$
B		6	4	6	6	80	2	2	2	$u_2 = 0$ (let)
C		3	2	5	5	15	1	1	1	$u_3 = -3$
Dummy		0	0	0	0	40	0	–	–	$u_4 = -6$
Requirement		75	20	50		60	10	10		
Column Penalties	1	3	1	5*						
	2	2	1	1						
	3	3*	2	1						
Column Nos. (v_j)		$v_1 = 6$	$v_2 = 4$	$v_3 = 6$						

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 2

Here, m = No. of rows = 4 and n = No. of columns = 3

$m + n - 1 = 4 + 3 - 1 = 6$ = No. of cell allocations

So the solution is nondegenerate

Now Row Nos. (u_i) and Column Nos. (v_j) are calculated using the formula $C_{ij} = u_i + v_j$ for all the Allocated Cells. Also to start with, it is assumed that $u_2 = 0$

Next, Opportunity Costs (Δ_{ij}) are calculated for all the Unallocated Cells using the formula $\Delta_{ij} = C_{ij} - (u_i + v_j)$ and written at the left bottom corner of the Unallocated Cells.

As $\Delta_{ij} \geq 0$, the solution is optimal.

Optimum Distribution Plan

From Factory	To Warehouse	Quantity (Units)	Cost/Unit (₹)	Total (₹)	Minimum total cost = 10 + 360 + 40 + 60 + 45 + 80 = ₹595
(1)	(2)	(3)	(4)	(5)=(3)x(4)	
A	E	10	1	10	
B	D	60	6	360	
	E	10	4	40	
	F	10	6	60	
C	D	15	3	45	
Dummy	F	40	2*	80	

This cost is the penalty for not meeting the demand of F.

- b)** Arrival rate = $\lambda = 2$ per hour
 Service rate = $\mu = 3$ per hour

- (i) Average number of machinists being served or waiting to be served at any given time:

$$L_s = \frac{\lambda}{\mu - \lambda} = \frac{2}{3 - 2} = 2$$

- (ii) Average Time a machinist spends waiting for the services:

$$W_q = \frac{\lambda}{\mu} \times \frac{1}{\mu - \lambda} = \frac{2}{3} \times \frac{1}{3 - 2} = 0.667 \text{ hours}$$

It means a machinist spends 40 minutes (i.e., 60×0.667) in the queue.

- (iii) Average time in the system

$$W_s = \frac{1}{(\mu - \lambda)} = \frac{1}{3 - 2} = 1 \text{ hour}$$

Average number of machinists in the system = 2 [As per (i) above]

Cost of two machinists being away from work = $₹4 \times 2 = ₹8.00$ per hour

Attendant cost = 1.50 per hour
9.50 per hour

Cost of 8- hour day = 8 hrs x 9.50 = ₹ 76.00

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 2

(iv) It is assumed that there is still a single service point, but the average service rate with 2 attendants now is 4 per hour

Now $\lambda = 2$ per hour

$\mu = 4$ per hour

Average number of machinists in the system = $L_s = \frac{\lambda}{\mu - \lambda} = \frac{2}{4 - 2} = 1$

Average time spent by a machinist in the system = $W_s = \frac{1}{\mu - \lambda} = \frac{1}{4 - 2} = \frac{1}{2}$ hour

Machinists cost = $1/2$ hr x ₹ 4 =	₹ 2.00
Attendant cost (@1.50 per attendant x 2 attendants)	₹ 3.00
Total Cost	₹ 5.00

Cost per 8 – hour day = ₹ 5 × 8 hrs. = ₹ 40.00

5. (a) In a factory, there are six jobs to perform, each of which should go through two machines A and B, in the order AB. The processing timings (in hours) for the jobs are given here. You are required to determine the sequence for performing the jobs that would minimise the total elapsed time, T. What is the value of T?

Job	Machine A	Machine B
1	7	3
2	4	8
3	2	6
4	5	6
5	9	4
6	8	1

- (b) An electric company which generates and distributes electricity conducted a study on the life of poles. The repatriate life data are given in the following table:

Life data of electric poles

Year after installation:	1	2	3	4	5	6	7	8	9	10
Percentage poles failing:	1	2	3	5	7	12	20	30	16	4

If the company now installs 5,000 poles and follows a policy of replacing poles only when they fail, how many poles are expected to be replaced each year during the next ten years?

To simplify the computation assume that failures occur and replacements are made only at the end of a year.

If the cost of replacing individually is ₹160 per pole and if we have a common group replacement policy it costs ₹ 80 per pole, find out the optimal period for group replacement.

[7+9=16]

Answer:

5. (a)

- (i) The least of all the times given in the table is for job 6 on machine B. So, perform job 6 in the end. It is last in the sequence. Now delete this job from the given data.
- (ii) Of all timings now, the minimum is for job 3 on machine A. So, do the job 3 first.

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 2

- (iii) After deleting job 3 also, the smallest time of 3 hours is for job 1 on machine B. Thus, perform job 1 in the end (before job 6).
- (iv) Having assigned job 1, we observe that the smallest value of 4 hours is shared by job 2 on machine A and job 5 on machine B. So, perform job 2 first and job 5 in the end.
- (v) Now, the only job remaining is job 4, it shall be assigned the only place left in the sequence. The resultant sequence of jobs is, therefore, as follows:

3	2	4	5	1	6
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This sequence is the optimal one. The total elapsed time, T, is obtained in Table as equal to 36 hours.

Table: Calculation of Total Elapsed Time (T)

Job	Machine A		Machine B	
	In	Out	In	Out
3	0	2	2	8
2	2	6	8	16
4	6	11	16	22
5	11	20	22	26
1	20	27	27	30
6	27	35	35	36

As shown in this table, the first job, job 3, starts at time 0 on the machine A and is over by time 2, when it passes to machine B to be worked on till time 8. The job 2 starts on the machine A at time 2 as the machine is free at that time. It is completed at time 6 and has to wait for 2 hours before it is processed on machine B, starting at time 8 when this machine is free. Similarly, the various jobs are assigned to the two machines and the in and out times are obtained.

(b) Chart showing Optimal Replacement Period

Average life of the pole - $1 \times 0.01 + 2 \times 0.02 + 3 \times 0.03 + 4 \times 0.05 + 5 \times 0.07 + 6 \times 0.12 + 7 \times 0.20 + 8 \times 0.3 + 9 \times 0.16 + 10 \times 0.04 = 7.05$ years.

No. of poles to be replaced every year = $5000/7.05 = 709$

Average yearly cost on individual replacement = $709 \times ₹160 = ₹1,13,440$.

Group Replacement: Initial Cost = $5,000 \times ₹80 = ₹4,00,000$

Year	No. of poles to be replaced	Yearly cost of individual replacement @₹160/pole (₹)	Cumulative Cost of individual replacement (₹)	Total cost of individual replacement as well as group replacement (₹)	Average Annual Cost = Total Cost/Year (₹)
1	$5,000 \times 0.01 = 50$	8,000	8,000	4,08,000	4,08,000
2	$5,000 \times 0.02 + 50 \times 0.01 = 101$	16,160	24,160	4,24,160	2,12,080
3	$5,000 \times 0.03 + 50 \times 0.02 + 101 \times 0.01 = 152$	24,320	48,480	4,48,480	1,49,493
4	$5000 \times 0.05 + 50 \times 0.03 + 101 \times 0.02 + 152 \times 0.01 = 256$	40,960	89,440	4,89,440	1,22,360
5	$5,000 \times 0.07 + 50 \times 0.05 + 101 \times 0.03 + 152 \times 0.02 + 256 \times 0.01 = 362$	57,920	1,47,360	5,47,360	1,09,472
6	$5,000 \times 1.2 + 50 \times 0.07 + 101 \times 0.05 + 152 \times 0.03 + 256 \times 0.02 + 362 \times 0.01 = 6023$	9,63,680	11,11,040	15,11,040	2,51,840

Optimal replacement at the end of the 5th year.

Answer to MTP_Intermediate_Syllabus 2016_June 2020_Set 2

Section – II: (Strategic Management)

6. Choose the correct answer from the given alternatives: 1x6=6

- (i) New entrants to an industry are more likely when.
- (a) It is difficult to gain access to distribution channels
 - (b) Economies of scale in the industry are high
 - (c) Product differentiation in the industry is low
 - (d) Capital requirement in the industry are high
- (ii) Typically Profits are highest in which stage of the industry life-cycle ?
- (a) Introduction
 - (b) Growth
 - (c) Maturity
 - (d) Decline
- (iii) A Question Mark in BCG Matrix is an investment, which
- (a) Yields low current income but has bright growth prospects.
 - (b) Yields high current income and has bright growth prospects.
 - (c) Yields high current income and has bleak growth prospects.
 - (d) Yields low current income and has bleak growth prospects
- (iv) A supplier group is powerful if
- (a) It is not concentrated
 - (b) Offers unique products
 - (c) Its customers can backward integrate
 - (d) There are no switching costs
- (v) The strategy which concentrates around a production market is:
- (a) Vertical Integration
 - (b) Niche
 - (c) Horizontal Expansion
 - (d) Diversification
- (vi) The reason for failure of Strategic Management may be ascribed to
- (a) Over-estimation of resource competence
 - (b) Failure to obtain senior management commitment
 - (c) Failure to obtain employee commitment
 - (d) All of the above

Answer:

6. (i) (c) Product differentiation in the industry is low
(ii) (b) Growth
(iii) (a) Yields low current income but has bright growth prospects
(iv) (b) Offers unique products
(v) (b) Niche
(vi) (d) All of the above

[Answer any two questions from the following]

7. (a) Discuss the differences between objectives and goals.

(b) What are the factors influencing portfolio strategy?

[4+8=12]

Answer:

7. (a) The difference between objectives and goals may be drawn in terms of the following four dimensions.

1. **Time Frame.** Objectives are timeless, enduring, and unending; goals are temporal, time-phased, and intended to be superseded by subsequent goals. Because objectives relate to the ongoing activities of an organisation, their achievement tends to be open-ended in the sense of not being bounded by time. For example, the survival objective of a business organisation is never completely attained since failure is always a future possibility.
2. **Specificity.** Objectives are stated in broad, general terms, dealing with matters of image, style, and self-perception. These are aspirations to be worked in the future. Goals are much more specific, stated in terms of a particular result that will be accomplished by a specific date. In the above example, survival as an objective is not very specific because it leads to different interpretation of the state of survival. On the other hand, goals can be expressed in terms of say achievement of 10 per cent growth in the net sales in the next year. This is more specific and time bound.
3. **Focus.** Objectives are usually stated in terms of some relevant environment which is external to the organisation; goals are more internally focused and carry important implications about how resources of the organisation are utilised or will be utilised in future. Therefore, objectives are more generalised statements like maintaining market leadership, striving continuously for technological superiority, etc. A goal may imply a resource commitment requiring the organisation to use those resources in order to achieve the desired outcomes.
4. **Measurement.** Both objectives and goals can be stated in terms which are quantitatively measured but the character of measurement is different. Generally, quantitative objectives are set in relative terms. For example, Reliance Textiles has put its objectives like this: to acquire top position among the Indian companies. This objective may not be achieved in any one year, but it is timeless and externally focused, providing a continuing challenge for the company. Quantitative goals are expressed in absolute terms. For example, a company has stated its goal to achieve 10 per cent growth in its sales in the next year. The achievement of this goal can be measured irrespective of environmental conditions and competitors' actions.

(b) There are number of factors - historical, personal, strategic, environmental etc. which influence portfolio strategy. Such factors are given below:

1. **Mission/Vision:** The mission of the company is one of the most important factors which influence, the portfolio strategy because the mission defines the scope and purpose of the company. Formulation of clear vision about the future has let to restricting the portfolio companies like Glaxo.
2. **Value system:** A factor very much complimentary to the mission that influences the portfolio strategy is the value system of the promoters or major stock holders. After the Murugappa group took over the EID Parry, the liquor business of the EID Parry group was sold off as the Murugappa group management felt that it was unethical to be in the liquor business.

- 3. Future of Current Business:** The future prospects of the current business are a very important factor influencing the portfolio strategy. If a current business, particularly the most important one, has a bleak future a company would be tempted to divest or diversify into growing business. Having felt that the future of the tobacco business would be very bleak, the ITC diversified into speciality paper, packaging and printing, hotels, agribusiness, financial services and international business etc. and today the non-tobacco businesses contribute a considerable share of the total turnover of ITC. (Some of these diversifications, however, have not been successful, and the company has, therefore, decided to concentrate more on its core business-tobacco).
- 4. Position on the Portfolio Matrix/PLC:** The position of different business on the product portfolio life cycle also may influence the portfolio strategy of a company. Products in the declining stage may be dropped. Similarly some of the dogs or question marks could also be eligible candidates for divestment. Several Indian companies, like the Ceat, have decided to drop businesses which are peripheral or which are not important in terms of business volume or are not otherwise satisfactory in terms of performance and which do not hold out promises for the future of the company. They have adopted the strategy of focusing on the core business (es).
- 5. Government Policy:** Government policy sometimes is an important determinant of portfolio strategy. The pre- 1991 regulatory regime did not permit many companies, particularly large ones and foreign firms, to pursue the type of growth and diversification strategies they would have followed in an environment of business freedom, resulting in distorted portfolios. The liberalisation has very significantly transformed the environment. The grant of more autonomy to the Navarathnas has provided them with considerable leeway for charting out their future growth.
- 6. Competitive Environment:** The competitive environment too has its influence on the portfolio strategy of many companies. When competition is absent or limited, as in a protected market, even firms which are inefficient may be able to thrive. The protection itself may prompt firms to enter such business.

However, as the market becomes competitive, as has been happening in India because of the liberalisation, things may undergo drastic changes. Many firms which survived or flourished in the protected regime would not be able to survive the competition. Further, for various reasons mentioned under the Case for Focusing, it would become necessary to focus on the core business.
- 7. Company Resources:** The resources and strengths of the company, undoubtedly, are important factors influencing the 'portfolio strategy'.
- 8. Supply/Demand Conditions:** Problems with input supplies may encourage backward integration. Similarly, problems with marketing the output, or advantages of value addition, may encourage forward integration. When products or services can be obtained cheaply/ more efficiently from outside, it may encourage the dropping of such business and dependence on outside sources.

8. (a) State the benefits of Contingency Planning.

(b) State the various advantages and disadvantages of SBU structure.

[6+6=12]

Answer:

8. (a) Benefits of Contingency Planning

- (i) It will make the future through their proactive planning and advanced preparation.
- (ii) It will introduce original action by removing present difficulties.
- (iii) It enables to anticipate future problems.
- (iv) It will change the goals to suit internal and external changes.
- (v) It experiments with creative ideas and take initiative.
- (vi) It will attempt to shape the future and create a more desirable environment.
- (vii) It permits quick response to change,
- (viii) It prevents panic in crisis situations.
- (ix) It makes managers more adaptable to unforeseen changes

(b) Advantages of SBU structure:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses.

Disadvantages of SBU structure:

- (i) May provide inconsistent approach to tackle customers, etc, because each unit may work in it's own way to handle situations.
- (ii) High cost approach.

9. Write short notes on any three of the following:

[4x3=12]

(a) Marketing Objectives

(b) Mc Kinsey's 7 –s Frame work

(c) Expected Results from BPR.

(d) Corporate Planning

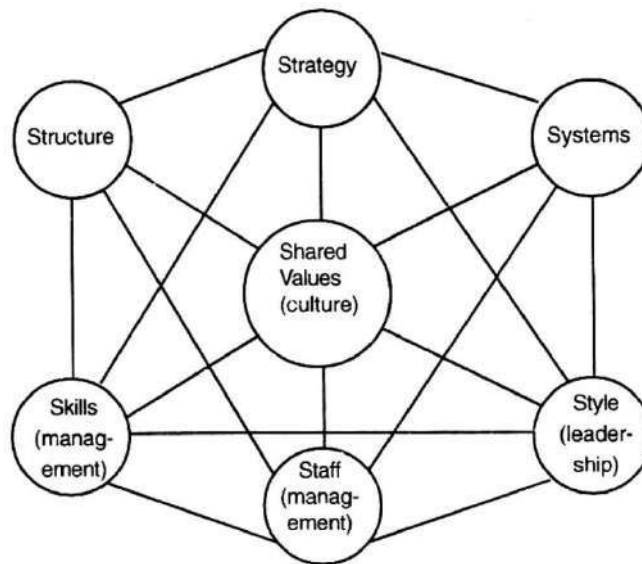
Answer:

9. (a) Marketing Objectives:

- (i) Creating awareness and appreciation of the crucial role of consumer in shaping decisions, and of the profit as a basic foundation of corporate existence, stability and growth.
- (ii) Awareness that consumers can only be helped to solve their problems through corporate efforts.
- (iii) Awareness and concern with trans-departmental implications of an individual department's decisions and actions and their effect on the firm's equilibrium with its external environment— consumers, competitors, government, etc.
- (iv) Concern with, and interest in, the innovation of products and services so as to solve select consumer problems.
- (v) Concern with the effect of new product and service introduction on firm's present and potential profit position.
- (vi) Sensing and monitoring information as regards market potential to serve as a base for goal and target setting.

- (vii) Focus in coordinating company effort and in establishing corporate and departmental objectives consistent with the enhancement of the firm's profit position.
- (viii) Awareness and appreciation of the role of formal, periodic, short and long-range planning of company's goals, strategies and tactics resulting in an integrated system of marketing actions.
- (ix) Desire and preparedness for the creation, expansion, contraction, termination, or in any way, restructuring of any corporate function in order to mobilize, utilize and control corporate effort.

(b) McKinsey's 7-S Framework:



McKinsey's 7-S Framework

Strategy is dependent on many variables – Internal as well as external. All factors are interrelated.

The McKinsey Company, a well-known management consultancy firm in the United States, towards the end of the 1970s was asked to find a solution to this knotty issue. The researchers Peters and Waterman found after examining America's best-run companies that the problem in strategy lay in its implementation and structure was only one lever in the hands of management. The other levers were systems, staff, style, skills, and superordinate goals. A strategy is usually successful when the other S's in the 7-S framework fit into or support the strategy.

- **Strategy:** A set of decisions and actions aimed at gaining a sustainable competitive advantage.
- **Structure:** The organization chart and associated information that shows who reports to whom and how tasks are both divided and integrated.
- **Systems:** The flow of activities involved in the daily operation of a business, including its core processes and its support systems.
- **Style:** How managers collectively spend their time and attention and how they use symbolic behaviour. How management acts is more important than what management says.

- **Staff:** How companies develop employees and shape basic values.
- **Shared Values:** Commonly held beliefs, mindsets and assumptions that shape how an organisation behaves— its corporate culture.
- **Skills:** An organisation's dominant capabilities and competencies.

(c) Expected Results from BPR:

The expected results for a company that implements business process reengineering are the following:

- Reallocation of jobs and processes so as to be combined into fewer, to be executed in natural order, simultaneously and by the least possible number of employees.
- Reorganization of the company's structure (downsizing) and employee empowerment.
- Jobs and processes become flexible so as to be executed according to the needs of each case, company's and customer's need's (hybrid centralized / decentralized operations)

The above changes will bring reductions of costs in the company, better quality (as far as price, promptness of delivery and offerings of related services) in the products and services provided to the customers. BPR shows that there is 'more than one way to skin a cat' and enables a fresh view without ingrained prejudice affecting judgement. It can produce huge initial savings where a business is struggling and often has the affect of turning around an unprofitable operation. Also, it leaves the business with a fully documented model of the operation, which is invaluable if embarking on a quality programme.

The expected outcome from a successful BPR process should be the desired one for the favor of the business concerned. The dramatic changes that are caused involve people's jobs and working relationships as it is very often that jobs are eliminated and the entire process is not as beneficial for all.

(d) Corporate Planning:

It is concerned with determination of objectives treating the company as a whole. It develops means to achieve the company's overall objectives. The corporate plans may relate to achieve corporate objectives for short-run and/or long-run. It is an integrated systems approach considering different functions, divisions and units of the organization. Such corporate plans are framed at the corporate level by the top management.

Corporate planning is not synonymous with long range planning. Corporate planning is concerned with both short periods as well as long periods. The time span depends on how far ahead a company wants to forecast, depends on nature of business and depends on commitment of resources required for it. Corporate planning in an engineering firm will involve long-term considerations but it will have short-term consideration in case of textile firm. Long range planning necessarily connotes planning with a long time horizon, generally five years or more.

Corporate planning is associated with long range planning in labour intensive industries. Corporate planning is concerned with the existing products in existing markets as well as new products and new markets. Long-range planning takes care of only the existing products in existing markets.

**Paper 9 – Operations Management
and
Strategic Management**

Paper 9 – Operations Management and Strategic Management

Full Marks: 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – A (Operation Management)

PART – I

1. (a) Choose the correct Answer: (1x10=10)
- (i) Number of product varieties that can be manufactured in Job production is:
 - (a) Limited to one or two,
 - (b) Large varieties of products,
 - (c) One only
 - (d) None of the above.
 - (ii) Generally, in continuous production the production is carried out to:
 - (a) Customer's order,
 - (b) Government orders only,
 - (c) For stock and supply,
 - (d) Few rich customers.
 - (iii) The starting point of Production cycle is:
 - (a) Product design,
 - (b) Production Planning,
 - (c) Routing,
 - (d) Market research.
 - (iv) Effective capacity can NOT be determined by which of the following factors?
 - (a) Product design and product-mix
 - (b) Quantity and quality capabilities
 - (c) Facilities
 - (d) None of the above
 - (v) Which one of the following standards is associated with the "Quality Assurance in Final Inspection "Test"?"
 - (a) ISO 9001
 - (b) ISO 9002
 - (c) ISO 9003
 - (d) ISO 9004
 - (vi) To determine where the plant should be located for maximum operating economy and effectiveness, refers to which one of the following?
 - (a) Plant layout
 - (b) Facility location
 - (c) Capacity planning
 - (d) Capacity requirement

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- (vii) In which of the following stages the management should try to change its approach by changing its strategy from “buy my product” to “try my product”?
- (a) Introduction
 - (b) Growth
 - (c) Maturity
 - (d) Decline
- (viii) One of the important charts used in Programme control is
- (a) Gantt chart
 - (b) Material chart
 - (c) Distribution chart
 - (d) Maintenance chart
- (ix) For a marketing manager, the sales forecast is:
- (a) Estimate of the amount of unit sales or a specified future period,
 - (b) Arranging the sales men to different segments of the market
 - (c) To distribute the goods through transport to satisfy the market demand,
 - (d) To plan the sales methods
- (x) With reference to the characteristics of a good product design, which one of the following is referred to “the ease of manufacture with minimum cost”?
- (a) Reliability
 - (b) Productibility
 - (c) Specification
 - (d) Simplification

- (b) Match Column “A” with column “B” (6×1=6)

A	B
a. Furniture	(i) spinning mill
b. brainstorming	(ii) smithy
c. cotton yarn	(iii) crashing
d. computer aided design	(iv) value analysis
e. network analysis	(v) carpentry
f. forgings	(vi) product design

- (c) State whether the following statements” true” or “false” (6×1=6)
- (i) Customer service is a key objective of operations management
 - (ii) A work stoppage generally reduces the cost of production
 - (iii) Increased productivity leads to cost reduction.
 - (iv) One of the limitations of Gantt Chart is that it does not clearly indicate the details regarding progress of activities.
 - (v) Breakdown maintenance doesn't require use of standby machines.
 - (vi) Load control is typically found wherever a particular bottleneck machine does not exist in the process of manufacturing.

Answer:

1. (a)

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
(b)	(c)	(d)	(d)	(c)	(c)	(b)	(b)	(a)	(b)

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(b)

A	B
a. Furniture	(v) Carpentry
b. brainstorming	(iv) value analysis
c. cotton yarn	(i) spinning mill
d. computer aided design	(vi) product design
e. network analysis	(iii) crashing
f. forgings	(ii) smithy

(c)

(i)	True
(ii)	False
(iii)	True
(iv)	True
(v)	False
(vi)	True

PART – II

2. (a) (i) Define operation system briefly with some example. 3
 (ii) Discuss recent trends in production management and its impact to global competition? 4
- (b) (i) What is demand forecasting? What are the methods of forecasting? 3
 (ii) An investigation into the use of Bus in 5 towns has resulted in the following data:

Population in town (in lakhs)	(X)	40	60	70	80	100
No. of Bus	(Y)	450	650	550	800	1000

Fit a linear regression of Y on X and estimate the number of scooters to be found in a town with a population of 180 lakhs. 6

Answer:

2. (a) (i) An Operating System is defined as a configuration of resources combined for the provision of good or services, Retail organizations, hospitals, bus and taxi services, tailors, hotels and dentists are all examples of operating systems. Any operating system converts inputs, using physical resources, to create outputs, the function of which is to satisfy customers wants. The creation of goods or services involve transforming or converting inputs into outputs. Various inputs such as capital, labour, and information are used to create goods or services using one or more transformation processes (e.g., storing, transporting, and cutting). It is important to note that goods and services often occur jointly. For example, having the oil changed in your car is a service, but the oil that delivered is a good. Similarly, house painting is a service, but the paint is a good. The goods-service combination is a continuum. It can range from primarily goods, with little service, to primarily service, with few goods. Because there are relatively few pure goods or pure services, companies usually sell product

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packages, which are a combination of goods and services. There are elements of both good production and service delivery in these product packages.

(ii) Recent trends in production/operations management relate to global competition and the impact it has on manufacturing firms. Some of the recent trends are:

1. **Global Market Place:** Globalisation of business has compelled many manufacturing firms to have operations in many countries where they have certain economic advantage. This has resulted in a steep increase in the level of competition among manufacturing firms throughout the world.
2. **Production/Operations Strategy:** More and more firms are recognising the importance of production/ operations strategy for the overall success of their business and the necessity for relating it to their overall business strategy.
3. **Total Quality Management (TQM):** TQM approach has been adopted by many firms to achieve customer satisfaction by a never-ending quest for improving the quality of goods and services.
4. **Supply-Chain Management:** Management of supply-chain, from suppliers to final customers reduces the cost of transportation, warehousing and distribution throughout the supply chain.
5. **Lean Production:** Production systems have become lean production systems which use minimal amounts of resources to produce a high volume of high quality goods with some variety. These systems use flexible manufacturing systems and multi-skilled workforce to have advantages of both mass production and job production (or craft production).

(b) (i) Different authorities on marketing and production have devised several methods or techniques of demand forecasting. The forecasts may be result of what market people or buyers say about the product or they may be the result of statistical and quantitative techniques.

The most common methods of demand forecasting are:

1. Survey of buyer's intentions or the user's expectation method.
2. Collective opinion or sales force composite method.
3. Trend projection method.
4. Moving average method.

(ii) Computation of trend value

Population (in lakhs) X	No. of scooters demanded Y	Squares of population X ²	Product of population and No. of scooters demanded XY
40	450	1600	18000
60	650	3600	39000
70	550	4900	38500
80	800	6400	64000
100	1000	10000	100000
$\Sigma X = 350$	$\Sigma Y = 3450$	$\Sigma X^2 = 26500$	$\Sigma XY = 259500$

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Regression equation of Y on X

$$Y = a + bX$$

To find the values of a and b we will have to solve the following two equations

$$\Sigma Y = na + b\Sigma X \quad \dots (i)$$

$$\Sigma XY = a\Sigma X + b\Sigma X^2 \quad \dots (ii)$$

By putting the values, we get

$$3450 = 5a + 350b \quad \dots (iii)$$

$$259500 = 350a + 26500b \quad \dots (iv)$$

By multiplying equation no. (iii) by 70 putting as equation (v) we get,

$$2,41,500 = 350a + 24500b \quad \dots (v)$$

By subtracting equation (v) from equation (iv), we get

$$18000 = 2000b$$

or, $2000 = 18,000$

$$b = \frac{18000}{2000}$$

By substituting the value of b in equation no. (iii), we get

$$3450 = 5a + 350b$$

or $3450 = 5a + 350b$

or $3450 = 5a + 350 \times 9$

or $3450 = 5a + 3150$

or $3450 - 3150 = 5a$

or $5a = 300$

or $a = \frac{300}{5} = 60$

$$Y = a + bX$$

or, $Y = 60 + 9X$

When $X = 180$ lakhs

then,

$$Y = 60 + 9(180)$$

or $Y = 60 + 1620$

or $Y = 1680$

3. (a) (i) What is Product design and define its objectives? 4
(ii) What are the factors which influences a product design? 4

(b) The following data is available for a manufacturing unit:

No. of operators	:	15
Daily working hours	:	8
No. of days per month	:	25
Std. production per month	:	300 units
Std. Labour hours per unit	:	8

The following information was obtained for November 2015:

Man days lost due to absenteeism	:	30
Unit produced	:	240
Idle Time	:	276 man hours

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Find the following: —

- (a) Percent absentism
- (b) Efficiency of utilisation of labour
- (c) Productive efficiency of labour
- (d) Overall productivity of labour in terms of units produced per man per month. 8

Answer:

3. (a) (i) Product design is an activity under production and operation management functions. product design directly affects product quality, production costs and customer satisfaction. Hence, the design of product is crucial to success in today's global competition. A good product design can improve the marketability of a product by making it easier to operate or use, upgrading its quality, improving its appearance, and/or reducing manufacturing costs
- The objectives of product design:
- (i) The overall objective is profit generation in the long run.
 - (ii) To achieve the desired product quality.
 - (iii) To reduce the development time and cost to the minimum.
 - (iv) To reduce the cost of the product.
 - (v) To ensure productibility or manufacturability (design for manufacturing and assembly).
- (ii) Factors Influencing Product Design:
- (1) Customer requirements: The designers must find out the exact requirements of the customers to ensure that the products suit the convenience of customers for use.
 - (2) Convenience of the operator or user: The industrial products such as machines and tools should be so designed that they are convenient and comfortable to operate or use.
 - (3) Types of materials used: Discovery of new and better materials can improve the product design. Designers keep in touch with the latest developments taking place in the field of materials and components and make use of improved materials and components in their product designs.
 - (4) Work methods and equipment's: Designers must keep abreast of improvements in work methods, processes and equipment's and design the products to make use of the latest technology and manufacturing processes to achieve reduction in costs.
 - (5) Cost/Price ratio: In a competitive market, there is lot of pressure on designers to design products which are cost effective because cost and quality are inbuilt in the design.
 - (6) Product quality: The product quality partly depends on quality of design and partly on quality of conformance.
 - (7) Effect on existing products: New product designs while replacing existing product designs, must take into consideration the use of standard parts and components, existing manufacturing and distribution strategies and blending of new manufacturing technology with the existing one so that the costs of implementing the changes are kept to, the minimum.

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(8) Packaging: Packaging is an essential part of a product and packaging design and product design go hand in hand with equal importance. Packaging design must take into account the objectives of packaging such as protection and promotion of the product.

- (b) No. of days per month = 25
 Daily working hrs. = 8
 No. of operators = 15
 No. of Man days per month = 15 × 25 = 375 Man days.
 Total working hrs. per month = 375 × 8 = 3,000
 Hours lost in absenteeism in a month = 30 × 8 = 240
- (a) Present absenteeism: $\frac{240 \text{ hrs} \times 100}{3000 \text{ hrs}} = 8\%$
- (b) Efficiency of utilization of labour: $\frac{\text{standard labour hour to produce 240 units}}{\text{Total labour hour}} \times 100$
 $= \frac{240 \times 8}{3000} \times 100$
 $= 64\%$
- (c) Standard time required to produce 240 units = 240 × 8 hrs = 1920 labour hrs
 In NOV, man hours lost 30 days' × 8 = 240 hours
 Idle time (in hours) 276 hours
 Total loss of time 516 hrs
 productive hours available in NOV = 3000
 less: Total loss of time 516
 Actual labour hours 2484
 Efficiency of labour = $\frac{\text{std.labour hours}}{\text{Actual labour hour}} = \frac{1920 \times 100}{2484} = 77.3\%$
- (d) 15 men produces 300 units,
 Std. labour productivity = 300/15 = 20 units.
 In November, overall productivity = 240/15 = 16 units.
 i.e. productivity falls by 25%.

4. (a) The marketing time of Nestle India Ltd requires some household data from a different city before introducing their new product. The team has been ordered by the management to perform this job in two days, the coming Saturday and Sundays. So, the team has no option other than to spend half a day in each of the cities. the relevant data are given below:

Day and time	Probability of a household contact			
	City 1	City 2	City 3	City 4
Saturday morning	0.32	0.85	0.16	0.64
Saturday evening	0.60	0.56	0.95	0.80
Sunday morning	0.70	0.35	0.40	0.62
Sunday evening	0.10	0.72	0.64	0.90
No. of households expected to be interviewed	150	100	200	200

As an expert of Operations research in the company, you have been requested by the management to suggest the plan (visiting) to the team in the 4 cities so that the expected response may be optimized.

8

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- (b) After observing heavy congestion of customers over a time of Diwali marketing in a shopping mall, the mall administrator has decided to set up an additional counter in a nearby site. He has compiled statistics relating to the customer's arrival pattern and service pattern as given below. He has also decided to evaluate the services by the using simulations technique.

Arrivals		Services	
Inter-arrival time (minutes)	Probability	Service time (minutes)	Probability
2	0.22	4	0.28
4	0.30	6	0.40
6	0.24	8	0.22
8	0.14	10	0.10
10	0.10		

Assume:

- (i) The starting hours at 9.00 a.m.
- (ii) Only one counter is set up.
- (iii) The following 12 Random Numbers are to be used to depict the customer arrival pattern:

78, 26, 94, 08, 46, 63, 18, 35, 59, 12, 97 and 82

The following 12 Random Numbers are to be used to depict the service pattern:

44, 21, 73, 96, 63, 35, 57, 31, 84, 24, 05, 37

You are required to find out the probability of being idle and average time spent by a customer waiting in queue. 8

Answer:

4. (a) Step 1:

Expected no. of household responses:

Day and time	City 1	City 2	City 3	City 4
Saturday morning	$0.32 \times 150 = 48$	85	32	128
Saturday evening	90	56	190	160
Sunday morning	105	35	80	124
Sunday evening	15	72	128	180

The assignment algorithm (Hungarian Method) can now be used after converting into minimization problem by subtracting the highest response figure (190) from each element of above matrix

Step 2 :

Day and time	City 1	City 2	City 3	City 4
Saturday morning	$190 - 48 = 142$	105	158	62
Saturday evening	100	134	0	30
Sunday morning	85	155	110	66
Sunday evening	175	118	62	10

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Step 3: Row MINIMA

Day and time	City 1	City 2	City 3	City 4
Saturday morning	142-62=80	43	96	0
Saturday evening	100	134	0	30
Sunday morning	19	89	44	0
Sunday evening	165	108	52	0

Step 4 : column MINIMA

Day and time	City 1	City 2	City 3	City 4	
Saturday morning	61	0	96	0	L2
Saturday evening	81	91	0	30	L3
Sunday morning	0	46	44	0	L4
Sunday evening	146	65	52	0	L1

Minimum No. s of lines are drawn to cover maximum zeroes. Since number of lines are equal to the order (4x4) of the matrix an optimal solution is reached and we make the assignments as shown in table 5 below:

Day and time	City 1	City 2	City 3	City 4
Saturday morning	61	0	96	0
Saturday evening	81	91	0	30
Sunday morning	0	46	44	0
Sunday evening	146	65	52	0

Day & Time		City	Response
Saturday morning	to	2	85
Saturday evening	to	3	190
Sunday morning	to	1	105
Sunday evening	to	4	180

Hence optimal number of responses = 85+190 +105+180=560.

(b)

Inter-arrival time				Service time			
Minutes	Probability	Cumulative probability	Range of Random No.	Minutes	Probability	Cumulative probability	Range of Random No.
2	0.22	0.22	00-21	4	0.28	0.28	00-27
4	0.30	0.52	22-51	6	0.40	0.68	28-67
6	0.24	0.76	52-75	8	0.22	0.90	68-89
8	0.14	0.90	76-89	10	0.10	1.00	90-99
10	0.10	1.00	90 - 99	-	-	-	-

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Sl. No.	Random No. for inter arrival time	Inter arrival time (Mins.)	Entry time in queue as per clock	Service start time as per clock	Random no for service time	Service time (Mins.)	Service end time as per clock	Waiting time of customer (Mins.)	Idle time (Mins.)
1	78	8	9.08	9.08	44	6	9.14	-	8
2	26	4	9.12	9.14	21	4	9.18	2	-
3	94	10	9.22	9.18	73	8	9.30	-	4
4	08	2	9.24	9.30	96	10	9.40	6	-
5	46	4	9.28	9.40	63	6	9.46	12	-
6	63	6	9.34	9.46	35	6	9.52	12	-
7	18	2	9.36	9.52	57	6	9.58	16	-
8	35	4	9.40	9.58	31	6	10.04	18	-
9	59	6	9.46	10.04	84	8	10.12	18	-
10	12	2	9.48	10.12	24	4	10.16	24	-
11	97	10	9.58	10.16	05	4	10.20	18	-
12	82	8	10.06	10.20	37	6	10.26	14	-
Total Time								140	12

Average time spent by the customer waiting in the queue = $140/12 = 11.67$ minutes

Probability of idle time of petrol station = Total Idle time = $12/86 = 0.1395$ time of the Service Channel*

* Service End Time - 10.26 Hrs. Service Channel opened at 9.00 hrs. i.e. Total Time of the Service Channel = 1 hr. 26 Mins = 86 Mins

5. (a) (i) **What are the difference between CPM and PERT?** 3
(ii) **A project with normal duration and cost along with crash duration and cost for each activity is given below:**

Activity	Normal time (Hrs.)	Normal cost (₹)	Crash time (Hrs.)	Crash cost (₹)
1-2	5	200	4	300
2-3	5	30	5	30
2-4	9	320	7	480
2-5	12	620	10	710
3-5	6	150	5	200
4-5	0	0	0	0
5-6	8	220	6	310
6-7	6	300	5	370

Overhead cost is ₹ 50 per hour.

Required:

Draw network diagram and identify the critical path.

6

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- (b) The data on the running costs per year and resale prices of equipment A whose purchase price is ₹ 3,00,000 are as follows :

Years	1	2	3	4	5	6	7
Running cost (₹)	45,000	57,000	69,000	87,000	1,08,000	1,35,000	1,65,000
Resale value (₹)	1,50,000	75,000	37,500	18,000	12,000	12,000	12,000

- (i) What is the optimum period of replacement?
 (ii) When equipment A is two years old equipment B which is a new model for the same usage is available. The optimum period for replacement is 4 years with an average cost of ₹1,08,000. Should equipment A be changed with equipment B? If so, when? [7]

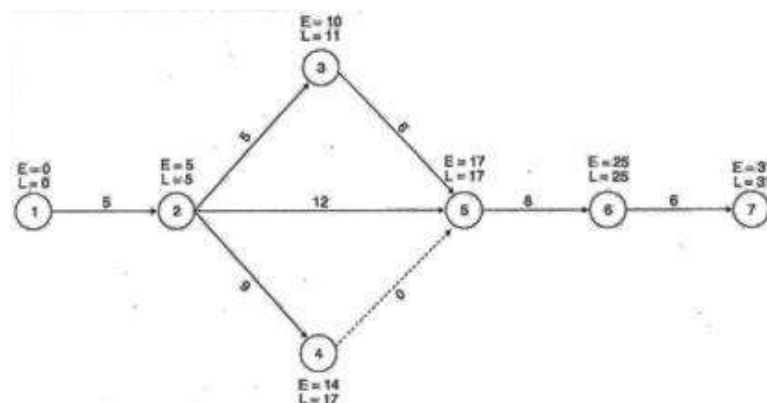
Answer:

5. (a) (i) **Difference in PERT and CPM**

Although these techniques (PERT and CPM) use the same principles and are based on network analysis yet they are different in the following respects from each other:

- (1) PERT is appropriate where time estimates are uncertain in the duration of activities as measured by optimistic time, most likely time, and pessimistic time, whereas CPM (Critical Path Method) is good when time estimates are found with certainty. CPM assumes that the duration of every activity is constant and therefore does not deal with uncertainty in time.
- (2) PERT is concerned with events which are the beginning or ending points of operation while CPM is concerned with activities.
- (3) PERT is suitable for non-repetitive projects while CPM is designed for repetitive projects.
- (4) PERT can be analysed statistically whereas CPM not.
- (5) PERT is not concerned with the relationship between time and cost, whereas CPM establishes a relationship between time and cost and cost is proportionate to time.

(ii)



Paths →	1-2-5-6-7 (Let's denote this by A)	1-2-3-5-6-7 (Let's denote this by B)	1-2-4-5-6-7 (Let's denote this by C)
Duration	31 hours	30 hours	28 hours
The critical path is A. Its duration is 31 hours			

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(b) Determination of optimal replacement period

Year of Service n	Running cost (₹) R(n)	Cumulative running cost (₹) $\sum R(n)$	Resale Price (₹) S	Depreciation Cost (₹) C - S	Total cost (₹) TC(n)	Average cost per year (₹) ATC (n)
(1)	(2)	(3)	(4)	(5)=3,00,00 - S	(6) = (3)+(5)	(7)=(5)/(1)
1	45,000	45,000	1,50,000	1,50,000	1,95,000	1,95,000
2	57,000	1,02,000	75,000	2,25,000	3,27,000	1,63,500
3	69,000	1,71,000	37,500	2,62,000	4,33,000	1,44,333.33
4	87,000	2,58,000	18,000	2,82,000	5,40,000	1,35,000
5	1,08,000	3,66,000	12,000	2,88,000	6,54,000	1,30,800
6	1,35,000	5,01,000	12,000	2,88,000	7,89,000	1,31,500
7	1,65,000	6,66,000	12,000	2,88,000	9,54,000	1,36,285.714

Since the average cost corresponding to the 5- year period is minimum, the optimum period for replacement is 5 years.

(ii) As the lowest average cost for equipment B is smaller than that for equipment A, it is beneficial to change the Equipment. To decide the time of replacement A by equipment B, the average cost of equipment A in the successive years is computed as shown in Table below:

Average Running Cost When Equipment is 2 years' old.

Years of Service	Running Cost (₹)	Depreciation Cost (₹)	Total Cost (₹)	Cumulative Cost (₹)	Average Cost (₹)
3	68,000	75,000-37,500=37,500	1,06,500	1,06,500	1,06,500
4	87,000	37,500-18,000=19,500	1,06,500	2,13,000	1,06,500
5	1,08,000	6000	1,14,000	3,27,000	1,09,033
6	1,35,000	--	1,35,000	4,62,000	1,15,500
7	1,65,000	--	1,65,000	6,27,000	1,25,400

Hence, equipment A should be replaced with equipment B, when it is four years' old.

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Section – B : (Strategic Management)

PART - I

6. (a) Choose the correct Answer: (6x1=6)
- (i) A corporate strategy can be defined as:
- (a) A list of actions about operational planning and statement of organisation structure and control system;
 - (b) A statement of how to compete, direction of growth and method of assessing environment;
 - (c) Abatement of organisation's activities and allocation of resources;
 - (d) A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives;
- (ii) A strategic business unit (SUB) is defined as a division of an organisation:
- (a) That help in the marketing operation;
 - (b) That enable managers to have better control over the resources;
 - (c) That help in the choice of technology;
 - (d) That help in the allocation of scarce resources;
- (iii) McKinney's 7-s framework consists of:
- (a) Structure, strategy, software, skills, styles, staff and supervision
 - (b) Structure, strategy, systems, skills, styles, syndication and shared values.
 - (c) Structure, strategy, systems, skills, steering power, styles and shared values.
 - (d) Structure, strategy, staff, skills, systems, shared values, super ordinate goal.
- (iv) The Product Market matrix comprising of Strategies of Penetration, Market Development Product Development and Diversification was first formulated by
- (a) Ansoff
 - (b) Drucker
 - (c) Porter
 - (d) Andrews
- (v) 'Niche' is similar to the
- (a) Growth strategy
 - (b) Milking strategy
 - (c) Flanking strategy
 - (d) Survival strategy
- (vi) For an actor in Bollywood, his outstanding performance would be a /an
- (a) Asset
 - (b) Strategic Asset
 - (c) Core competency
 - (d) Capability

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Answer:

6. (a)

(i)	(d) a course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives
(ii)	(b) that enable managers to have better control over the resources.
(iii)	(d) Structure, strategy, staff, skills, systems, shared values, super ordinate goal.
(iv)	(a) Ansoff
(v)	(C) Flanking strategy
(vi)	(c) Core competency

PART II

(Answer any two questions out of three questions)

7. (a) **What are the difference between vision and mission? Discuss in brief the formulation of Organizational Mission.** 6
- (b) **Explain the objective of SWOT analysis and its advantages and disadvantages.** 6

Answer:

7. (a) Vision is a statement of the future. It articulates the basic characteristic that shape organisations strategy. It indicates where the organisation is headed and what it intends to be.

There is a quote that 'great visionary can foresee the future in advance and take steps accordingly to be at forefront'. So, we can conclude that;

1. Vision provide a road map to Company's future
2. Vision indicates the kind of company management is trying to create for future.
3. Vision specifies about company intention and capabilities to adapt to new technologies
4. Vision also specifies management policies towards customers and societies.

A number of organisations have summed up their visions in a brief phrase for e.g.

- Nike: 'To bring innovation and inspiration to ever athlete in the world.'
- Scotland Yard: 'to make London the safest major city in the world.'
- Dabur: 'Dedicated to the health and wellbeing of every household.'
- Infosys: 'To be a globally respected corporation that provides best-of- breed business solutions, leverage technology, delivered by best- in class people.'

The term 'mission' implies the fundamental and enduring objectives of an organisation that set it apart from other organisations of similar nature The mission statement of an organisation can be either product oriented or customer oriented. A product-oriented business definition focuses on the characteristics of the products sold and the markets served, not on which kinds of customer needs the products are satisfying.

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Mission statement of some organisations and the nature of the statement

- Bharat Gas: To make Bharat Gas a dominant brand in the segments we market, by becoming trendsetters in customer service, safety and quality. (It is a customer oriented mission statement).
- Nirma: Nirma is a customer focused company committed to consistently offer better quality products and services that maximise value to the customer. (It is a customer oriented mission statement).
- Microsoft corporation: to empower every person and every organisation on the planet to achieve more. (It is a customer oriented mission statement).

Formulation of Organisational Mission:

Organisation cannot declare the mission just on some great whim and fancy, it should be based on organisations' existing capabilities and achievable milestones. Here are some guidelines for formulation of "mission" statement

- It should be based on existing business capabilities "Who we are and what we do?"
- It should follow the long term strategy principles
- Profit making should not be the only mission of organisation
- It should be logical extension of business existing capabilities
- It should clearly and precisely present the future orientation of business

(b) The objectives of SWOT analysis:

The acronym SWOT stands for Strengths, Weaknesses, Opportunities, and Threats.

The objectives of SWOT analysis is to express the qualitative and quantitative areas of the business which have strengths to exploit, and the areas have weaknesses which must be improved. Although every area has to investigate, only the areas of significant strength or weakness should warrant further attention. While finalizing the corporate plan together with corporate objectives growth strategy, it should be necessary to make a review of the corporate strength and weakness in connection with its mission and objectives.

Corporate strengths and weaknesses can be broadly enumerated as under:

Corporate Strengths:

Highly professionalised managerial group including directors and the chief executive an environment prevailing for commitments to jobs and responsibility with team spirit by the work force

Corporate Weaknesses:

Similar to Corporate strengths, there may be corporate weaknesses too.

Opportunities:

The following may be termed as 'Opportunities' which should be timely utilised and availed of by the organisation gainfully:

- (i) Seasonal/climatically demand of products.
- (ii) Global markets for the company's products/services (Export opportunities).
- (iii) Rural markets to explore and to penetrate.
- (iv) To explore the markets in the undeveloped/under-developed/developing states/places.

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- (v) To avail of the incentives/concessions declared by Central and State Governments
- (vi) Diversifications opportunities
- (vii) Mergers/acquisition opportunities

Threats:

- (i) Competition
- (ii) Price cutting war
- (iii) Free imports
- (iv) Industrial unrest
- (v) Political instability

Advantages and disadvantages of SWOT analysis:

SWOT analyses are simple and easy to list but hard to implement fully. It takes time and research to completely analyze the situation. SWOT analysis might not be able to provide results for each factor plus for the analysis to be successful, it requires expertise which would analyze all possible threats and weaknesses and turn them into strength and opportunity. It requires resources and capital to perform and a positive outcome cannot be guaranteed. SWOT analysis is considered the best because it focuses on internal and external factors both while only focuses on external factors. Some top companies like Ford, Microsoft and Sony prefer monthly SWOT analysis as their markets are expanding and growing every month and they consider internal factors of the company important.

8. (a) Discuss the various stages in Strategic Planning. 6
- (b) Write a short note on Strategic Business Unit. 6

Answer:

8. (a) The various stages in strategic planning are given below:

Stage I: Strategic Option Generations

At this stage, a variety of alternatives are considered, relating to the firm's product and markets, its competitors and so forth. Examples of strategies might be:

- (a) increase market share
- (b) penetration into international market
- (c) concentration on core competencies
- (d) acquisition or expansion etc.

Stage II - Strategic Options Evaluation

Each option is then examined on its merits.

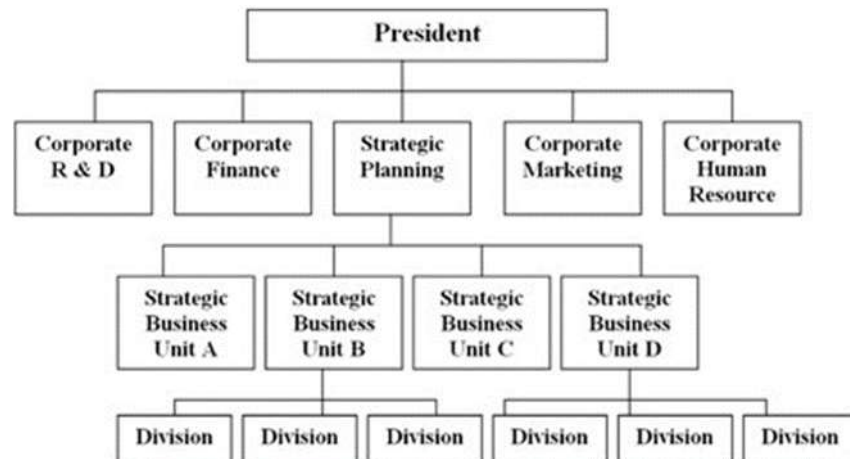
- (a) does it increase existing strengths?
- (b) does it alleviate existing weaknesses?
- (c) is it suitable for the firm's existing position?
- (d) is it acceptable to stakeholders?

Stage III - Strategic Selection

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It involves choosing between the alternative strategies. This process is strongly influenced by the values of the managers in selecting the strategies.

- (b) SBU groups similar divisions into "Strategic Business Units" and then delegate's authority and responsibility of each unit to a senior executive who is normally identified as CEO or MD of that SBU. It is an extension of Divisional structure.



SBU Structure

Big organisation like Unilever, etc. have many SBUs for their different categories of products like Cosmetics, Food products and Beverages, etc. and each is managed through separate unit head.

Advantages:

- (i) Promotes accountability since units' heads are responsible for individual SBU profitability
- (ii) Career development opportunities are further higher in this structure
- (iii) Allow better control of categories of products manufacturing, marketing and distributions
- (iv) Helps to expand in different related and unrelated businesses

Disadvantages:

- (i) May provide inconsistent approach to tackle customers, etc. because each unit may work in it's own way to handle situations
- (ii) High cost approach

Some of major reasons of using SBU approach are as follow:

- A scientific method of grouping the businesses of a multi-business corporation which helps the firm in strategic planning.
- An improvement over the geographical grouping of businesses and strategic planning based on locational units.
- An SBU is a grouping of related businesses that can be taken up for strategic planning distinct from the rest of the businesses.

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- Grouping the businesses on SBU lines helps the firm in strategic planning by removing the ambiguity and confusion generally seen in grouping businesses.
- Each SBU is a separate business from the strategic planning standpoint. In the basic factors, viz., mission, objectives, competition and strategy-one SBU will be distinct from another.
- Each SBU will have its own distinct set of competitors and its own distinct strategy.
- Each SBU will have a CEO. He will be responsible for strategic planning for the SBU and its profit performance; he will also have control over most of the factors affecting the profit of the SBU.

The three most important Characteristics of SBU are:

- It is a single business or a collection of related businesses which offer scope for independent planning and which might feasibly stand alone from the rest of the organisation.
- Has its own set of competitors.
- Has a manager who has responsibility for strategic planning and profit performance, and who has control of profit-influencing factors.

9. Write Short notes on any three questions out of the following four questions. (3x4=12)

- (a) Strategy formulation
- (b) BCG Theory
- (c) BPR
- (d) ADL matrix

Answer:

9. (a) **Strategic formulation:**

- (i) Develop and evaluate strategic alternatives
- (ii) Select appropriate strategies for all levels in the organisation that provide relative advantage over competitors
- (iii) Match organizational strengths to environmental opportunities
- (iv) Correct weaknesses and guard against threats

Implementation of strategy

- (i) effectively fitting organizational structure and activities to the environment
- (ii) The environment dictates the chosen strategy; effective strategy implementation requires an organisational structure matched to its requirements. Evaluating results
- (iii) How effective have strategies been?
- (iv) What adjustments, if any, are necessary

Strategy formulation as function wise:

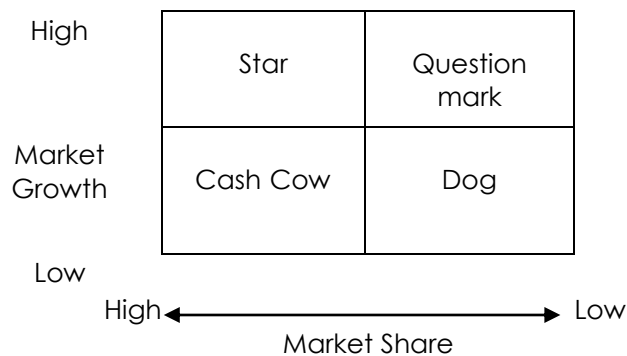
Strategy often require changes in the way an organization is structured for two major reasons:

1. Structure largely dictates how objectives and policies will be established;
2. Structures dictates how resources will be allocated.

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The choice of structure appears contingent on the strategy of the firm in terms of size, diversity of the products /services offered, and market served. Whether this is due to inertia, organizational politics, or a realistic assessment of the relative costs of immediate structural change, historical evidence suggests that the existing structure will be maintained and not radically redesigned until a strategy's profitability is increasingly disproportionate with increasing sales.

- (b) **BCG THEORY:** The Boston Consulting Group (BCG)'s matrix analyses 'products and businesses by market share and market growth:



This growth/share matrix for the classification of products into cash cows, dogs, rising stars and question marks is known as the Boston classification for product-market strategy.

- (i) Stars are products with a high share of a high growth market. In the short term these require capital expenditure, in excess of the cash they generate, in order to maintain their market position, but promise high returns in the future.
- (ii) In due course, however, stars will become cash cows, with a high share of a low-growth market. Cash cows need very little capital expenditure and generate high levels of cash income. The important strategic feature of cash cows is that they are already generating high cash returns, which can be used to finance the stars.
- (iii) Question marks are products in a high-growth market, but where they have a low market share. A decision needs to be taken about whether the products justify considerable capital expenditure in the hope of increasing their market share, or whether they should be allowed to 'die' quietly as they are squeezed out of the expanding market by rival products. Because considerable expenditure would be needed to turn a question mark into a star by building up market share, question marks will usually be poor cash generators and show a negative cash flow.
- (iv) Dogs are products with a low share of a low growth market. They may be ex-cash cows that have now fallen on hard times. Dogs should be allowed to die, or should be killed off. Although they will show only a modest net cash outflow, or even a modest net cash inflow, they are 'cash traps' which tie up funds and provide a poor return, on investment, and not enough to achieve the organisation's target rate of return.

Limitations of the BCG Model:

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The BCG model analyses products in the light of two variables: the growth in the market as a whole, and the growth of the product's share of the market in relation to other products. It suggests that there is a relationship between these variables and the product's propensity to generate cash or consume it. It rests on the assumption that the firm with the highest market share can be the lowest cost producer. The model suggests that cash cows should be used to fund stars. There are a number of limitations to the model (and remember that it is only a model, and any model necessarily simplifies the real world which it tries to depict).

- (c) **BPR:** Business process re-engineering (BPR) is a business management strategy, originally pioneered in the early 1990s, focusing on the analysis and design of workflows and processes within an organization. BPR aimed to help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. BPR seeks to help companies radically restructure their organizations by focusing on the ground-up design of their business processes.

The whole process of BPR in order to achieve the above mentioned expected results is based on key steps-principles which include redesign, retool, and re-orchestrate. Each step-principle embodies the actions and resources as presented in the table below.

REDESIGN	RETOOL	RECORCHESTRATE
<ul style="list-style-type: none">• Simplify• Standardize• Empowering• Employeeeeship• Groupware• Measurements	<ul style="list-style-type: none">• Networks• intranets• extranets• Work Flow	<ul style="list-style-type: none">• synchronize• process• IT• human resources

Creating the new enterprise involves considerable change in virtually everything to do with people's working lives. Rather than fixing the old, we set out to create the new. There is a fundamental transformation occurring in business - in terms of its structure, processes, people, and technology. The table following presents the changes in that occur in the business under BPR.

- (d) **ADL matrix:** The ADL portfolio matrix suggested by Arthur D. Little (ADL) consists of 20 cells, identified by competitive position and its stage of industry maturity. In this matrix, the stage of industry maturity is identified in four stages viz., embryonic, growth, maturity and ageing. The competitive position is categorized into five classes viz., dominant, strong, favourable, tenable and weak. The purpose of the matrix is to establish the appropriateness of a particular strategy in relation to these two dimensions.

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The position within the life cycle and of the company is determined in relation to eight external factors (or disciplines) of the evolutionary stage of the industry. These are:

- (a) market growth rate
- (b) growth potential
- (c) breadth of product line
- (d) number of competitors
- (e) spread of market share among the competitors
- (f) customer loyalty
- (g) entry barriers
- (h) technology

It is the balance of these factors which determines the life cycle. The competitiveness of the organization can be established by looking at the characteristics of each category. The weights must be defined to calculate the matrix position of a particular business. The matrix location of each unit can be used to formulate a natural strategy to accomplish the business goals of the firm.

**Paper 9- OPERATIONS MANAGEMENT &
STRATEGIC MANAGEMENT**

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Paper 9- OPERATIONS MANAGEMENT & STRATEGIC MANAGEMENT

Full Marks: 100

Time allowed: 3 hours

The figures in the margin on the right side indicate full marks.

This question paper has two sections.

Both the sections are to be answered subject to instructions given against each.

Section – A

1. (a) Choose the correct answer: [1x10=10]

- (i) Generally the size of the order for production in Job production is :
 - a. Small
 - b. Large
 - c. Medium
 - d. Very large

- (ii) The activity of specifying when to start the job and when to end the job is known as:
 - a. Planning
 - b. Scheduling
 - c. Timing
 - d. Follow-up

- (iii) In job production system, we need:
 - a. More unskilled labours
 - b. Skilled labours
 - c. Semi-skilled labours
 - d. Old people

- (iv) The lead-time is the time:
 - a. To place holders for materials
 - b. Time of receiving materials
 - c. Time between receipt of material and using materials,
 - d. Time between placing the order and receiving the materials

- (v) The method used in scheduling a project is:
 - a. A schedule of break-down of orders
 - b. Outline master programme
 - c. PERT & CPM
 - d. Schedule for large and integrated work

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- (vi) The act of going round the production shop to note down the progress of work and feedback the information is known as:
- Follow up
 - Dispatching
 - Routing
 - Trip card
- (vii) MRP stands for:
- Material requirement planning
 - Material reordering planning
 - Material requisition procedure
 - Material recording procedure
- (viii) One of the important charts used in programme control is:
- Material chart
 - Gantt chart
 - Route chart
 - Inspection chart
- (ix) Variety reduction is generally known as:
- Less varieties
 - Simplification
 - Reduced varieties
 - None of the above
- (x) Conversion of inputs into outputs is known as:
- Application of technology
 - operations management
 - Manufacturing products
 - product

(b) Match the products in Column-I with production centres in column –II:

[1x6=6]

	I		II
(A)	Electricity	(a)	Blast Furnace
(B)	Petrol	(b)	generator
(C)	Iron	(c)	Refinery
(D)	Cloth	(d)	Assembly line
(E)	Car	(f)	spinning Mill
(F)	Cotton yarn	(g)	power Loom

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(c) State whether the following statements are True or False: [1x6=6]

- (i) Method study should precede work measurement ()
- (ii) Increased productivity leads to cost reduction ()
- (iii) A good materials handling system always consists of conveyors ()
- (iv) Project costs increase as the duration of the project increases ()
- (v) It is desirable to conduct work measurement after method study ()
- (vi) No handling is the best handling ().

Answer any three questions from the following: [3x16=48]

2. (a) List the scope of operations management? [8]

(b) What are the characteristics of a good plant layout? [8]

3. (a) What does Product Design do? Discuss — Process design and selection. [6]

(b) A department works on 8 hours shift, 288 days a year and has the usage data of a machine, as given below:

Product	Annual Demand (units)	Processing time (standard time in hours)
A	325	5.0
B	450	4.0
C	550	6.0

Calculate:

- (a) processing time needed in hours to produce products A, B and C,
- (b) Annual production capacity of one machine in standard hours, and Number of machines required. [10]

4. (a) A captain of a cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows:

		Batting Position				
		III	IV	V	VI	VII
Batsmen	A	40	40	35	25	50
	B	42	30	16	25	27
	C	50	48	40	60	50
	D	20	19	20	18	25
	E	58	60	59	55	53

Make the assignment so that the expected total average runs scored by these batsmen are maximum. [10]

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- (b) Table shows the time remaining (number of days until due date) and the work remaining (number of day's work) for 5 jobs which were assigned the letters A to E as they arrived to the shop. Sequence these jobs by priority rules viz., (a) FCFS, (b) EDD, (c) LS (d) SPT and (e) LPT. [6]

Job	Number days until due date	Number of days work remaining
A	8	7
B	3	4
C	7	5
D	9	2
E	6	6

5. (a) Project with the following data is to be implemented, Draw the network and find the critical path.

Activity	Predecessor	Duration (days)	Cost (₹ day)
A	-	2	50
B	-	4	50
C	A	1	40
D	B	2	100
E	A, B	3	100
F	E	2	60

- What is the minimum duration of the project?
- Draw a Gantt chart for early start schedule.
- Determine the peak requirement money and day on which it occurs above schedule. [8]

- (b) A large computer installation contains 2,000 components of identical nature which are subject to failure as per probability distribution that follows:

Month End:	1	2	3	4	5
% Failure to date:	10	25	50	80	100

Components which fail have to be replaced for efficient functioning of the system. If they are replaced as and when failures occur, the cost of replacement per unit is ₹3. Alternatively, if all components are replaced in one lot at periodical intervals and individually replace only such failures as occur between group replacement, the cost of component replaced is ₹1.

- Assess which policy of replacement would be economical.
- If group replacement is economical at current costs, then assess at what cost of individual replacement would group replacement be uneconomical.
- How high can the cost per unit in-group replacement be to make a preference for individual replacement policy? [8]

Section – B

6. Choose the correct answer:

[6x1=6]

- (i) A corporate strategy can be defined as:
- (a) A list of actions about operational planning and statement of organization structure and control system;
 - (b) A statement of how to compete, directions of growth and method of assessing environment;
 - (c) Abatement of organization's activities and allocation of resources;
 - (d) A course of action or choice of alternatives, specifying the resources required to achieve certain stated objectives;
- (ii) A strategic business unit (SBU) is defined as a division of an organization:
- (a) That help in the marketing operations;
 - (b) That enable managers to have better control over the resources;
 - (c) The help in the choice of technology;
 - (d) That help in the allocation of scarce resources;
- (iii) Benchmarking is:
- (a) The analytical tool To identify high cost activities based on the 'Pareto Analysis'.
 - (b) The search for industries best practices that lead to superior performance;
 - (c) The simulation of cost reduction schemes that help to build commitment and improvement of actions;
 - (d) The process of marketing and redesigning the way a typical company works;
- (iv) What are enduring statements of purpose that distinguish one business from other similar firms:
- (a) Policies
 - (b) Mission statements
 - (c) Objectives
 - (d) Rules
- (v) Indian Airlines decreasing the airfare on the Delhi – Mumbai sector following the introduction of the no frills airlines would be an example of
- (a) Cost leadership
 - (b) Price leadership
 - (c) Product differentiate
 - (d) Focus

- (vi) Question mark in BCG Matrix is an investment, which
- (a) Yields low current income but has bright growth prospects
 - (b) Yields high current income and has bright growth prospects
 - (c) Yields high current income and has bleak growth prospects
 - (d) Yields low current income and has bleak growth prospects

Answer any one question from the following:

[1x12=12]

7. (a) What do you mean by strategy? State its features? [5]
- (b) Explain the objective of SWOT analysis and its advantages and criticism? [7]
8. (a) Discuss various stages in strategic planning. [6]
- (b) Discuss Mc Kinsey's 7-s frame work? [6]
9. **Write a short note on any of the following three questions:** [3x4=12]
- (a) Strategic planning;
 - (b) Corporate level management.
 - (c) BCG Matrix;
 - (d) BPQ;