OMSM

PREVIOUS QUESTIONS PAPERS

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**

(vi) 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**

(vii) 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**

(viii) For a marketing manager, the sales forecast is
- **(A) estimate of the amount of unit sales for a specified future period.**
- **(B) arranging the salesmen to different segments of the market.**
- **(C) to distribute the goods through transport to satisfy the market demand.**
- **(D) to plan the sales methods.**

(ix) 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**

(x) 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**

(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
- **(i) Merit Rating is used to determine the cost of a product.**
- **(ii) Project costs increase as the duration of the project increases.**
- **(iii) In carrying out Job Evaluation studies, point system is the best method.**
- **(iv) Production planning and control is essentially concerned with the control of Finished goods.**
- **(v) A Productivity Index is a device of expressing the ratio between outputs and the inputs of the resources numerically.**
- **(vi) 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

(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:

(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 = ¾
Proportion of machine time = ¼
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×(2,000/2,600) = 76.923 hours
(2) Time taken per article = (76.923×60)/5,000 = 0.923 minute
(3) Observed manual labour time per article = 0.923×(3/4) = 0.6922 minute
(4) Observed machine time per article = 0.923×(1/4) = 0.230 minute
(5) Normal labour time per unit = Observed time/unit × Rating factor = 0.6922×1.20 = 0.8306 minute
(6) Standard labour time per unit = 0.8306+(15/100)×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

(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**

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

Draw the network diagram. **6**

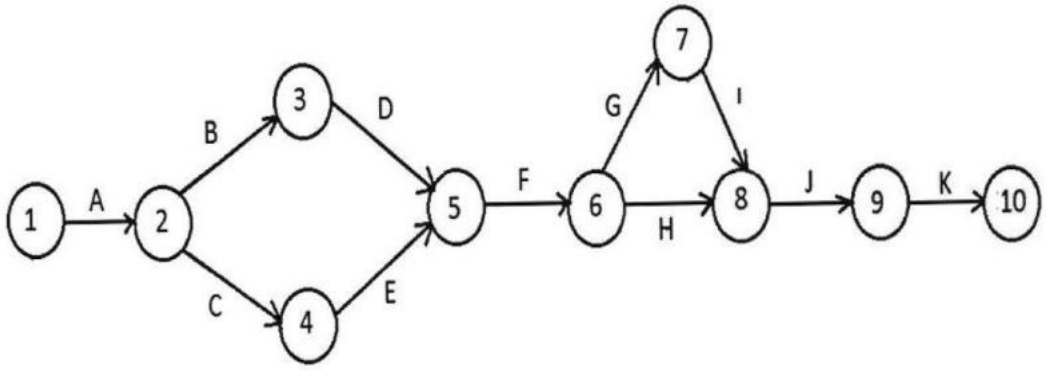
(b) Product A has a Mean Time Between Failures (MTBF) of 35 hours and a Mean Time to Repairs (MTTR) of 6 hours. Product B has a MTBF of 45 hours, and has a MTTR of 3 hours.
(i) Which product has higher reliability?
(ii) Which product has greater maintainability?
(iii) Which product has greater availability? **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.

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)

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

- 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**

(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)

(b)

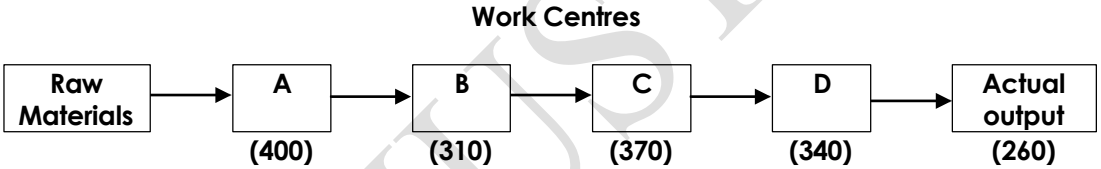
I		II
(A) Fixture	(v)	Appliance for holding the work
(B) Process layout	(vi)	Grouping together of similar machines in one department
(C) Capital Intensity	(iv)	Mix of equipment and labour which will be used by the firm
(D) Operations Management	(i)	Conversion of Inputs into outputs
(E) Crashing	(ii)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

1. **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.
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:** 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

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: λ = 60/60 per second = 1 per minute
Service Rate: μ = 60/48 per second= 1.25 per minute

(i) Average Queue Length: $L_q = (\lambda/\mu)\times[\lambda/(\mu - \lambda)]$ = (1/1.25)x[(1/(1.25 - 1)]
=1/(1.25x0.25) = 16/5
= 3.2 workers

(ii) Average Length of non-empty queues:
$L_n = [\mu/(\mu - \lambda)]$ = 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. 2×3=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).

(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**

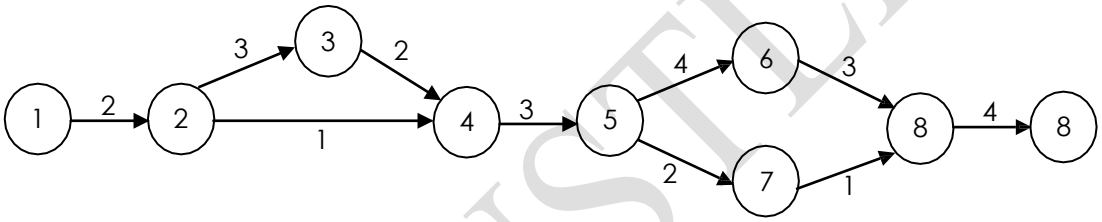
Answer:

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 x ` 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:
- **(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.**

(ii) 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.**

(iii) 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**

(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.

(b) Portfolio analysis is a term used in describing methods of analysing a product -market portfolio with the following aims.

(i) 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.

(ii) To identify what strategy is needed to maintain a strong position or improve a weak one.

Factors influencing Portfolio Strategy:

1) Mission/Vision.
2) Value system.
3) Future of Current Business.
4) Position on the Portfolio Matrix/PLC.
5) Government Policy.
6) Competitive Environment.
7) Company Resources.
8) Supply/Demand Conditions.
9) Competitive Moves.
10) Portfolio Strategy of Parent.
11) 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:

(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.

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

(vi) 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.

(vii) 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.

(viii) 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

(ix) 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

(x) 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.

(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

(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: 16×3=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.

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 × 12 = 38,400 units per annum
C_0 = 28
C_h=2.5 + 25% of 24 = 8.5
EOQ = √[(2 × 28 × 38,400)/8.5] = 502.97 = 503 units (approx.)

Total Cost = $C_o + C_{rm} + C_h$
= [(38,400 × 28)/503)] + (38,400 × 24) + [(503 × 8.5)/2]
= 2,137.57 + 9,21,600 + 2,137.75
= 9,25,875.32

(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_0 = 28;
C_h = 2.5 + 25% of 22.56 = 8.14
EOQ = √[(2 × 28 × 38,400)/8.14] = 513.98 = 514 units (approx.)
Total Cost = $C_0 + C_{rm} + C_h$
= [(38,400 × 28)/514)] + (38,400 × 22.56) + [(514 × 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% of 20.4 = 7.6
EOQ = √[(2 × 28 × 38,400)/7.6] = 531.92 = 532 units (approx.)
Total Cost = $C_0 + C_{rm} + C_h$
= [(38,400 × 28)/532)] + (38,400 × 20.4) + [(532 × 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

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.

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

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: = λ = 3 per hour
Service Rate: = μ = 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:
$W_q = [(\lambda/\mu) \times 1/(\mu - \lambda)] = (3/4) \times 1/(4-3) = 0.75$ hours = 45 minutes.

(iii) Average time in the system:
$W_S = [1 / \mu - \lambda)] = 1/(4-3) = 1$ hr.

Average number of machinists in the system = 3 [As per (i) above]
Cost of three machinists being away from work = 5 x 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 x 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 λ = 3 per hour
μ = 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) x 60 = 20 minutes.

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

(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 the 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**

(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.

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.

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

(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

(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.

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

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:

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

$b = \sum XY/\sum X^2$

$= 290/70 = 4.143$ approx.

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

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

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

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

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

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

(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

Answer: 4(a)

Initial Feasible Solution by North- West Corner method.

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

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.

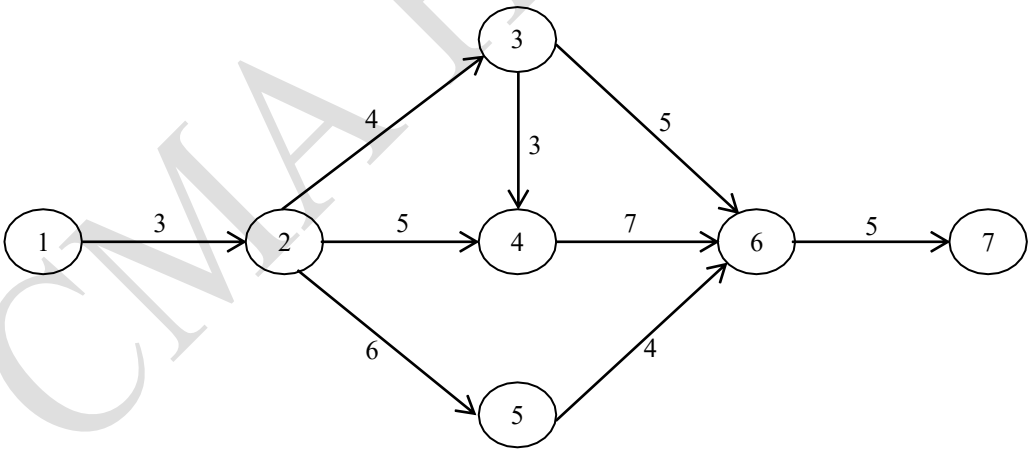
The Installation charges amount to Rs.3,800 and the machine has a scrap value of only Rs.1,800 because the firm has a monopoly of this type of work. The maintenance cost in various years is given in the following table:

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. **(2×3)+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

1-2-4-6-7 → 3+5+7+5 =20 months

I-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.

(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)

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

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)

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

(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) (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

(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.

(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

(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**

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).

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.

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.

(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.

(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

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 = Z = 18 customers per hour

Service Rate = μ = 1 / service time = (1 customer / 2.5 minutes) × 60 minutes per hour = 24 customers per hour

(i) System Utilisation = p = Z Mμ = 18 / (1× 24) = 0.75

(ii) Percentage idle time = 1 – p = 1– 0.75 = 0.25, or 25 percent

(iii) Expected no. of customers waiting to be served = $Lq = Z^2/\mu(\mu - Z)$

$= (18)^2 / [24 \times (24 – 18)] = 2.25$ customers

(iv) Average time customers will spend in the system =

$W_s = (L_q / Z) + (1/\mu) = (2.25/18) + (1/24) = 0.1667$ hrs = 10 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**

(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 dale) - (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

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 = (2×2500) / 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 × 12,000 × 365 × 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.

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.

(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 ―missionǁ statement

- It should be based on existing business capabilities ―Who we are and what we do?ǁ
- 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
- 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.

Fimis 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) 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

(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. Modem 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 liberaliation 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.

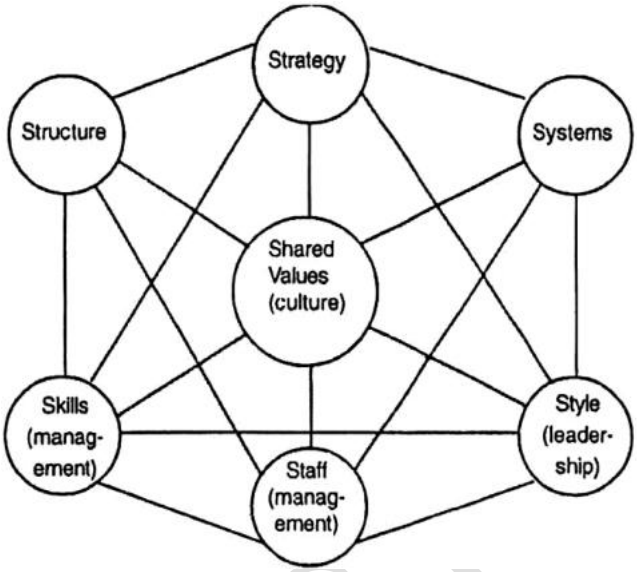
(v) Development of core competency. An enterprise succeeds in achieving its strategic objectives mainly on the basis of capabilities in the technical, marketing or human skills in areas of crucial importance. These are known as core competencies of the organisation which are unique internal strengths 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

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

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.

(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

(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 rotable 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.

(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

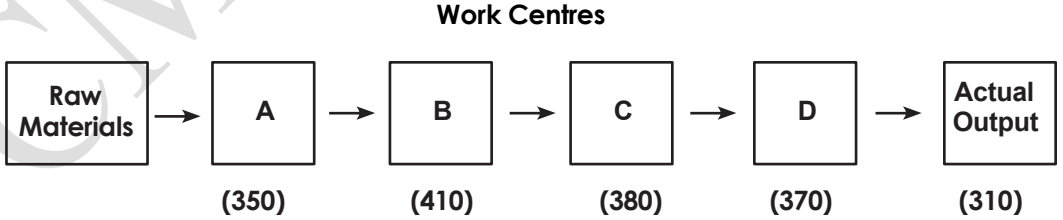
(v) True

(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: 3×3=9



(i) Identify the bottle neck centre.

(ii) Determine the system capacity.

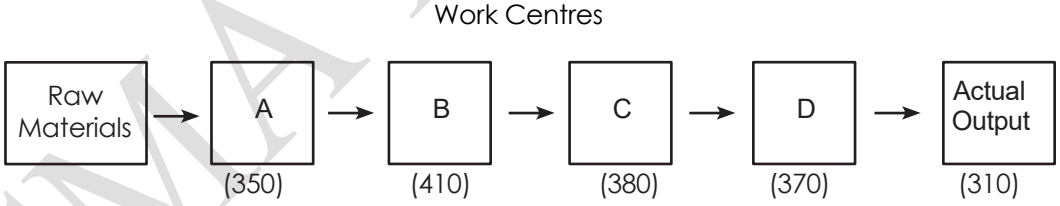
(iii) Determine the system efficiency.

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)×100 (i.e. maximum possible output) = 88.57%

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.

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	

Wj = Warehouse

Fi = 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.

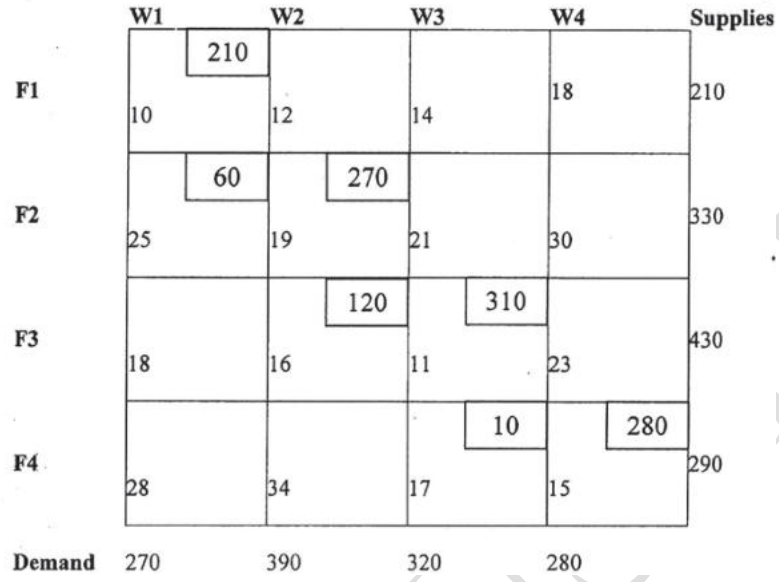
Demand/Week	0	5	10	15	20	25
Frequency	3	7	5	11	18	6

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



Wj = Warehouse

Fi = 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		

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**

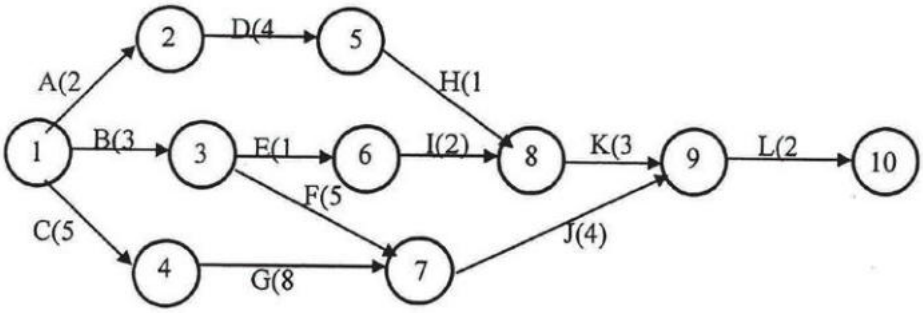
(b) RST Company has kept records of breakdown of its machines for 300 days work year as shown below:

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

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 = 1.434×600 = 860.4/-

Cost of preventive maintenance program per day = ` 250 + 600 = 850/- Expected annual savings from the preventive maintenance program = (860.4 – 850) × 300 = 10.4 × 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 in 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.

(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.

(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?

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 by 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 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:

Ans1. 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 productionis:

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 inspace 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. ✔ Shot 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 repetitiveprojects".

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

8 Marks

Q.1 With the help of following of following data, project the trend of sales for the next 7years:

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

4 Marks

Q.2 State the reasons, why Production or Operations Strategy is directly influenced byproduct design?

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.**

6 Marks

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.

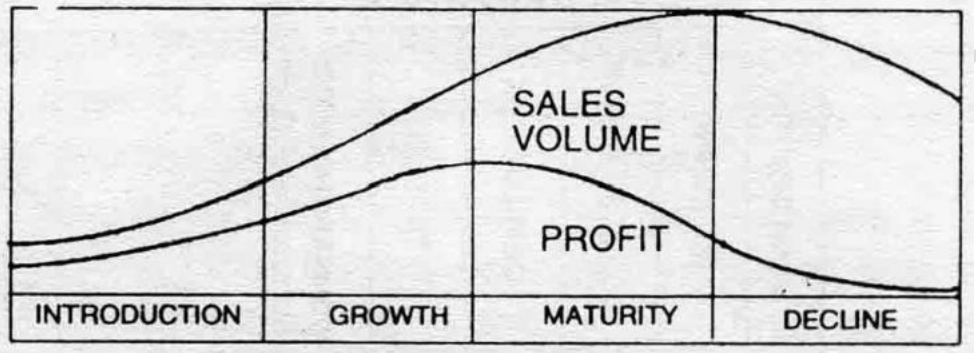
(ii) Manufacturing cost: Higher the lot size, lower will be the cost per unit produced because of distribution of set up costs for setting up production or machines and preparing paper work (production orders). But the carrying cost (handling and storing costs) will increase with increase in lot size.

(iii) Cost of deterioration and obsolescence: Higher the lot size, higher will be the possibility of loss due to deterioration (items deteriorating

6 Marks

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.

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.

Q.1 8 Marks

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

4+4 = 8 Marks

Q.1 A firm is using a machine whose purchase price is Rs. 12,000/-. The installationcharges 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.

4 Marks

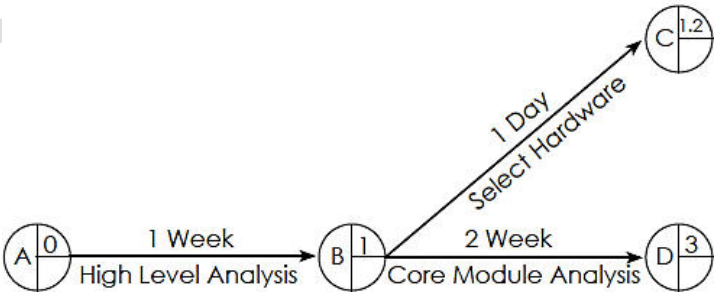
Q.2 Draw a Circle and Arrow Diagram to show two activities, that cannot be started until the first activity has been completed.

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.



SIX LAQ

(3X4 = 12 Marks)

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.

Section D Case Study Question

3+3+3+3 = 12 Marks

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 tothoroughly 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.

20433

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*). 1×7=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	-	1
B	2-3	A	3
C	2-4	A	15
D	2-5	A	1
E	3-5	B	10
F	4-5	C	6
G	5-6	D,E,F	1
H	6-7	G	1
I	6-8	G	15
J	7-8	H	2

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 funcions :

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 Tones) for the year :**
Year 2020= (Y_{20})= 95.988
Year 2025= (Y_{25})= 111.718

Answer to Question No. 3 (a) : **1X7 = 7 Marks**

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

City / Sales Man	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 firming 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 ≠ 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 ≠ 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)]

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]

(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. = 4.17customers

(iv) Average time customers will spend in the system = 0.200 hours= 12 minutes

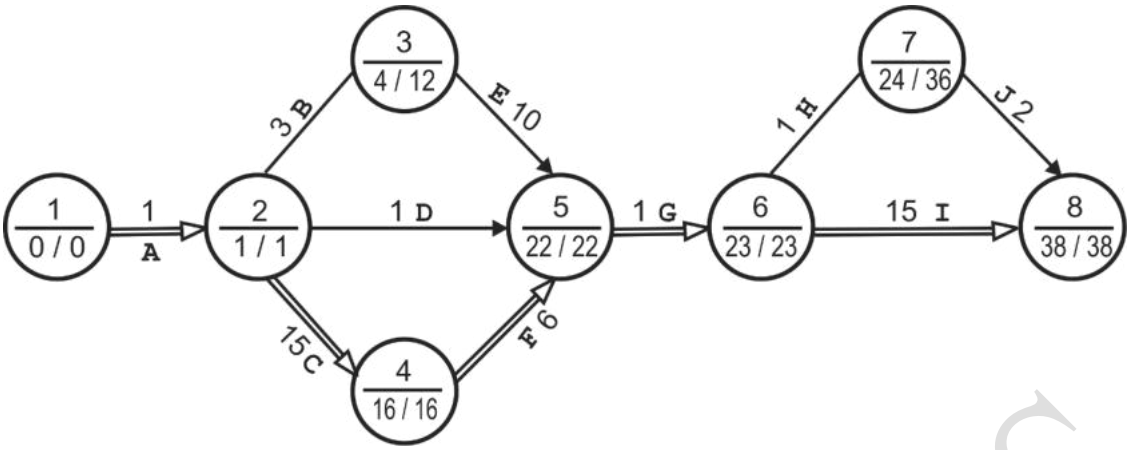
Answer to Question No. 5 (a) : **5+1 = 6 Marks**

(i) The machine may best be replaced every **7th year.**

(ii) The average cost of Replacement is **Rs 4250** approximately

Answer to Question No. 5 (b) : **3+2+2+3 = 10 Marks**

(i)



(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.

Answer to Question No. : 9 **4X3 = 12 Marks**

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
• **Simplify** • **Standardize** • **Empowering** • **Employee ship** • **Groupware** • **Measurements**	• **Networks** • **Intranets** • **Extranets** • **Work Flow**	• **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(OMSM)
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 regardning 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 shoutdown 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. manufacturers 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 faciliates 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 been 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 Plan (MRP1) / Distribution Resource Planning (DRP) / Enterprise Resource Plann (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)

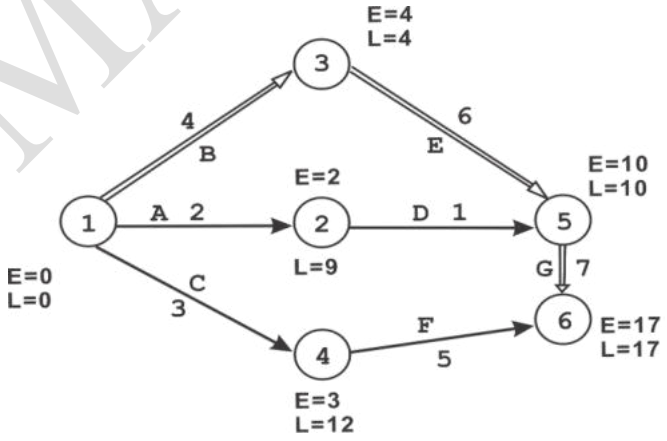
Break down cost per month = Rs 2160

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)

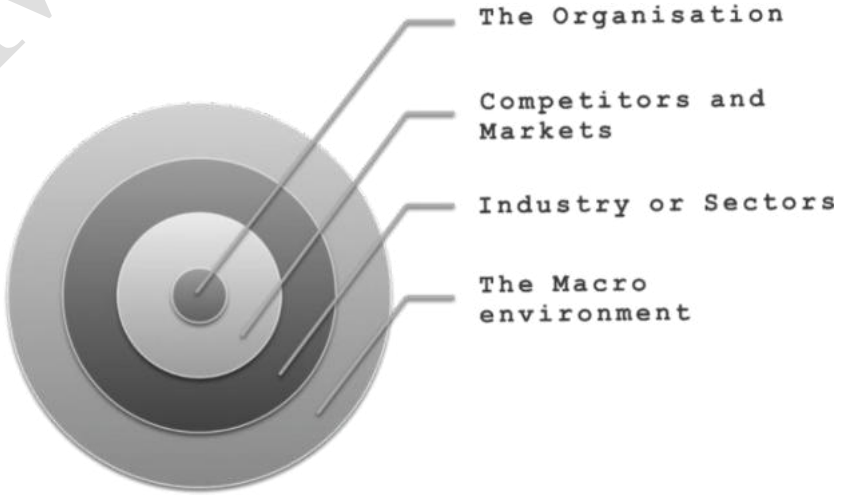
(i) —Strategy" can be defined as —the direction and scope of an organisation over the long term, which achieves advantage for the organisation through the configuration of resources within a changing environment and to fulfill stakeholder expectations.

(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 emphases 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 busine ss 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 cha racter 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. If 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 ca n 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 dramati c 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 (loT):

- Increasingly, organisations in a variety of industries are using loT 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 loT 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 loT and the data produced by loT also feeds these technologies.

- **Conversational artificial intelligence (AOl) :**

  Advances in neural networks have brought natural-language processing (NLP) to loT 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 loT 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 loT.

- **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 loT 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 loT sensors inside medical fridges can enable them to be monitored remotely, and their temperature changed as per requirement.

INTERMEDIATE EXAMINATION

December 2023 ***P–9(OMSM)***

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

This section contains Question No. 1. All parts of this question are compulsory. Answer the following questions:

1. Choose the correct answer from the given alternatives. (You may write only the Roman numeral and the Alphabet chosen for your answer): 2×15=30

(i) With reference to the operations of a manufacturing company, one of the important decisions "How to reach the products to the customers?" Is related to which one?

(A) Quality Management

(B) Inventory Management

(C) Maintenance Management

(D) Distribution

(ii) Which one of the following is associated with the question "How much space and capacity does each economic activity centre need?"

(A) Facility location

(B) Facility layout

(C) Capacity Planning

(D) MRP

(iii) The non-linear iterative process that seeks to understand users needs challenge assumptions, redefine problems and create innovative solutions to prototype and test, is called:

(A) Product design

(B) Product Mix

(C) Design thinking

(D) Product Life Cycle

(iv) Any solution that also satisfies the non-negative restrictions of the general linear programming problem is called a :

(A) Basic Solution

(B) Feasible Solution

(C) Basic Feasible solution

(D) Optimal feasible solution

(v) ISO Standards are reviewed every:

(A) Year

(B) 2 Years

(C) 5 Years

(D) 10 Years

(vi) ABS Ltd., a manufacturing Company has a production line consisting of five work centers in series with individual capacity in units per shift as are given. The actual output of line is 270 units per shift.

Work Centre	P	Q	R	S	T
Capacity/Shift	350	320	360	325	300

Identify the bottle neck centre

(A) Work Centre P

(B) Work Centre R

(C) Work Centre T

(D) Work Centre S

(vii) Under Maintenance management, two types of costs and need to be balanced-one is cost of premature replacement, other is cost of:

(A) Purchase of Raw Materials

(B) Breakdown

(C) Purchase of finished goods

(D) None of the above

(viii) The technique which involves developing a model of real phenomenon and then performing experiments on the model evolved, is referred to as:

(A) Transportation

(B) Assignment

(C) Simulation

(D) Queuing

(ix) Which one of the following refers to the job-specific goals of each individual employee?

(A) Performance Objectives

(B) Personal Objectives

(C) Professional Objectives

(D) Organization Genomics

(x) Which one of the following is related to a situation when consumers have a preference for the products of established companies?

(A) Economics of Scale

(B) Brand Loyalty

(C) Customer switching costs

(D) Absolute cost advantages

(xi) 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 is called:

(A) Transformation

(B) Reprocessing

(C) Total Quality Management

(D) Business Process Re-engineering (BPR)

(xii) A collection of data that is huge in volume and is growing exponentially with time is called:

(A) Big data

(B) Huge data

(C) Block Chain

(D) Cloud data

(xiii) The expected time for an activity of project B is 7 days. If the optimistic and pessimistic time are 3 days and 15 days respectively, what will be the most likely time of the activity?

(A) 10 days

(B) 6 days

(C) 12 days

(D) None of these

(xiv) In SWOTC Analysis, the Letter 'C' denotes :

(A) Champions

(B) Characteristics

(C) Challenges

(D) Core Values

(xv) While developing KRAs (Key Result Areas) following can be the hurdle(s):

(A) Lack of clarity

(B) Distractions

(C) Top-Down Imposition Areas

(D) All of the above

Section-B

Answer any five questions out of seven questions given. Each question carries 14 marks. 14×5=70

2. (a) "Recent trends in Production and Operations Management related to global competition and the impact it has on manufacturing firms." **In this context**, state in brief the recent trends in production and operations management. (*Any seven*) 7

(b) You are working as a Production Manager in a Manufacturing unit. You are required to determine whether resources are to be organized around products or process in order to implement the flow strategy. **In this context, describe** in brief the basic process types to be chosen. (*any seven*) 7

3. (a) **Summarize** the Basic types of Production Control. 7

(b) The following table gives the age of cars of SKODA Make and its Annual Maintenance Cost.

Age of Cars in Years (X)	2	4	6	8
Maintenance cost (in thousand of ₹)(Y)	10	20	25	30

Required:

(a) ***Fit a*** Linear Regression of Y on X

(b) ***Estimate***: (i) Maintenance Cost for Age of Cars of 10 years

(ii) Age of car in years for Maintenance cost of ₹ 50000 7

4. (a) in a job shop operation of ZINT Ltd., five jobs may be performed on any four machines. The hours are required for each job on each Machine are presented in the following table.

Job \ Machine	1	2	3	4
A	6	2	5	2
B	2	5	8	7
C	7	8	6	9
D	6	2	3	4
E	9	3	8	9

The plant foreman would like to assign the jobs so that the total time is minimized.

Required:

Develop the Optimal assignment of jobs to Machines and *Assess* the Corresponding Total Time (in hours) and also *identify* the job which will be left unassigned. 7

(b) RAGON (P) & Co. has a single machinist in a repair shop. He works eight hours a day and on an average four machines break each day. It takes on the average one hour to repair a machine. Simple queue conditions exist.

Required:

(i) **Identify** the expected number of machines on the repair shop.

(ii) **Determine** the expected number of machines in the shop on which the machinist has not started to work.

(iii) **Assess** the average down-time (waiting for repairs or undergoing repairs) per machine?

(iv) The average time a machine waits for service would be **how much**? 7

5. (a) The Management of BB HOTEL IN is considering periodic replacement of light bulbs fitted in its rooms. There are 200 rooms in the hotel and each room has 5 bulbs. The Management is conducting a study on the life of the light bulbs. The following mortality rates have been observed for the light bulbs.

Month of USE	1	2	3	4	5
Percent of bulbs failing by that month	10	15	25	30	20

There are 1000 light bulbs in use and it costs ₹ 100 to replace an individual bulb which has burnt out. If all bulbs were replaced simultaneously, it would cost ₹ 20 per bulb. It is proposed to replace all bulbs at fixed intervals, whether or not they have burnt out and to continue replacing burnt out bulbs as they fail.

Required:

(i) *Examine* the number of light bulbs to replaced every month.

(ii) *Calculate* the average monthly cost (₹) of individual replacement.

(iii) *Identify* at what interval of time the Management of BB Hotel IN should replace all the light bulbs and which policy of replacement would economical. 7

(b) TINTEX LTD., a construction company has an opportunity to submit a bid for the construction of a new apartment building. From specifications provided by the developer, a PERT Network for the project has been developed and the estimate of optimistic; most likely and pessimistic, completion duration in days (a, m and b respectively) for each activity are shown below:

Activity and Identification	**Estimated Time in Days**			
		Optimistic (a)	**Most likely (m)**	**Pessimistic (b)**
A	1-2	15	20	25
B	1-3	20	25	30
C	2-3	6	10	14
D	2-4	8	12	16
E	3-4	2	6	10
F	4-5	6	10	14

Required:

(i) *Assess* the expected Time (in days) of the project.

(ii) *Draw* the Project Network and identify all paths through it.

(iii) *Identify* the Critical Path with its duration and *assess* the Total Float and Free Float of each activity of the Project. 7

6. (a) *Explain in brief* the various important issues that need to be kept in mind while setting up objectives of an organization. 7

(b) "In spite of the fact that Cloud computing has huge benefits yet, it has its own causes of Concern". In *this context, examine* the Demerits of Cloud computing. (*Any seven*). 7

7. (a) Examine Various Mechanisms that may be employed for identifying Strategic alternatives in the medium and large organizations. 7

(b) "The value chain describe the categories of activities within and around an organization which create a product or service". In *this context, demonstrate* the activities involved in value chain of an organization. 7

8. (a) "While designing a Control System, top management should remember that controls should following strategy". In this *context enumerate* the recommended guidelines for proper control. 7

(b) *Demonstrate* in brief some of the areas that have the ability to create goal congruence. 7

PAPER – 9 : OPERATIONS MANAGEMENT AND STRATEGIC MANAGMENT

SUGGESTED ANSWERS

SECTION - A

1.

(i)	(D)
(ii)	(B)
(iii)	(C)
(iv)	(B)
(v)	(C)
(vi)	(C)
(vii)	(B)
(viii)	(C)
(ix)	(B)
(x)	(B)
(xi)	(D)
(xii)	(A)
(xiii)	(B)
(xiv)	(C)
(xv)	(D)

SECTION – B

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 recognizing 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 comp anies 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.

(7) **Worker Involvement :** The recent trend is to assign responsibility for decision making and problem solving to the lower levels in the organisation. This is known as employee involvement and empowerment **Examples** of worker involvement are quality circles and use of work teams or quality improvement teams.

(8) **Re-engineering:** This involves drastic measures or break-through improvements to improve the performance of a firm, It involves the concept of clean -slate approach or starting from scratch in redesigning the business processes.

(9) **Environmental Issues :** Today's production managers are concerned more and more with pollution control and waste disposal which are key issues in protection of environment and social responsibility.

(10) **Corporate Downsizing (or Right Sizing) :** Downsizing or right sizing has been forced on firms to shed their obesity. This has become necessary due to competition, lowering productivity, need for improved profit and for higher dividend payment to shareholders.

(11) **Supply - Chain Management :** Management of supply-chain, from suppliers to final customers reduces the cost of transportation, warehousing and distribution throughout the supply chain.

(12) **Lean Production:** Production systems have become lean production systems which use minimal amounts of resources to produce a high volume of high quality go ods with some variety.

2. (b)

The basic Process type to be chosen by the Production Manager are enumerated below :

(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 characterized 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.

(ii) **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.

(iii) **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. 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.

(iv) **Continuous process :** This is used when a very highly standardised product is desired in high volumes. These systems have almost no variety in output and hence there is no need for equipment flexibility. A continuous process is the extreme end of high volume, standardised production with rigid line flows. Examples of products made in continuous process systems include petroleum products, steel, sugar, flour, paper, cement, fertilisers etc.

(v) **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.

3. (a)

Basic types of production control:

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.

(iii) Load control

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

(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. Thus, production control in batch -system of control operates with a set of

3. (b)

(a) Regression equation of y on x is

$Y = 5 + 3.25\ \chi$

(b) (i) Maintenance Cost for Age of Cars of 10 years : Rs 37,500

(ii) Age of Car in Years for Maintenance Cost of Rs 50000 : 13.85 years

4. (a)

Step 1 :

Since the number of Jobs are not equal to the number of Machines, a dummy Machine – 5 is created. The time (in hours) Consumed by any Job for the dummy Machines – 5 is 0.

Machine / Job	1	2	3	4	5
A	6	2	5	2	0
B	2	5	8	7	0
C	7	8	6	9	0
D	6	2	3	4	0
E	9	3	8	9	0

Step 2 :

Column Operation

Machine / Job	1	2	3	4	5
A	~~4~~	~~0~~	~~2~~	~~0~~	~~0~~
B	~~0~~	~~3~~	~~5~~	~~5~~	~~0~~
C	5	6	3	7	0
D	~~4~~	~~0~~	~~0~~	~~2~~	~~0~~
E	7	1	5	7	0

Here minimum no. of Horizontal and Vertical Straight lines to cover all the *Zeros* = 4 * order of Matrix (5), So, Solution is non optimal.

STEP - 3 :

Subtract $\perp$ from every uncovered value and add $\perp$ to every value at the intersection of two lines. Draw the number of lines to cover all Zeros.

Improved Matrix

Machine / Job	1	2	3	4	5
A	~~4~~	~~0~~	~~2~~	~~0~~	~~1~~
B	~~0~~	~~3~~	~~5~~	~~5~~	~~1~~
C	~~4~~	~~5~~	~~2~~	~~6~~	~~0~~
D	~~4~~	~~0~~	~~0~~	~~2~~	~~1~~
E	~~6~~	~~0~~	~~4~~	~~6~~	~~0~~

Here minimum no. of Horizontal and Vertical Straight lines to cover all the *Zeros* = 5 order of Matrix.

So, the solution is optimal.

Hence the optimal assignment is made in the matrix below.

Machine / Job	1	2	3	4	5
A	4	0	2	[0]	1
B	[0]	3	5	5	1
C	4	5	2	6	[0]
D	4	0	[0]	2	1
E	6	[0]	4	6	0

The optimal assignment and corresponding Time are as follows :

Jobs	Machine	Time (in hours)
A	**4**	**2**
B	**1**	**2**
C	**5 (Dummy)**	**0**
D	**3**	**3**
E	**2**	**3**
		10

Minimum Time is 10 hours and Unassigned Job is C.

4. (b)

(i) The expected number of Machines in the repair Shop : = 1 Machine

(ii) The expected number of Machines in the shop in which the Machinist has not started to work : = 0.50 Machine

(iii) The average down time (Waiting for Repairs) per Machine : = 2 Hours after failing

(iv) Average time a Machine waits for Service : = 1 Hour

5. (a)

(i) No. of light bulbs to be replaced every month = 299 bulbs.

(ii) The average monthly cost of the individual replacement = Rs. 29900

(iii) Group replacement : Initial Cost = Rs. 20000

The optimum replacement cycle under Group replacement is given under:

Month	No. of light bulbs to be replaced	Monthly cost of Individual replacement @ Rs. 100 / bulb (Rs.)	Cumulative cost of Individual replacement (Rs.)	Total cost of individual replacement as well as Group replacement (Rs.)	Average monthly cost (Rs.)
1.	100	10000	10000	30000	30000
2.	160	16000	26000	46000	23000
3.	281	28100	54100	74100	24700
4.	377	37700	91800	111800	27950
5.	350	35000	126800	146800	29360

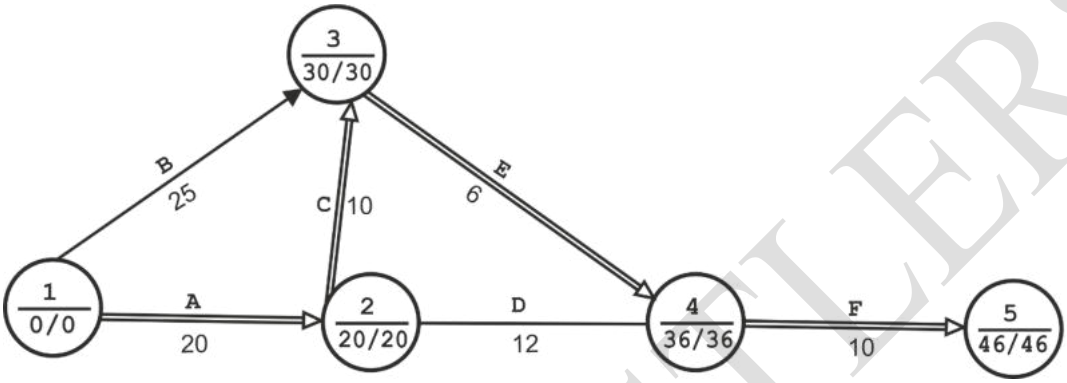
Since the Average Cost as stated Supra is lowest in 2 nd Month the optimal interval i.e. replacement is in 2 months. So the Management of BB Hotel should replace all light bulbs in every two months. Further since the average Cost (Rs 23000) is less than Rs 29900 of individual replacement, the Group Replacement Policy is economical and better.

5. (b)

(i) Expected Time (in days).

Activity and Identification		(a)	(m)	(b)	$te = \frac{a + 4m + b}{6}$
A	1 – 2	15	20	25	20
B	1 – 3	20	25	30	25
C	2 – 3	6	10	14	10
D	2 – 4	8	12	16	12
E	3 – 4	2	6	10	6
F	4 – 5	6	10	14	10

(ii)



(iii) Critical Path with duration of the project :
(A – C – E – F) 1 – 2 – 3 – 4 – 5 and duration 46 days.

The floats for each Activity are assessed below :

Activity and Identification		Expected Time	EST	EFT	LST	LFT	Flats	
							Total	Free (TF – HS)
A	1 – 2	20	0	20	0	20	0	0
B	1 – 3	25	0	25	5	30	5	5
C	2 – 3	10	20	30	20	30	0	0
D	2 – 4	12	20	32	24	36	4	4
E	3 – 4	6	30	36	30	35	0	0
F	4 – 5	10	36	46	36	46	0	0

6. (a)

The important issues that need to be kept in mind while setting objectives are as follows :

(i) **Specificity :** Specificity is related to the organisational level for which a set of objectives have been stated. Objectives may be stated at different levels of specificity. At one extreme they might be very broadly stated goals and on the other extreme it may be translated into performance targets.

(ii) **Multiplicity :** The issue of multiplicity arise from the fact that it is rare for an organisation to work on a single objective or a few objectives. Since objectives deal with a large number of functional areas, a large number of them have to be formulated to cover the diverse aspects of the organisation's functioning.

(iii) **Periodicity :** Objectives may be set for different time frame. It is possible to set long term, medium term and short term objectives. Normally organisations determine objectives for the long term and the short term. These different time frame of objectives need to be integrated with each other in order to achieve the desired result.

(iv) **Verifiability :** The issue of verifiability revolves around the question of deciding whether an objective has been met or not. Moreover, linked to verifiability is the concept of quantification. A definite way to measure an objective is to quantify it. In cases where objectives cannot be quantified, qualitative objectives may be set.

(v) **Reality :** It is often found that organisations have two set of objectives namely, official and operative. While the official objectives are those which the organisation professes to attain, the operative objectives are those which they seek to attain in reality. For example developing human resource is the official objective of most of the organisations.

(vi) **Quality :** The capability of an objective to provide a specific direction and a tangible bas is for evaluating performance determines the quality of an objective. For example stating that "to increase revenue" is considered to be a bad objective as it lacks the element of measurability.

6. (b)

The demerits of Cloud computing are enumerated below :

(i) **Cloud Security :** There is clear lack of transparency regarding how and where sensitive information entrusted to the cloud provider is handled. When relying on the cloud, organisations risk data breaches, hacking of APIs and interfaces, compromised credentials and authentication issues.

(ii) **Costs unpredictability :** The concept pay-as-you-go subscription plans for cloud use, along with scaling resources to accommodate fluctuating workload demands, can make it tough to define and predict final costs.

(iii) **Lack of capability and expertise :** With cloud-supporting technologies rapidly advancing, organisations are struggling to keep up with the growing demand for tools and employees with the proper skill sets and knowledge needed to architect, deploy and manage work loads and data in a cloud.

(iv) **IT Governance :** The emphasis on do-it-yourself capability in cloud computing can make IT Governance difficult, as there is no control over provisioning, de provisioning and management of infrastructure operations.

(v) **Compliance with Industry laws :** When transferring data from on-premises local storage into cloud storage, it can be difficult to manage compliance in the industry regulation through a third party.

(vi) **Management of multiple clouds :** Every cloud is different, so multi-cloud deployments can dis-join efforts to address more general cloud computing challenges.

(vii) **Cloud Performance :** Network and providers outages can interfere with productivity and disrupt business processes if organisations are not prepared with contingency plans.

(viii) **Building a private Cloud :** Architecting, building and managing private clouds whether for its own purpose or for a hybrid cloud goal can be a daunting task for IT Department, and staff.

(ix) **Cloud migration :** The process of moving applications and other data to a cloud Infrastructure often causes complications. Migration projects frequently take longer than anticipated and go-over budget.

(x) **Vendor Lock-in :** Switching between cloud providers can cause significant Issues. This includes Technical incompatibilities, legal and regulatory limitations and substantial costs incurred from sizable data migrations.

7. (a)

The various Mechanisms that may be employed for identifying the strategic alternatives in the medium and large organisations are examined as follows :

(i) **Brainstorming Sessions :** In most organizations, strategic alternatives are identified during brainstorming sessions of top management and key executives. In such meetings, participants generate a number of alternatives. At this stage, no importance is give n to the relative merits and demerits of the options. In the next stage, each alternative is reviewed and subjected to close scrutiny. The alternatives which are considered fairly appealing are further examined and analyzed for final selection.

(ii) **Special Meetings :** Some large organizations may hold special meetings of top executives away from their work, in a hotel or a holiday resort. This is to ensure that the process of thinking is not disturbed by interruptions during the course of deliberations. The participants present different alternative scenarios along with their recommended courses of action. Depending on the assumptions and future trends, each course of action is discussed and attempts are made to finalize the best options for further analysis.

(iii) **Outside Consultants :** Some organizations may engage the services of an outside consultant to handle the process of generating alternative strategies. The premise is that an outsider can observe the phenomenon objectively and dispassionately, and bring in his own expertise into the process. The outside viewpoint is expected to be new and fresh, and thus can show up many new opportunities to the organization.

(iv) **Joint Meetings :** Another useful way of generating alternatives is to hire the services of a consultant and also associate some internal members in the process. This method has the advantage of blending the new ideas contributed by the outside consultants with workable solutions from within the organization.

7. (b)

The activities involved in Value Chain can be broadly divided into two types namely, primary activities and secondary or support activities.

The following are the Primary activities :

(i) Inbound logistics are activities concerned with receiving; storing an d distributing inputs to the product or service including materials handling, stock control, transport, etc.

(ii) Operations transform these inputs into the final product or service. Operations include machining, packaging, assembly, testing, etc.

(iii) Outbound logistics collect, store and distribute the product to customers, for example warehousing, materials handling, distribution, etc.

(iv) Marketing and sales provide the means whereby consumers / users are made aware of the product or service and are able to purchase it. This includes sales administration, advertising and selling.

(v) Service includes those activities that enhance or maintain the value of product or service, such as installation, repair, training and spares.

Support activities help to improve the effectiveness or efficiency of primary activities. The following are the support or secondary activities:

(i) **Procurement :** It refers to the processes that occur in many parts of the organisation for acquiring the various resource inputs to the primary activities.

(ii) **Technology development :** All value activities have a 'technology', even if it is just know - how. Technologies may be concerned directly with a product or with processes or with a particular resource.

(iii) **Human resource management :** This transcends all primary activities. It is concerned with those activities involved in recruiting, managing, training, developing and rewarding people within the organisation.

(iv) **Infrastructure :** The formal systems of planning, finance, quality control, i nformation management, and the structures and routines that are part of an organisation's culture.

8. (a)

The following guidelines are recommended for proper Control. (Any Seven)

(i) Control should involve only the minimum amount of information needed to give a reliable picture of events: Too many controls create confusion. Focus on the strategic factors by following Pareto's 80/20 rule: Monitor those 20% of the factors determines 80% of the results.

(ii) Control must be reasonable Frequent reporting and rapid reporting may frustrate control.

(iii) Controls do not work unless they are acceptable to those who apply them.

(iv) Controls should monitor only meaningful activities and results, regardless of measurement difficulty: If cooperation between divisions is important to corporate performance, some form of qualitative or quantitative measure should be established to monitor cooperation.

(v) Controls must be flexible to take care of changing circumstances.

(vi) Controls should be timely so that corrective action can be taken before it is too late: Steering controls, controls that monitor or measure the factors influencing performance, should be stressed so that advance notice of problems is given.

(vii) Long-term and short-term controls should be used: If only short-term measures are emphasized, a short-term managerial orientation is likely.

(viii) Controls should aim at pinpointing exceptions: Only activities or results that fall out - side a predetermined tolerance range should call for action.

(ix) Emphasize the reward of meeting or exceeding standards rather than punishment for failing to meet standards : Heavy punishment of failure typically results in goal displacement. Managers will fudge reports and lobby for lower standards.

8. (b)

Some of the areas that have the ability to create Goal Congruence are stated below :

(i) Communication and Understanding –

Channels of communication and how goals are perceived are important to achieve goal congruence. Operational managers have a responsibility of being aware as to what actions are desirable and what goals are to be achieved. It should be understood that the communication of different goals can occur through informal channels, which involves meetings and face to face interactions, or through formal channels including budgets or other financial documents.

(ii) Create direction –

One of the reasons for lack of goal congruence is the absence of direction related to employees' behaviour. Performance management and goals facilitate efficient communication about what managers want their subordinates to focus on. It needs no mention that providing clear information and direction, employees can better understand what is expected from them, how to perform adequately, and how to contribute effectively to the achievement of the organisational goal.

(iii) Motivation –

The problem of motivation can exist even though employees h ave knowledge about how to perform adequately because employees can act in their own self interest instead of in the

organisation's best interest. The employees can make their own performance report better by allocating resources without befitting the organisation as a whole. One of the strongest reasons for demotivation among employees and managers is dislike for the work allocated. The reason for motivation varies among employees. While some employees feel motivated for some recognition and appraisals others may feel motivated because of commitment and responsibility without any required pay off. The more motivated the employees of the organisation the better will be the goal congruence.

(iv) Incentives –

In order to increase the likelihood of employees working to achieve their individual goals, organisation's aim to influence motivation by providing incentives. Research suggests that individuals tend to perform better when they are rewarded. Rewards and compensations should create goal congruence between individual goals and organisational goals by stimulating individuals to perform by providing incentives, as rewards a re related to increased effort.

(v) Connection

It is very important to create a connection between goals, performance measures and incentives. In order to align the employees' self-interest and overall organisational objectives it is necessary to relate incentives with performance.

INTERMEDIATE EXAMINATION

June 2024

P–9(OMSM)
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

This section contain Question No.1. All parts of this question are compulsory.

1. Choose the correct answer from the given alternatives (You may write only the Roman numeral and the Alphabet chosen for your answer): 2×15=30

(i) Let's consider an example of a product manufacturing company, who is aware that it needs to produce the products. One of the important aspects involved in the operational planning which is related to the question "How much to produce?" is known as :

(A) Process Selection & Layout

(B) Aggregate Planning

(C) Demand Forecasting

(D) Quality Management

(ii) _____ of a plant is the maximum rate of output (goods or services) the plant can produce.

(A) Production

(B) Potential

(C) Demand

(D) Capacity

(iii) Which one of the following basic process types is used when a very highly standardized product is desired in high volumes?

(A) Batch Process

(B) Continuous Process

(C) Job Shop Process

(D) Project Process

(iv) Which one of the following production controls is typically found whenever a particular bottleneck machine exists in the process of Manufacturing?

(A) Load Control

(B) Batch Control

(C) Block Control

(D) Flow Control

(v) Which one of the following ISO Standards evaluates the Management of the entire manufacturing process, from purchasing to design, to training?

(A) ISO 9004

(B) ISO 9003

(C) ISO 9000

(D) ISO 9001

(vi) A Zinc Plant of ZOS Ltd., manufactures product Z of 30 units per shift of 8 hours. If the Standard time per unit is 12 minutes, what is the productivity per shift of 8 hours?

(A) 60 %

(B) 75 %

(C) 80 %

(D) 90 %

(vii) Which one of the following design Tests asks whether a proposed Structure will set up links between parts of the organizations that are important but bound to be strained?

(A) The People Test

(B) The Feasibility Test

(C) The difficult Links Test

(D) The Flexibility Test

(viii) RON Ltd., a manufacturer of ball bearings provides the following items that is being managed using a fixed order Quantity Model with Safety Stock :

Annual Demand (D) : 24000 Units

Order Quantity (QO) : 3600 Units

Safety Stock (S) : 400 Units

What is the average Inventory Level ?

(A) 2500 units

(B) 2400 Units

(C) 2200 Units

(D) None of (A) , (B) and (C)

(ix) The Slack Time of the Tail event and Slack time of Head event of an activity M are 15 days and 2 days respectively. If the total Float of Activity M is 16 days, Free Float will be:

(A) 13 days

(B) 14 days

(C) 15 days

(D) 18 days

(x) Which one of the following Digital Marketing Strategies is a form of paid Advertising that allows Marketing Teams to essentially purchase traffic to their website?

(A) Email Marketing

(B) Mobile Marketing

(C) Pay-per Click (PPC)

(D) Affiliate Marketing

(xi) Which of the following is / are true for a Blue Ocean Strategy?

(A) Create and Capture new demand

(B) Boat the Competition

(C) Exploit existing demand

(D) Compete in existing Markets

(xii) Which one of the following Sorts of Business defined by the Market growth / market share axes of BCG Matrix, is a business unit with high market share in a matured market?

(A) Cash Cow

(B) Dog

(C) Star

(D) Question Mark (or problem Child)

(xiii) _____ is the science of using mathematical calculations and logic to generate time effective sequence of task considering any resource and cost constraints.

(A) Scheduling

(B) Plan

(C) Milestone

(D) Work-in-Progress

(xiv) Which one of the following announces what the Company is providing to Society; either a Service or a Product?

(A) Mission

(B) Vision

(C) Values

(D) Objectives

(xv) Which one of the following types of Cloud Computing, is a distribution model that delivers software applications over the Internet, these applications are often called web services?

(A) Infrastructure as a Service (Iaas)

(B) Platform as a Service (Paas)

(C) Software as a Service (Saas)

(D) Amazon Web Services (AWS)

Section–B

Answer *any Five* questions from Question No. 2 to Question No. 8.

Each question carries 14 Marks. **14×5=70**

2. (a) "The Production Management of To-day presents certain characteristics which make it look totally different from what it was during the past. Specifically, To-day's production system is characterized by at least Four Features". **In this Context Summarize** the Said Features. 7

(b) "Customers pay for the products that best fulfil their requirements and provide them the desired value". **In this Context append** the characteristics of a good product design. 7

3. (a) "Production Control involves the various functions". **In accordance with this align** these said functions. 7

(b) **RONTEX Ltd.,** a medium size manufacturing Company has provided productions analysis of Coriander powder (in Lakh tonnes) for the years 2015 to 2023 as follows:

Year	2015	2017	2019	2021	2023
Productions of Coriander powder (in Lakh Tonnes)	54	63	69	81	48

(Present Calculation up to two decimal Points)

Required:

(i) Using the methods of least Squares **Analyze** a Straight line value.

(ii) **Assess** the estimated Production (in Lakh Tonnes) of Coriander Powder for the years 2014 and 2028. 7

4. (a) In a Book Sales Emporium of PRANTIK (B) Ltd., four Salesmen A, B, C and D are available in four Counters P, Q, R and S. Each Salesman can handle any counter. Their Services (in hours) of each counter, when manned by each Salesman is given below :

	Counter			
Salesman	**P**	**Q**	**R**	**S**
A	30	46	34	22
B	11	20	11	5
C	28	43	28	18
D	14	23	17	8

Required :

(i) **Analyze** and **Assign** the Salesmen to appropriate counters so as to minimize the service time.

(ii) **Assess** the total service times (in hours). 7

(b) A production line of **ZFORD (M) Ltd.,** turns out about trucks per day; fluctuations occur for many reasons. The production can be described by a probability distribution as follows :

Production Per day	Probability	Production per day	Probability
45	0.03	**51**	0.15
46	0.05	**52**	0.10
47	0.07	**53**	0.07
48	0.10	**54**	0.05
49	0.15	**55**	0.03
50	0.20		

Finished trucks transported by a Train at the end of the day. The train capacity is only 51.

[**Given :** Random number: 37, 35, 63, 25, 50, 71, 95, 16, 55 and 53]

Required :

(i) **Using the Random** numbers stated Supra, **Simulate** the productions and waiting of trucks in the factory for the first 10 days.

(ii) **Evaluate** the average number of trucks waiting in the Factory.

(iii) **Assess** what will be the average number of empty space on the train. 7

5. (a) **RONTIX Ltd.**, a fleet owner finds from its past records that the cost per year of running a truck whose purchase price is ₹ 6,00,000 are as given below :

Year	1	2	3	4	5	6	7	8
Running Costs(₹ in Thousand)	100	120	140	180	230	280	340	400
Re-Sales Price (₹ in Thousand)	300	150	75	37·50	20	20	20	20

(Assume that Cost of Money is zero.)

Required :

(i) **Assess** the average annual cost of truck for each year.

(ii) **Analyze** and **Infer** at what age should the truck be replaced on economic consideration. 7

(b) **ZOTECH Ltd.**, has recently won a Contract for the installation of a die casting machine at a local factory of a large national firm of electronic Engineers. The following table gives the various activities in this job and normal duration (in days) thereof

Activity and Identification		Preceding Activities	Duration (days)
A	1 – 2	–	2
B	2 – 3	A	3
C	2 – 4	A	15
D	2 – 5	A	3
E	3 – 5	B	12
F	4 – 5	C	8
G	5 – 6	D, E and F	3
H	6 – 7	G	12

Required :

(i) **Design** the **PERT** Network diagram and indicate all paths through it.

(ii) **Identify** the Critical Path and its duration (in days).

(iii) **Analyze** and **Assess** the Total Float, Free Float and Independent Float of each activity. 7

6. (a) "Strategic Management involves a greater Scope than that of any one area of operational Management." – **In this Context align** the objectives of Strategic Management. 7

(b) Demonstrate the different types of Digital Marketing Strategies. **(Any Seven).** 7

7. (a) "Identifying key drives for change helps managers to focus on the PESTEL factors that are most important and which must be addressed as the highest priority" **— Justify the statement** with the help of PESTEL Framework. 7

(b) **Analyze** the Techniques that can help to improve Strategic decision Making. 7

8. (a) "Michael Goold and Andrew Compbell provide Nine design tests against which to check specific tailor – made structural Solutions" **— In this Context, Analyze** any seven of these nine test. 7

(b) "Hammer and Champy (1993) point to the existence of a set of 'commonalities, recurring themes or characteristics' that can guide Business Process Re-engineering (BPR)". **— In accordance with this, align** the said Commonalities or characteristics that guide BPR. 7

PAPER – 9 : OPERATIONS MANAGEMENT AND STRATEGIC MANAGMENT

SUGGESTED ANSWERS

SECTION – A

1.

(i) (C)
(ii) (D)
(iii) (B)
(iv) (A)
(v) (C)
(vi) (B)
(vii) (C)
(viii) (C)
(ix) (B)
(x) (C)
(xi) (A)
(xii) (A)
(xiii) (A)
(xiv) (A)
(xv) (C)

SECTION – B

2. (a)

Today's production system is characterized by the following features:

(i) **Manufacturing as Competitive Advantage:**

Unlike the past, today 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 but only some techniques which the companies are employing to gain competitive advantage.

(ii) **Services Orientations :**

Service sector is gaining greater relevance these days. The production system, therefore, needs to be organized keeping in mind the peculiar requirements of the service component. The entire manufacturing needs to be geared to serve (a) intangible and perishable nature of the services, (b) constant interaction with clients or customers, (c) small volumes of production to serve local markets, and (d) need to locate facilities to serve local markets.

(iii) **Disappearance of Smokestacks :**

Protective labour legislation, environmental movement and gradual emergence of knowledge based organizations 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.

(iv) **Small has Become Beautiful :**

E.F. Schumacher, in his famous book Small is Beautiful, opposed giant organizations and increased specialization. He advocated, instead, intermediate technology based on smaller working units, community ownership, and regional workplaces utilizing local labor 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 organizations and mass production systems.

2. (b)

The Characteristics of Good Product design is appended below:

(i) Product Quality: The product must satisfy the needs of the end customers while providing optimum value. The performance should be at par with the expectations.

(ii) The product must be reliable and worthy for paying for the same.

(iii) The product must be designed at an optimum cost to be offered at an affordable price to the target customers.

(iv) The product must be having a shorter design to market lead time.

(v) The aesthetics/looks of the product must create an immediate impression in the minds of the customers.

(vi) The product must be easily maintainable and reproducible.

(vii) The product must be compatible, user-friendly and upgradable with availability of after sales support (e.g., spare parts).

(viii) The product should balance between standardized basic features and customized augmented features.

(ix) A detailed specification.

(x) The product must be safe to use, error proof and should not harm the environment and users.

3. (a)

The Functions involved in Production Control are aligned as follows:

(i) Planning the production operations in detail.

(ii) Routing, i.e., laying down the path for the work to follow and the order in which the various operations will be carried out,

(iii) Scheduling, i.e., establishing the quantity of work to be done, and fixing the time table for performing the operations,

(iv) Dispatching, i.e., issuing the necessary orders, and taking necessary steps to ensure that the time targets set in the schedules are effectively achieved,

(v) Follow-up, taking necessary steps to check up whether work proceeds according to predetermined plans and how far there are variances from the standards set earlier,

(vi) Inspection, i.e., conducting occasional check-ups of the products manufactured or assembled to ensure high quality of the production.

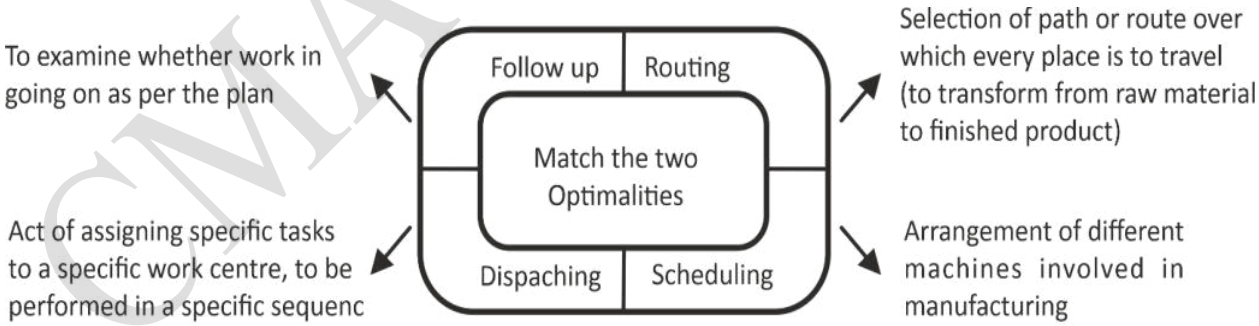


Figure : Techniques of Production Control

3. (b)

(i) The equation of Straight line Trend is $Y_e = a + b\chi$

$$Y_e = 63 + 0.30\,\chi$$

(ii) Assessment of Sales (in Lakh Tonnes) for :

Year 2014 = 61.50 Lakh Tonnes.

Year 2028 = 65.70 Lakh Tonnes.

4. (a)

Step – 1: Matrix after Row Operation.

	COUNTER			
Salesman	**P**	**Q**	**R**	**S**
A	8	24	12	0
B	6	15	6	0
C	10	25	10	0
D	6	15	9	0

Step – 2 : Matrix after Column Operation.

	COUNTER				
Salesman	**P**	**Q**	**R**	**S**	
A	2	9	6	0	
B	~~0~~	~~0~~	~~0~~	~~0~~	
C	4	10	4	0	
D	~~0~~	~~0~~	~~3~~	~~0~~	**(1)**

The numbers of allocated cells are not equal to the number of rows. Hence, the solution is not optimal.

(i) The revised table is prepared by considering the least uncovered value 2, and adjusting it with uncovered cell values and those lying at the intersection of lines.

	COUNTER				
Salesman	**P**	**Q**	**R**	**S**	
A	~~0~~	~~7~~	~~4~~	~~0~~	
B	~~0~~	~~0~~	~~0~~	~~2~~	
C	2	8	2	0	
D	~~0~~	~~0~~	~~3~~	~~2~~	**(1)**

TABLES - 3

(ii) Minimum number of lines to cover all zeros equal 4 which matches with the order to the Matrix (as shown in Table – 3). Assignments made are shown with squares as shown in Table – 4.

	COUNTER				
Salesman	P	Q	R	S	
A	[0]	7	4	~~0~~	
B	~~0~~	~~0~~	[0]	2	
C	2	8	2	[0]	
D	~~0~~	[0]	3	2	(2)

The optimal assignment is:

Salesman	COUNTER	Service time (Hour)
A	**P**	**30**
B	**R**	**11**
C	**S**	**18**
D	**Q**	**23**
	TOTAL	**82**

4. (b)

(i) **Statement showing allocation of Random Numbers**

Production Per day	Probability	Cumulative Probability	Random Number Assigned
45	0.03	0.03	00 – 02
46	0.05	0.08	03 – 07
47	0.07	0.15	08 – 14
48	0.10	0.25	15 – 24
49	0.15	0.40	25 – 39
50	0.20	0.60	40 – 59
51	0.15	0.75	60 – 74
52	0.10	0.85	75 – 84
53	0.07	0.92	85 – 91
54	0.05	0.97	92 – 96
55	0.03	1.00	97 – 99

Simulation Work Sheet:

SL. No.	Random No.	Production per day	Capacity of Train	No. of Trucks waiting in the Factory	Trucks Shipped	No. of empty Space on the train
01.	37	49	51		49	2
02.	35	49	51		49	2
03.	63	51	51		51	--
04.	25	49	51		49	2
05.	50	50	51		50	1
06.	71	51	51		51	--
07.	95	54	51	3	51	--
08.	16	48	51	--	51	3
09.	55	50	51	--	50	1
10.	53	50	51	--	50	1
TOTAL				**3**		**12**

(ii) Average number of Trucks waiting in the factory = 0.30

(iii) Average number of Empty Space in the Train = 1.20

5. (a)

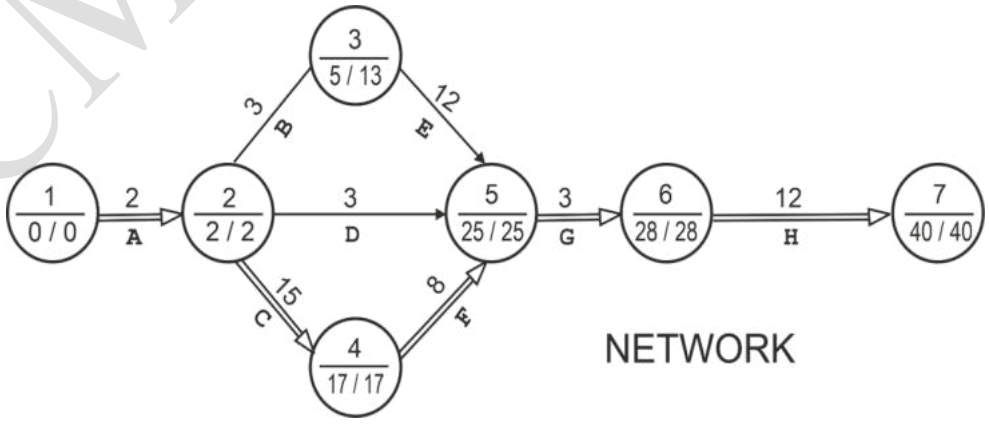
(i) **The average Annual Costs to date for each year are assessed below :**

COST OF OWNING AND OPERATING TRUCK (D IN THOUSAND)

Year (t)	Running Costs	Cumulative Running Cost	Resale value	Depreciation (Capital Cost)	Total Costs	Average cost per year
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
1.	100	100	300	300	400	400
2.	120	220	150	450	670	335
3.	140	360	75	525	885	295
4.	180	540	37.50	562 5	1102 5	275 63
5.	230	770	20	580	**1350**	**270**
6.	280	1050	20	580	1630	271 67
7.	340	1390	20	580	1970	281 43
8.	400	1790	20	580	2370	296 25

(ii) After analysis of the parameter stated Supra, we conclude that the truck should be replaced at the end of the Fifth year, of which average annual Cost (D 270000) is minimum; otherwise the average annual cost would increase after fifth year.

5. (b)



NETWORK

Critical Path and duration (in days) 1 – 2 – 4 – 5 – 6 – 7 and 40 days

Activity and Identification		Duration Days	DAYS						
			EST	LST	EFT	LFT	Total Float	Free Float	Independent Float Free-Tail
A	1 – 2	2	0	0	2	2	0	0	0
B	2 – 3	3	2	10	5	13	8	0	0
C	2 – 4	15	2	2	17	17	0	0	0
D	2 – 5	3	2	22	5	25	20	20	20
E	3 – 5	12	5	13	17	25	8	8	0
F	4 – 5	8	17	17	25	25	0	0	0
G	5 – 6	3	25	25	28	28	0	0	0
H	6 – 7	12	28	28	40	40	0	0	0

6. (a)

The objectives of Strategic Management are aligned as under:

(i) To identify opportunities and adapt resources to exploit the opportunities created.

(ii) To create opportunities by stretching the resources and competences of the organization and capitalize them.

(iii) To help managers to understand the key relationships among actions, context, and performance by providing the conceptual frameworks.

(iv) To help an organization enjoy competitive advantage.

(v) To sustain and improve the competitive position by the deployment and acquisition of appropriate resources and by monitoring and responding to environmental changes.

(vi) To monitor and remain responsive to the demands of key stakeholders.

(vii) To identify the critical success factors and meet the needs and wants of the customers.

(viii) To avoid failure by focusing on the building blocks of competitive advantage (superior efficiency, superior quality, superior innovation and superior responsiveness to customers), instituting continuous improvement and learning, tracking the best industrial practices and using benchmarking.

(ix) To overcome inertia and accept the changes in the ever-changing environment to remain competitive and at times to survive.

(x) To develop a creative and innovative attitude and to think strategically.

6. (b)

The different types of Digital Marketing strategies are demonstrated below:

1. **Social Media Marketing Platforms:**

   Todays' consumers are highly reliant on social media platforms such as Instagram, Facebook, LinkedIn, and Snap chat. This is why it is essential that brands are active across accounts. Social media platforms allow marketers to reach their prospects in a myriad of ways.

2. **Influencer Marketing:**

   Another effective way to harness digital channels to reach target audiences is with influencer marketing. Brands can partner with celebrities, sites, or others that are considered experts in their field, that share similar values.

3. **Email Marketing:**
   Email marketing campaigns allow organizations to stay connected with prospects and customers, sending them customized newsletters or offers based on past shopping history or brand engagements.
4. **Content Marketing:**
   Content marketing allows marketing teams to be proactive in answering their users' questions. Marketing teams create content, videos, and other assets to answer questions or provide context to consumers throughout the three stages of the buyer's journey as (i) The Awareness Stage (ii) The Consideration stage and (iii) The Decision Stage.
5. **Search Engine Optimization (SEO) Marketing:**
   Search engine optimization often goes hand in hand with content marketing. When the customer from the above example is conducting research for which gym shoes to buy, they will probably click on one of the first three results that appear on Google.
6. **Pay-per-click (PPC):**
   Pay-per-click is a form of paid advertising that allows marketing teams to essentially purchase traffic to their website. Marketers place ads on websites or search engines such as Google and Microsoft Bing, and pay a fee each time the ad is clicked on.
7. **Affiliate Marketing:**
   Affiliate marketing is similar to referral programs; it involves working with outside individuals or companies under the agreement that they promote your product in exchange for a commission from each sale that can be attributed to their efforts.
8. **Mobile Marketing:**
   Mobile marketing initiatives can include many of the digital marketing strategies mentioned above, and typically will leverage a combination of text messages, social media, email, push notifications, and mobile applications.

7. (a)

PESTEL framework covers six main types of environmental influences, namely, Political, Economic, Social, Technological, Environmental and Legal. All these influences create both opportunities as well as threats depending upon the situation.

Political instability poses threats to business organizations whereas, Political stability and a favourable government creates opportune business environment.

Economic growth leads to an increase in customer expenditures which in turn gives companies the opportunity to expand operations and earn higher profits. On the contrary Recession increases competitive pressures and decreases customer expenditures causing a threat to the companies.

Social influences include changing cultures and demographics. Demographic forces are outcomes of changes in the characteristics of a population, such as age, gender, ethnic origin, race, sexual orientation, and social class. Like the other forces in the general environment, demographic forces present managers with opportunities and threats and can have major implications for organizations.

Technological influences refer to innovations such as artificial intelligence, internet, nano-technology, or the rise of new composite materials.

Environmental stands specifically for 'green' issues, such as pollution and waste. The environmental factors have now become extremely important for organisations as countries across the globe are increasingly concerned with the environmental changes and are striving towards clean, green and renewable sources of energy.

Legal embraces Legislative constraints or changes such as health and safety Legislation or restriction on Company mergers and acquisitions.

7. (b)

The Techniques for improving strategic decision making are enumerated below:

Devil's advocacy

It requires the generation of a plan, and a critical analysis of that plan. One member of the decision-making group acts as the devil's advocate, emphasizing all the reasons that might make the proposal unacceptable. In this way, decision makers can become aware of the possible perils of recommended courses of action.

Dialectic inquiry

It is more complex because it requires the generation of a plan (a thesis) and a counter-plan (an antithesis) that reflect plausible but conflicting courses of action. Strategic managers listen to a debate between advocates of the plan and counter-plan and then decide which plan will lead to higher performance. The purpose of the debate is to reveal the problems with the definitions, recommended courses of action, and assumptions of both plans.

The outside view

It requires planners to identify a reference class of analogous past strategic initiatives, determine whether those initiatives succeeded or failed, and evaluate the project at hand against those prior initiatives.

Group Think

- Concept was given by psychologist Irvin Janis.
- It occurs when a group of decision makers embarks upon a course of action without questioning underlying assumptions.
- Typically, a group coalesces (unites) around a person or policy.
- It ignores or filter out information that can be used to question the policy and develops after the fact rationalizations for its decision.
- Commitment to the mission or goals becomes based on an emotional rather than an objective assessment of the correct course of action.
- The consequences can be poor decisions.

8. (a)

The design tests are analyzed as follows:

(i) **The Market-Advantage Test:**
This test of fit with market strategy is fundamental, following Alfred Chandler's classic principle that 'structure follows strategy'. For example, if coordination between two steps in a production process is important to market advantage, then they should probably be placed in the same structural unit.

(ii) **The Parenting Advantage Test:**
The structural design should fit the 'parenting' role of the corporate Centre.

(iii) **The People Test:**
The structural design must fit the people available. It is dangerous to switch completely from a functional structure to a multidivisional structure if, as is likely, the organization lacks managers with competence in running decentralized business units.

(iv) **The Feasibility Test:**
This is a catch-all category, indicating that the structure must fit legal, stakeholder, trade union or similar constraints.

(v) **The Specialized Cultures Test:**
This test reflects the value of bringing together specialists so that they can develop their expertise in close collaboration with each other. A structure fails if it breaks up important specialist cultures.

(vi) **The Difficult Links Test:**
This test asks whether a proposed structure will set up links between parts of the organizations that are important but bound, to be strained.

(vii) **The Redundant Hierarchy Test**:
Any structural design should, be checked in case it has too many layers of management, causing undue blockages and expense. Delayering in response to redundant hierarchies has been an important structural trend in recent years.

(viii) **The Accountability Test**:
This test stresses the importance of clear lines of accountability, ensuring the control and commitment of managers throughout the structure.

(ix) **The Flexibility Test:**
In a fast-moving world, an important test is the extent to which a design will allow for change in the future. For instance, divisional domains should be specified broadly enough to allow divisional managers to follow new opportunities as they emerge.

8. (b)

The commonalities or characteristics that guide BPR are as follows:

(i) Combining several jobs into one.
(ii) Allowing workers to make decisions.
(iii) Performing the steps of a process in a natural order.
(iv) Recognition that processes have multiple versions and designing processes to take account of different situations.
(v) Reducing checks and controls to the point where they make economic sense.
(vi) Minimizing reconciliation.
(vii) Appointing a case manager to provide a single point of contact at the interface between processes.
(viii) Performing process where it makes the most sense e.g. if the accounting department needs pencils, it is probably cheaper for such a small order to be purchased directly from the office equipment store along the block than to be order via the firm's purchasing department.
(ix) Reconciling centralization with decentralization in process design, e.g. a shared database, decentralized decision can be made while permitting overall coordination simply through information sharing.

INTERMEDIATE EXAMINATION

December 2024

P–9(OMSM)
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

This section contains Question No. 1. All parts of this question are compulsory.

1. Choose the correct answer from the given four alternatives (You may write only the Roman Numeral and the Alphabet chosen for your answer): 2×15=30

(i) The ability to adapt quickly to changes in volume of demand, in the product mix demanded, and in product design or in delivery schedules, is sometimes referred to as

(A) Re-Engineering
(B) Business Process Restructuring
(C) Agile Manufacturing
(D) Right Sizing

(ii) Which one of the following is associated with the configuration of departments, work centres and equipment and machinery, with focus on the flow of materials or work through the production system?

(A) Facility Location
(B) Facility Layout
(C) Capacity Planning
(D) Process Design

(iii) In which one of the following phases of the product life cycle, organisations get engaged in aggressive promotional and pricing program?

(A) Introduction
(B) Growth
(C) Maturity
(D) Decline

(iv) The Annual Carrying Cost of Material ZB is ₹ 3·60 per unit and its Total Carrying Cost is ₹ 9,000 per annum. If there is no Safety Stock of Material ZB, what will be the Economic Order Quantity (EOQ) for Material ZB?

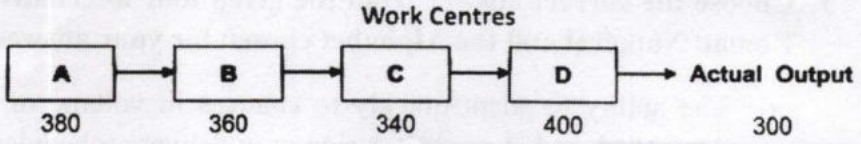
(A) 5000 units

(B) 6000 units

(C) 6500 units

(D) 4000 units

(v) ZOOS Ltd., a manufacturing firm, has four Work Centres A, B, C & D in series with individual capacities in units per day shown in the figure below:



What is the System Efficiency?

(A) 75·25%

(B) 80·33%

(C) 99%

(D) 88·23%

(vi) A cement factory of SITON (C) Ltd., in Madhya Pradesh works 7 days a week in 3 shifts per day having maintenance in the first shift of around 2 hours. It has roughly 100 workers which produces only pozzolanic properties cement better known as PPC. The output per month is around 2500 tonnes of PPC. What will be productivity per worker?

(A) 20 tonnes

(B) 30 tonnes

(C) 25 tonnes

(D) 15 tonnes

(vii) For Quality Assurance in Design, Production, Installation and Servicing the _____ Model is used.

(A) ISO 9002

(B) ISO 9001

(C) ISO 9003

(D) None of the above options

(viii) This _____ provides the broad "DATA", from which to identify key drivers of change.

(A) SWOT Analysis

(B) BCG Matrix

(C) PESTEL Analysis

(D) Critical Success Factors

(ix) Which one of the following cannot be closely associated with the "Red Ocean Strategy"?

(A) Boat the Competition

(B) Make the Value Cost trade-off

(C) Make the Competition irrelevant

(D) Exploit Existing Demand

(x) The process of _____ requires co-ordination across the entire organization and involves business culture changes.

(A) Digital Strategy

(B) Digitization

(C) Digital Transformation

(D) Data Aggregation

(xi) Forecasting the weather is an example of _____.

(A) Narrow AI

(B) General AI/Human-Level

(C) Super AI

(D) Deep-Learning

(xii) Which type of Production Control is most prominently applied in the industries like textiles, and book & magazine printing industries?

(A) Batch Control

(B) Load Control

(C) Order Control

(D) Block Control

(xiii) The Work Breakdown Structure is typically developed in which one of the following phases of the project management life cycle?

(A) Project Initiation Phase

(B) Project Planning Phase

(C) Project Quality Management Phase

(D) Execution Phase

(xiv) Strategy Formulation is characterized by—

(A) The focus is on effectiveness.

(B) It requires motivation and leadership skills.

(C) It involves managing forces during action.

(D) It is primarily an operational process.

(xv) Which one of the following activities involves receiving, storing and distributing inputs to the production process?

(A) Inbound Logistics

(B) Operations

(C) Marketing & Sales

(D) Outbound Logistics

Section-B

Answer any Five questions from Question No. 2 to Question No. 8.

Each question carries 14 marks. 14×5=70

2. (a) "The Plant Layout selected in conformity with Layout Principles should be an ideal one"— **In this context, align** those Plant Layout Principles. 7

(b) What is Design Thinking? **Briefly discuss** the five stages of Design Thinking. 7

3. (a) "Production Planning and Control fulfils its various objectives by focusing on the several important points/issues". **With reference to this statement, append** those said important points/issues.(Any Ten) 7

(b) METRO-WALLS ICE CREAM PARLOUR observed that during summer months the daily sales of its ice cream depends on the average day temperature as shown in the following Table:

Average Day Temperature in Centigrade (X)	20	25	30	35	40
Daily Sale of Ice Cream (in Thousand ₹) (Y)	10	20	30	40	50

Required:

(i) **Fit** a linear regression of Y on X.

(ii) **Estimate** the trend values of daily sales of ice cream for average day temperature of 32 and 42 centigrade.

(iii) **Estimate** the Average Day Temperature (in Centigrade) for the daily sale of ice cream of ₹ 60 thousands. 7

4. (a) A project of GREEN IP Ltd., consists of four major jobs, for which four contractors have submitted tenders. The tender amounts, in thousands of rupees, are given below:

Contractors	**JOBS**			
	A	B	C	D
1	39	70	37	50
2	20	27	47	63
3	25	37	58	49
4	43	48	46	50

(Each Contractor has to be assigned only one Job)

Required:

(i) **Analyze** and assign the Jobs to appropriate Contractors so as to minimize the Total Cost of the Project.

(ii) **Assess** the Total Costs of the Project. 7

(b) **Home Town Interior Decoration Ltd.**, uses a costly drier while painting the fire protection doors. The drier is highly volatile. It cannot be stored. In order to meet the requirement of drier, the exact quantity is purchased every day and consumed. The Management of the Company wants to Simulate the demand of the drier. For this the

Management of the Company collected data for past 100 days for the application of the drier on the number of doors and the same data are shown in the table below:

Daily Demand (No. of Driers)	Number of Days
0	20
1	30
2	20
3	10
4	6
5	4
6	10

Consider the following Table of two Digit Random Numbers:

Random Numbers	03	23	36	93	69	43	87	51	11	08

Required:

(i) Using the following generated random numbers in Sequence, **generate** the demand of driers for next ten days.

(ii) **Assess** the average demand of drier per day. 7

5. (a) A computer of ROPAM Ltd., has 1000 nos. of Electronic Tubes.

They are subject to Mortality as given below:

Period	Age at Failure (Hrs.)	Probability of Failure
1	0 – 200	0·10
2	201 – 400	0·26
3	401 – 600	0·35
4	601 – 800	0·22
5	801 – 1000	0·07

If the tubes are group replaced, the cost of replacement is ₹ 150 per Electronic tube. Group replacement can be done at fixed intervals in the night shift when the computer is not normally used. Replacement of individual Electronic tubes which fail in Service Cost ₹ 600 per Electronic tube.

Assume that:

(1) Electronic Tubes that fail during a period are replaced just before the end of the period.

(2) The actual percentage of failure during a period for a sub-population of the Tubes with the same age is the same as the expected percentage of failure during the period for that sub-population.

Required:

(i) **Analyze** the number of Electronic Tubes to be replaced every period.

(ii) **Assess** the failure costs (₹) on average of individual replacement of electronic tubes.

(iii) **Identify** at what interval of time the Company should replace all the electronic Tubes.

(iv) **Advice** which policy of replacement will be economical to the Company. 7

(b) BITZON Ltd., a Chemical Product Manufacturing Company have split their Schedule of Implementation into the following 6 activities and have estimated Time Duration (in weeks) under 3 Scenarios as under:

(Time in Weeks)

Activity and Identification		Optimistic time estimate	Pessimistic time estimate	Most likely time estimate
A	1 – 2	5	11	8
B	1 – 3	18	26	22
C	2 – 4	15	25	20
D	3 – 4	4	12	8
E	4 – 5	8	12	10
F	3 – 5	14	26	20

Required:

(i) **Assess** the expected duration (in weeks) for each activity.

(ii) **Design** the PERT Network Diagram and indicate all paths through it.

(iii) **Identify** the Critical Path and its Duration (in weeks).

(iv) **Analyze** and indicate the Total Float and Free Float available on each activity. 7

6. (a) "Objectives should possess certain desirable characteristics in order to be effective". **In this context, identify** and explain those characteristics of Effective Objectives. 7

(b) "Big data is a collection of data that is huge in volume and growing exponentially with time". **In this Context Identify** the different types of big data and **briefly explain** the main characteristics of big data. 7

7. (a) **Identify** and analyze the five main steps involved in the Formal Strategic Planning Process. 7

(b) "Business Environment exhibits many characteristics". **In this event, demonstrate** in brief the said important characteristics of Business Environment. 7

8. (a) "The Transnational Structure seeks to obtain the best form of the two extreme International Strategies, the Multi-Domestic Strategy and the Global Strategy". In this **context, identify** and discuss the characteristics of Transnational Structure. 7

(b) "The achievement of goal congruence is essential in order to increase the profitability of the organization and to achieve its goals". **With reference to this statement, demonstrate** some of the areas that have the ability to create goal congruence. 7

P-9: OPERATIONS MANAGEMENT AND STRATEGIC MANAGEMENT

SUGGESTED ANSWERS

SECTION – A

1.

(i) (C)

(ii) (B)

(iii) (C)

(iv) (A)

(v) (D)

(vi) (C)

(vii) (B)

(viii) (C)

(ix) (C)

(x) (C)

(xi) (A)

(xii) (D)

(xiii) (B)

(xiv) (A)

(xv) (A)

SECTION – B

2. (a)

The layout selected in conformity with layout principles should be an ideal one. These principles are aligned as under:

(i) Principle of Minimum Travel:
Men and materials should travel the shortest distance between operations so as to avoid waste of labour and time and minimise the cost of materials handling.

(ii) Principle of Sequence:
Machinery and operations should be arranged in a sequential order. This principle is best achieved in product layout, and efforts should be made to have it adopted in the process layout.

(iii) Principle of Usage:
Every unit of available space should be effectively utilised.

(iv) Principle of Compactness:
There should be a harmonious fusion of all the relevant factors so that the final layout looks well integrated and compact.

(v) Principle of Safety and Satisfaction:
The layout should contain built in provisions for safety for the workmen. It should also be planned on the basis of the comfort and convenience of the workmen so that they feel satisfied.

(vi) Principle of Flexibility:
The layout should permit revisions with the least difficulty and at minimum cost.

(vii) Principle of Minimum Investment:
The layout should result in savings in fixed capital investment, not by avoiding installation of the necessary facilities but by an intensive, use of available facilities.

2. (b)

Define Design Thinking:

Design thinking is a non-linear, iterative process that seeks to understand users' needs, challenge assumptions, redefine problems and create innovative solutions to prototype and test. This is involving five phases—Empathize, Define, Ideate, Prototype and Test—it is most useful to tackle problems that are ill-defined or unknown.

Five stages of Design Thinking are discussed as follows:

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. (a)

Production Planning and Control fulfils its various objectives by focusing on the following points / issues:

(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 changer in orders as requested by customers while orders are in process.

(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) Production of work orders to initiate production activities.

(xiv) Notifying sales and accounting of the acceptance of orders in terms of production feasibility.

(xv) Preparing the route sheets and schedules showing the sequence of operation required to produce particular products.

(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.

3. (b)

(i) Linear Regression of Y on X : Y = a + b X

Average day Temperature (in Centigrade)	**Daily Sale of Ice-Cream (in Thousand ₹)**	**Square of X**	**Product of X and y**
X	y	(χ^2)	(xy)
20	10	400	200
25	20	625	500
30	30	900	900
35	40	1225	1400
40	50	1600	2000
$\sum\chi = 150$	$\sum y = 150$	$\sum\chi^2 = 4750$	$\sum xy = 5000$

To find the values of a and b, the following equations are to be solved:

$\sum y = na + b\sum\chi$	Eqn. (i)
$\sum xy = a\sum\chi + b\sum\chi^2$	Eqn. (ii)
By putting the values, we get	
150 = 5 a + 150 b	Eqn. (iii)
5000 = 150 a + 4750 b	Eqn. (iv)
Multiplying eqn. (iii) by 30 and putting it as eqn. (v) we get	
4500 = 150 a + 4500 b	Eqn. (v)
By deducting eqn. (v) from eqn. (iv) we get,	
500 = 250 b, $\therefore \quad b = \frac{500}{250} = 2$	
By putting the value of b eqn. (iii), we get	
150 = 5 a + 2 x 150 = 5 a + 300	
Or, 5a = 150 – 300 or, 5a = – 150, or, a = $a = \frac{-150}{5} = -30$	
Now, by putting the value of a and b the required Regression Equation of Y on X is	
Y = a + bx ; or Y = – 30 + 2 x	
So, Y = 2 x – 30	

(ii) Estimated Trend value of daily Sales (Y) of Ice-Cream for

(a) Average day temperature of 32° C :
Y = 2 x 32 – 30 = 34 i.e. ₹ 34000

(b) Average day temperature of 42° C :
Y = 2 x 42 – 30 = 54 i.e. ₹ 54000

(iii) Estimated Average day Temperature (x) for daily Sales of Ice-Cream of D 60 Thousand is

$Y = 2x - 30$ or $2x = Y + 30 = 60 + 30 = 90$

or, $x = \frac{90}{2} = 45\ ^{\circ}C$

4. (a)

(i) The given problem is a standard minimization problem. Subtracting the minimum element of each raw from all its elements in turn, the given problem reduces to.

Again subtracting the minimum element of each column from all its elements in turn

Step 1. Row Subtraction

Contractor \ Job	A	B	C	D
1	2	33	0	13
2	0	7	27	43
3	0	12	33	24
4	0	5	3	7

Step 2. Column Subtraction

Contractor \ Job	A	B	C	D
1	2	28	0	6
2	0	2	27	36
3	0	7	33	17
4	0	0	3	0

Step 3. Draw he Minimum Straight lines to Cover Zeros.

Contractor \ Job	A	B	C	D
1	~~2~~	~~28~~	~~0~~	~~6~~
2	0	2	27	36
3	0	7	33	17
4	~~0~~	~~0~~	~~3~~	~~0~~

Since the number of lines is less than the order of cost matrix, select the smallest element in the cost matrix not covered by the lines, subtract this element from all the uncovered elements and also added to numbers at intersection of two lines.

Step – 4

Contractor \ Job	A	B	C	D
1	~~4~~	~~28~~	~~0~~	~~6~~
2	~~0~~	~~0~~	~~25~~	~~34~~
3	0	5	31	15
4	~~2~~	~~0~~	~~3~~	~~0~~

Step 5: Return to Step 3, cover all zeros. Since the number of lines is 4, the optimality creiteria is satisfied.

Contractor \ Job	A	B	C	D
1	4	28	[0]	6
2	0	[0]	25	34
3	[0]	5	31	15
4	2	0	3	[0]

Step 6 : Assign

Contractor	Job	Amount (₹) in thousand
1	C	37
2	B	27
3	A	25
4	D	50
Total		139

Hence, total minimum cost of the project will be ₹ 139000

4. (b)

(i) From the frequency table let us construct the relative frequency, probability and range of R. N. as follow:

Daily Demand	Relative Frequency	Probability	Cum Problem	Range of R. N.
0	20 / 100	0.20	0.20	00 – 19
1	30 / 100	0.30	0.50	20 – 49
2	20 / 100	0.20	0.70	50 – 69
3	10 / 100	0.10	0.80	70 – 79
4	6 / 100	0.06	0.86	80 – 85
5	4 / 100	0.04	0.90	86 – 89
6	10 / 100	0.10	1.00	90 – 99

Next the result of 10 days simulation is as follows:

Days	Random No.	Generated Demand of Driers
1	03	0
2	23	1
3	36	1
4	93	6
5	69	2
6	43	1
7	87	5
8	51	2
9	11	0
10	08	0
Total	-	18

(ii) Average demand of Drier per day :

$$\frac{18}{10} = 1.8 \text{ Driers}$$

5. (a)

(i) Consider each block of 200 hours as one period, we can calculate the number of replacements due to failure in successive periods, with a policy that only the electronics tubes which fail will be replaced.

Expected life of Electronic tube:
1x0.10+2x0.26+3x0.35+4x0.22+5x0.07 = 2.9 periods.

Expected number of failure in each period:

$$\frac{1000}{2.9} = 344.8276 \text{ i.e., } 345$$

Cost of Individual Replacement = 345 x 600 = ₦ 207000
Group Replacement: Initial Cost = 1000 x 150 = ₦ 150000

(ii) COMPUTATION AVERAGE COST :

No. of Period	Expected No. of Tubes to be replaced by the period end	Cum. No. of Tubes replace Individually by period end	COST		Total Cost (Te)	Average Cost (Te / n)
			Individually	Group		
			(D)	(D)	(D)	(D)
1.	100	100	60000	150000	210000	210000
2.	270	370	222000	150000	372000	186000
3.	403	773	463800	150000	613800	204600
4.	365	1138	682800	150000	832800	208200
5.	328	1466	879600	150000	1029600	205920

(iii) Since the average Cost (₦ 186000) is lowest in period 2. So, the Company should replace all the electronic tubes at period 2.

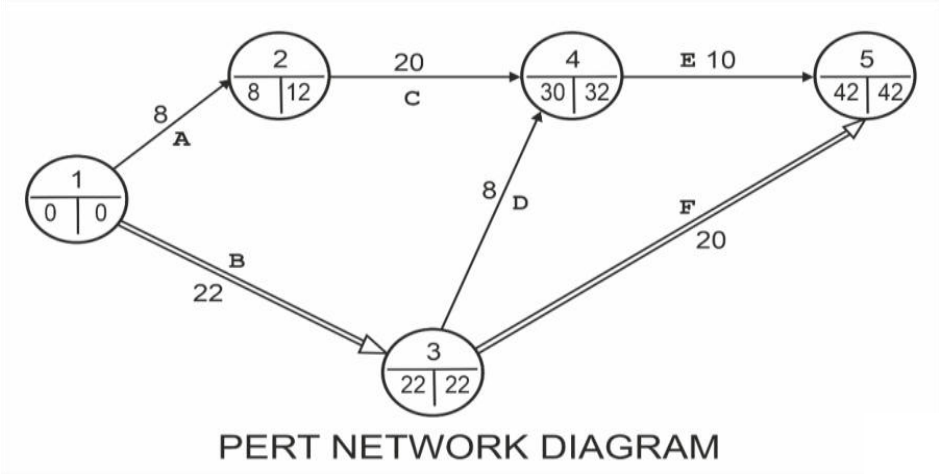
The Minimum Average Cost for group replacement is ₦ 186000, which is less than ₦ 207000 of individual replacement, for an interval of 200 hours / period 2. This is the optimal policy, and will be economical to the Company.

5 (b)

(i) **(Time in Weeks)**

Activity and Identification		Optimistic Time	Most Likely Time	Pessimistic Time	Expected Time
A	1 – 2	5	8	11	8
B	1 – 3	18	22	26	22
C	2 – 4	15	20	25	20
D	3 – 4	4	8	12	8
E	4 – 5	8	10	12	10
F	3 – 5	14	20	26	20

(ii)



PERT NETWORK DIAGRAM

(iii) Critical Path : 1 – 3 – 5, Duration : 42 Weeks

(iv) **(Time in Weeks)**

Activity and Identification		Duration	EST	EFT	LST	LFT	Total Float (LFT-EFT) Or (LST-EST)	Free Float (TF – Head Slack)
A	1 – 2	8	0	8	4	12	4	0
B	1 – 3	22	0	22	0	22	0	0
C	2 – 4	20	8	28	12	32	4	2
D	3 – 4	8	22	30	24	32	2	0
E	4 – 5	10	30	40	32	42	2	2
F	3 – 5	20	22	42	22	42	0	0

6. (a)

Objectives should possess Certain desirable characteristics in order to be effective. They are as follows:

(i) Specific:

The first step towards setting objectives is to specify what the company wants to achieve.

This involves answer to five specific set of questions namely, what the organisation wants to achieve? Why the company wants to achieve? Who are being involved in the process? Where it wants to achieve and which are the resources and constraints that needs to be identified? Specific objectives are more likely to lead and motivate the managers.

(ii) Understandable:

The objectives should be such that they are understandable to those who are expected to achieve them. Clarity in objectives helps to avoid ambiguity which in turn helps to achieve the desired results.

(iii) Measurable:

Objectives should be precise and measurable. There has to be a standard against which they can judge their performance. It is often considered to be a good practice to quantify objectives rather than to state them in qualitative terms. It helps to measure and control the achievement of the objectives with respect to comparable companies in a particular industry and in general.

(iv) Attainable:

Objectives must be challenging but realistic or attainable. They give all employees an incentive to look for ways of improving the operations of an organisation. If an objective is unrealistic in the challenges it poses, employees may give up; an objective that is too easy may fail to motivate managers and other employees.

(v) Relevant:

Objectives must be linked to the overall vision and mission of the organisation. There should not be any conflict between the objectives that the management has set with the goals of the organisation. This is a very important task as misalignment between the two can lead to failure in achieving the corporate vision.

(vi) Time Bound:

Objectives should specify a time period. Time constraints tell employees that success requires an objective to be attained by a given date, not after that date. Deadlines can inject a sense of urgency into objective attainment and act as a motivator. However, not all objectives require time constraints.

6. (b)

There are three types of Big Data, namely structured, unstructured and semi-structured.

Structured:

A structured data is any data that can be stored, accessed and process in the form of fixed format.

Un-Structured:

An un-structured data is one with unknown form or structure.

Semi-Structured:

A Semi-structured data can contain both the forms of data.

The Characteristics of Big Data are explained as under:

Volume:

Size of data plays a very crucial role in determining value out of data. Also, whether a particular data can actually be considered as a Big Data or not, is dependent upon the volume of data. The name Big Data itself is related to a size which is enormous. Hence, 'Volume' is one characteristic which needs to be considered while dealing with Big Data solutions.

Variety:

Variety refers to heterogeneous sources and the nature of data, both structured, unstructured and semi structured. During earlier days, spreadsheets and databases were the only sources of data considered by most of the applications however, in recent period data can be in the form of emails, photos, videos, monitoring devices, PDFs, audio, etc. These data also need to be analysed.

Velocity:

The term _velocity‘ refers to the speed of generation of data and processing of data to be responsive to the needs of the customers. Big Data velocity deals with the speed at which data flows in from sources like business processes, application logs, networks, and social media sites, sensors, mobile devices, etc. The flow of data is massive and continuous.

Variability:

This refers to the inconsistency which can be shown by the data at times, thus hampering the process of being able to handle and manage the data effectively.

7. (a)

Five Steps involved in Strategic Planning Process are enumerated below:

(i) Select the corporate mission and major corporate goals

The first component of the strategic planning process is crafting the organisation‘s mission statement, which provides the framework or context within which strategies are formulated. A mission statement has four main components: a statement of its reason for existence (i.e. a mission); a statement of some desired future state, usually referred to as the vision; a statement of the key values that the organisation is committed to; and a statement of major goals.

(ii) Analyse the organisation's external competitive environment to identify opportunities and threats :

The second component of the strategic planning process is an analysis of the organisation's external operating environment. The essential purpose of the external analysis is to identify strategic opportunities and threats within the 9rganization's operating environment that will affect how it pursues its mission. Three interrelated environments should be examined: the industry environment in which the company operates, the country or national environment and the wider socioeconomic or macro environment.

(iii) Analyse the Organization's internal operating environment to identify the Organization's strengths and weaknesses :

Internal analysis, the third component of the strategic planning process, focuses on reviewing the resources, capabilities, and competencies of a Company. The goal is to identify the strengths and weaknesses of the company. The next component of strategic thinking requires the generation of a series of strategic alternatives, or choices of future strategies to pursue, given the company's internal strengths and weaknesses and its external opportunities and threats.

(iv) Select Strategies :

Managers select strategies that build on the organisation's strengths and correct its weaknesses in order to take advantage of external opportunities and counter external threats. In order to select the right strategies managers compare and contrast the various alternative possible strategies against each other and then identify the set of strategies that will create and sustain a competitive advantage. It is very important for the strategic managers to keep in mind that the strategies selected should be consistent with the mission and major goals of the organisation.

(v) Implement the strategies :

In order to achieve a competitive advantage and increase profitability managers must put those strategies selected into action. Strategy implementation involves taking actions at the functional, business, and corporate levels to execute a strategic plan.

7. (b)

Business environment exhibits many characteristics. Some of the important characteristics are as follows:

- **Environment is complex:**

  The business environment happens to be very complex as it comprises of a number of factors namely, events, conditions and influences arising from different sources interacting with each other to create entirely new sets of influences. It is indeed difficult to instantly say what factors constitute a given environment. Environment is a complex phenomenon and it is easier to understand it in segments or compartments rather than grasp in totality.

- **Environment is dynamic:**

  The changing nature of environment is a constant. The dynamism of the environment is largely due to large number of factors that continuously influences its character and shape.

- **Environment is Multi-faceted:**

  The perception of the observer is very important to determine the shape and character of three environment. Changes in the environment may be perceived differently by different individual. 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 the environment affect the organization in more ways than one. The very survival and existence of an organisation is critically dependent on its environment.

8. (a)

The Transnational has the following detailed Characteristics:

(i) Each national unit operates independently, but is a source of ideas and capabilities for the whole Corporation. For example, in Unilever, the centre for innovation in hair-care products worldwide is in France.

(ii) National units achieve greater scale economies through specialisation on behalf of the Whole Corporation, or at least large regions. Unilever in Europe has replaced its web of small national food manufacturing units with a few specialised larger factories that export its products to other European countries.

(iii) The corporate centre manages this global network by first establishing the role of each business unit, then sustaining the systems, relationships and culture to make the network of business units operate effectively. The success of a transnational corporation is dependent on the ability simultaneously to achieve global competences, local responsiveness and organisation wide innovation and learning.

(iv) Global business managers have the overriding responsibility to further the company‘s global competitiveness, which will cross both national and functional boundaries.

(v) Country or area managers have potentially a dual responsibility to other parts of the transnational. First, they must act as a sensor of local needs and feed these back to those responsible internationally for new products or services. Second, they should seek to build unique competences: that is, becomes a centre of excellence which allows them to be a contributor to the company as a whole, in manufacturing or research and development, for instance.

(vi) Functional managers such as finance or IT have a major responsibility for ensuring worldwide innovation and learning across the various parts of the organisation.

(vii) Corporate (head office) managers integrate these other roles and responsibilities. Not only are they the leaders, but they are also the talent spotters among business, country and functional managers, facilitating the interplay between them. For example, they must foster the processes of innovation and knowledge creation.

8. (b)

The following are some of the areas that have ability to create goal congruence:

(i) Communication and Understanding :

Channels of communication and how goals are perceived are important to achieve goal congruence. Operational managers have a responsibility of being aware as to what actions are desirable and what goals are to be achieved. It should be understood that the communication of different goals can occur through informal channels, which involves meetings and face to face interactions, or through formal channels including budgets or other financial documents.

(ii) Create direction :

One of the reasons for lack of goal congruence is the absence of direction related to employees‘ behaviour. Performance management and goals facilitate efficient communication about what managers want their subordinates to focus on. It needs no mention that providing clear information and direction, employees can better understand what is expected from them, how to perform adequately, and how to contribute effectively to the achievement of the organisational goals.

(iii) Motivation :

The problem of motivation can exist even though employees have knowledge about how to perform adequately because employees can act in their own self-interest instead of in the organisation‘s best interest. The employees can make their own performance report better by allocating resources without befitting the organisation as a whole. One of the strongest reasons for demotivation among employees and managers is dislike for the work allocated. The reason for motivation varies among employees. While some employees feel motivated for some recognition and appraisals others may feel motivated because of commitment and responsibility without any required pay off. The more motivated the employees of the organisation the better will be the goal congruence.

(iv) Incentives :

In order to increase the likelihood of employees working to acHfeve their individual goals, organisation‘s aim to influence motivation by providing incentives. Research suggests that individuals tend to perform better when they are rewarded. Rewards and compensations should create goal congruence between individual goals and organisational goals by stimulating individuals to perform by providing incentives, as rewards are related to increased effort.

(v) Connection :

It is very important to create a connection between goals, performance measures and incentives. In order to align the employees‘ self interest and overall organisational objectives it is necessary to relate incentives with performance. By linking incentives to certain goals, individuals tend to pay more attention to what is important.

INTERMEDIATE EXAMINATION

June 2025

P–9(OMSM)
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

This section contain Question No.1. All parts of this question are compulsory.

1. Choose the correct answer from the given alternatives (You may write only the Roman numeral and the Alphabet chosen for your answer): 2×15=30

(i) With reference to the operations of a manufacturing company, one of the important decisions is "Are we producing right things"? Which one of the following is related to this?

(A) Quality Management
(B) Inventory Management
(C) Maintenance Management
(D) Delivery Planning

(ii) Which one of the following is associated with the question "Where should each centre be located"?

(A) Process layout
(B) Facility layout
(C) Product Layout
(D) Plant Layout

(iii) 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

(iv) A steel plant has a design capacity of 50000 tons of steel per day, effective capacity of 40000 tons of steel per day and actual output of 36000 tons of steel per day. Compute the efficiency of the plant.

(A) 90 %

(B) 72 %

(C) 80 %

(D) 110 %

(v) The following item is being managed using a fixed time period model with safety stock:

Weekly demand (D)	50 units
Review Cycle (T)	3 Weeks
Safety Stock (SS)	30 units

What is the average inventory turn(s) for the item? (1 year = 52 weeks)

(A) 84.20 turns per year

(B) 24.76 turns per year

(C) 80.50 turns per year

(D) None of the above

(vi) The Quality Circles and use of work teams or quality improvement teams are the examples of

(A) Time Reduction

(B) Lean Production

(C) Worker Involvement

(D) Re-Engineering

(vii) The over capacity is preferred when

(A) the cost of creating the capacity is prohibitively high.

(B) fixed cost of the capacity is not very high.

(C) shortage of products does not affect the company.

(D) the technology changes fast.

(viii) _____ is about how people may be motivated to work together in more effective ways.

(A) Organisational behavior

(B) Strategic Leadership

(C) Emotional Intelligence

(D) Organisational Change

(ix) A _____ is a business unit in a growing market, but not yet with high market share.

(A) Cash Cow

(B) Dog

(C) Question Mark

(D) Star

(x) _____ is a form of paid advertising that allows marketing teams to essentially purchase traffic to their website.

(A) Influencer Marketing

(B) Affiliate Marketing

(C) Pay-per-click

(D) Content Marketing

(xi) In which one of the following stages of Design Thinking, the aim is "to identify the best possible solution for each problem found"?

(A) Prototype

(B) Define

(C) Test

(D) Ideate

(xii) In the scheduling function, if the Critical Ratio for a job is greater than 1, it implies that

(A) the job is behind the schedule.

(B) the job is ahead of schedule.

(C) the job is not started yet.

(D) the job is exactly on schedule.

(xiii) The ISO Standard associated with the "Quality Assurance in Production and Installation" is

(A) ISO 9001

(B) ISO 9002

(C) ISO 9003

(D) ISO 9004

(xiv) Which one of the following cannot be called a valid "Type" of Big Data?

(A) Structured Data

(B) Unstructured Data

(C) Meta Data

(D) Semi-Structured Data

(xv) The _____ refers to a set of managerial decisions and actions that determines the long-term performance of an organization.

(A) Organisational culture

(B) Strategic management

(C) Vision

(D) Mission

SECTION - B

Answer any five questions from Question No. 2 to Question No. 8.

Each question carries 14 marks. 14×5=70

2. (a) **Align** the major important decision areas under production and operations management. 7

(b) **Analyze** the three important tools which are used for increasing productivity in industry. 7

3. (a) "Production planning and Control is a very important aspect of Production Management"— In this context, **append** the basic six types of production control. 7

(b) RONP Ltd. manufactures two colour televisions "Model 2M3" and "Model 3SP4" in a variety of sizes, colours and component combinations. Identical colour TVS are produced in lots of 100. The projected demand, lot size and time standard are shown in the following table :

Particular	Model 2M3	Model 3SP4
Demand forecast (D)	6000 Units / year	12000 Units / year
Lot Size (Q)	100 Units	100 Units
Standard Processing time (P)	20 Hours / Unit	40 Hours / Unit
Standard Setup time (s)	2 Hours / LOT	3 Hours / LOT

The factory currently works 3 shifts, 8 hours a day, 5 days a week, 50 weeks a year. It operates 100 workstations, each producing one colour TV in the time shown in the above Table. The factory maintains a 19% Capacity cushion (C).
(ignore use of overtime works).

Required :

(i) **Analyze** and **Assess** how many workstations will be required next year to meet the expected demand without decreasing the Company's current capacity cushion.

(ii) **Assess** the number of additional workstations to be required to meet expected demand.

[Present calculation (NOs) upto nearest integer] 7

4. (a) TOXIN Ltd., a manufacturing company has five jobs (D, E, F, G and H) and four machines (M_1, M_2, M_3 and M_4).

These jobs can be processed on any four machines. Resulting times (hours) vary with assignment. The required time (in hours) for each job on machine are given in following table :

Machine: / Job	M_1	M_2	M_3	M_4
D	8	4	7	4
E	4	7	10	9
F	9	10	8	11
G	8	4	5	6
H	11	5	10	11

The manager (Production) of the company would like to assign the jobs so that total time is minimized.

Required :

Develop the optimal assignment of jobs to machines and assess the corresponding total time (in hours). 7

(b) MR. RATUN, a bakery shopkeeper sells confectionary items. Past data of demand per week in hundred kilograms with frequency is given as below :

Demand / Week	**0**	**5**	**10**	**15**	**20**	**25**
Frequency	8	16	4	15	5	2

The following two digit random numbers are to be used to generate the demand for 10 weeks.

Random Numbers	**27**	**63**	**79**	**35**	**86**	**58**
	38	67	95	52		–

Required :

(i) Using the given two digit random numbers, **simulate** the 10 weeks demand of confectionary items.

(ii) **Analyze** the average demand per week. 7

5. (a) GOPA BANDHU AUDITORIUM has been decorated with 1000 coloured light bulbs. The mortality rates of this type of bulbs have been observed pursuant to a systematic study as follows:

Month	**1**	**2**	**3**	**4**
Percent Bulbs failing by month end	**15**	**15**	**40**	**30**

It costs ₹ 100 to replace a fused bulb. However, if all bulbs are replaced together, it would cost ₹ 40 per bulb. The auditorium management is thinking to replace all bulbs at fixed interval, whether or not the bulbs are fused and also to continue replacing fused bulbs as when they get fused.

Required :

(i) **Analyze** the number of light bulbs to be replaced every month.

(ii) **Assess** the average monthly cost for individual replacement.

(iii) **Analyze** and identify at what periodicity the Management of Gopa Bandhu Auditorium should replace all the light bulbs.

(iv) **Recommend** which policy of the replacement would be economical. 7

(b) A Research and Development department of ZOBEX Ltd. is developing a power supply for console television set. The department has listed down the activities with its time in the project as under :

Activity and Identification		**Preceding activity**	**Normal Time (Days)**
A	(1 - 2)	-	16
B	(1 - 3)	-	20
C	(2 - 3)	A	8
D	(2 - 4)	A	10
E	(3 - 4)	B, C	6
F	(4 - 5)	D, E	12

Required :

(i) **Design** a PERT Network Diagram and indicate all paths through it.

(ii) **Analyze** the critical path of the project.

(iii) **Assess** the Minimum time (in days) for completion of the project.

(iv) **Analyze** and assess the Total Float, Free Float and Independent float available on each activity. 7

6. (a) "Strategic Management was associated with increasing focus on competition as the central characteristic of the business environment"— **In this context, append** the basic elements of Strategic Management. 7

(b) "Artificial Intelligence (AI) is intelligence exhibited by machines and systems"— **In this context, enumerate** the three levels of Artificial Intelligence (AI) and **analyze** the various contemporary concepts, namely, Machine Learning (ML), Deep Learning & Blockchain. 7

7. (a) "Porter' value chain describes the categories of activities within and around an organization".— With reference to this statement **align** the activities involved in value chain of an Organization. 7

(b) "Rockart has identified four major sources of Critical Success Factors"— **In this context examine**, the said four sources of critical success factors citing **examples**. 7

8. (a) **Analyze** the differences between Strategy formulation and Strategy implementation according to David (2005). 7

(b) **Align** the guidelines, a strategic manager should keep in mind while implementing proper strategic control. 7

P-9: OPERATIONS MANAGEMENT AND STRATEGIC MANAGEMENT

SUGGESTED ANSWERS

SECTION – A

1.

(i) (A)

(ii) (B)

(iii) (B)

(iv) (A)

(v) (B)

(vi) (C)

(vii) (B)

(viii) (A)

(ix) (C)

(x) (C)

(xi) (A)

(xii) (B)

(xiii) (B)

(xiv) (C)

(xv) (B)

SECTION – B

2. (a)

The Major important decision areas under production and operations Management are aligned below:

(i) Product Selection

(ii) Facility Location Selection

(iii) Demand Forecasting

(iv) Process selection & Layout decision

(v) Capacity planning

(vi) Aggregate Planning, Master production schedule

(vii) Materials Requirement Planning (MRP) / Manufacturing Resource Planning (MRP I) / Distribution Resource Planning (DRP) / Enterprise Resource Planning (ERP).

(viii) Inventory Management

(ix) Supplier Selection / Sourcing

(x) Process Management

(xi) Quality Management

(xii) Maintenance

(xiii) Warehousing / Transportation

(xiv) Reverse Logistics

In Addition, an operations manager is also responsible for working capital management, skill-management etc.

2. (b)

The three important tools used for increasing productivity in an organization are analyzed as under:

I. Human Aspects:

Under this, cooperation of workers is sought in the following ways:

(i) More workers participation in management or in decision making through joint consultation.

(ii) Improving communication services.

(iii) Improving mutual trust and cooperation through improved job procedures, better training of employees, more workers incentives by implementing various incentive schemes, and labour welfare programmes.

(iv) Better planning of work, more effective management, more democracy in administration, improved human relations and selection and training of personnel at various levels of management are some human efforts from the side of management in order to improve the productivity.

II. Supply of Inputs:

(i) Improvement in the nature and quality of raw materials and their supplies to the work.

(ii) Proper provision of plant, equipment and their maintenance.

(iii) Introduction of more and more machines and equipment in place of physical work.

(iv) Fuller utilization of manpower and efficiency or capacity of plant and equipment employed.

III. Technological Aspects:

Certain methodological and technological developments are also necessary to improve the productivity of the organisation. These are;

(i) Work, time and motion studies to determine better ways and means of doing a job.

(ii) Implementing various simplification, specialization and standardisation programmes.

(iii) Applying control techniques comprising of production, planning and control, cost control and quality control techniques.

(iv) Improving layout of plants, shops and machine tools, and material handling and internal transportation system.

(v) Improving inspection techniques so as to minimise the wastage and defective work.

3. (a)

The basic six types of Production Control are appended below:

(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.

(iii) Load control:

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

(iv) Order Control:

The most, common type of production control is called order control. This type of control is common 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. Thus, production control in batch-system of control operates with a set of production planning and Control in continuous production systems.

3. (b)

(i) The number of hours of operation per year (N):
= 3 x 8 x 5 x 50 = 6000 hours

Requirements of Workstations:

$$\frac{[DP+(D/Q)xS]+[DP+(D/Q)xS]}{N[1-C]}$$

$$= \frac{[6000\,x\,20+(6000/100)x2]+[12000\,x\,40+(12000/100)x3]}{6000\,(1-0.19)}$$

$$= \frac{(120000+120)+(480000+360)}{6000x\,0.81} = \frac{600480}{4860} = 123.56$$

i.e. 124 Workstations

(ii) Additional requirement of Workstations = 124 – 100 = 24 Workstations

4. (a)

Since the number of Jobs are not equal to the number of Machines, a dummy Machine M5 is created. The time (in hours) consumed by any Job for the dummy Machine M5 is 0.

Machine / Job	M_1	M_2	M_3	M_4	M_5
D	8	4	7	4	0
E	4	7	10	9	0
F	9	10	8	11	0
G	8	4	5	6	0
H	11	5	10	11	0

Column Operation

Machine / Job	M_1	M_2	M_3	M_4	M_5
D	~~4~~	~~0~~	~~2~~	~~0~~	~~0~~
E	~~0~~	~~3~~	~~5~~	~~5~~	~~0~~
F	5	6	3	7	0
G	~~4~~	~~0~~	~~0~~	~~2~~	~~0~~
H	7	1	5	7	0

Here minimum no. of Horizontal and vertical Straight lines to cover all the Zeros = 4 < order of Matrix (5), so, Solution is not optimal.

Subtract 1(minimum value) from every uncovered value and add 1 to every value at the intersection of two lines. Draw the number of lines to cover all Zeros.

Improved Matrix

Machine / Job	M_1	M_2	M_3	M_4	M_5
D	~~4~~	~~0~~	~~2~~	~~0~~	~~1~~
E	~~0~~	~~3~~	~~5~~	~~5~~	~~1~~
F	4	5	2	6	0
G	~~4~~	~~0~~	~~0~~	~~2~~	~~1~~
H	~~6~~	~~0~~	~~4~~	~~6~~	~~0~~

Here minimum no. of Horizontal and Vertical Straight lines to Cover all the Zeros = 5 order of Matrix.
So, the solution is optimal.

Hence the optimal assignment is made in the matrix below.

Machine / Job	M_1	M_2	M_3	M_4	M_5
D	4	0	2	[0]	1
E	[0]	3	5	5	1
F	4	5	2	6	[0]
G	4	0	[0]	2	1
H	6	[0]	4	6	0

The optimal assignment and corresponding Time are as follows:

Jobs	Machine	Time (in hours)
D	M_4	4
E	M_1	4
F	M_5 (Dummy)	0
G	M_3	5
H	M_2	5
		18

Minimum Time is 18 hours

4. (b):

(i) Random No. Range Table for Demand

Demand per week	Frequency	Probability	Cumulative Probability	Range
0	8	0.16	0.16	00 – 15
5	16	0.32	0.48	16 – 47
10	4	0.08	0.56	48 – 55
15	15	0.30	0.86	56 – 85
20	5	0.10	0.96	86 – 95
25	2	0.04	1	96 – 99
	$\sum f = 50$	1.00		

Simulated Values for next 10 weeks

Weeks	Random Nos.	Demand
1	27	5
2	63	15
3	79	15
4	35	5
5	86	20
6	58	15
7	38	5
8	67	15
9	95	20
10	52	10
	Total	125

(ii) Average Weekly Demand: 125 / 10 = 12.5 Hundred kg. /week

5. (a)

(i) Average number of light bulb to be replaced every month:
Mean time between failures = 0.15 x 1 + 0.15 x 2 + 0.4 x 3 + 0.3 x 4 =2.85 months

Avg. Nos. of bulb = $\frac{1000}{2.85} = 350.88$

(ii) Average monthly cost of individual replacement = 350.88 x 100 = ₦ 35088

(iii) Number of bulbs to be replaced every month:

Month	Bulbs to be replaced
1	1000 x 0.15 = 150
2	1000 x 0.15 + 150 x 0.15 = 172.50
3	1000 x 0.40 + 150 x 0.15 +172.50 x 0.15 = 448.38
4	1000 x 0.30 + 150 x 0.40 + 172.50 x 0.15 + 448.38 x 0.15 = 453.13

All bulbs to be replaced (Group Replacement):

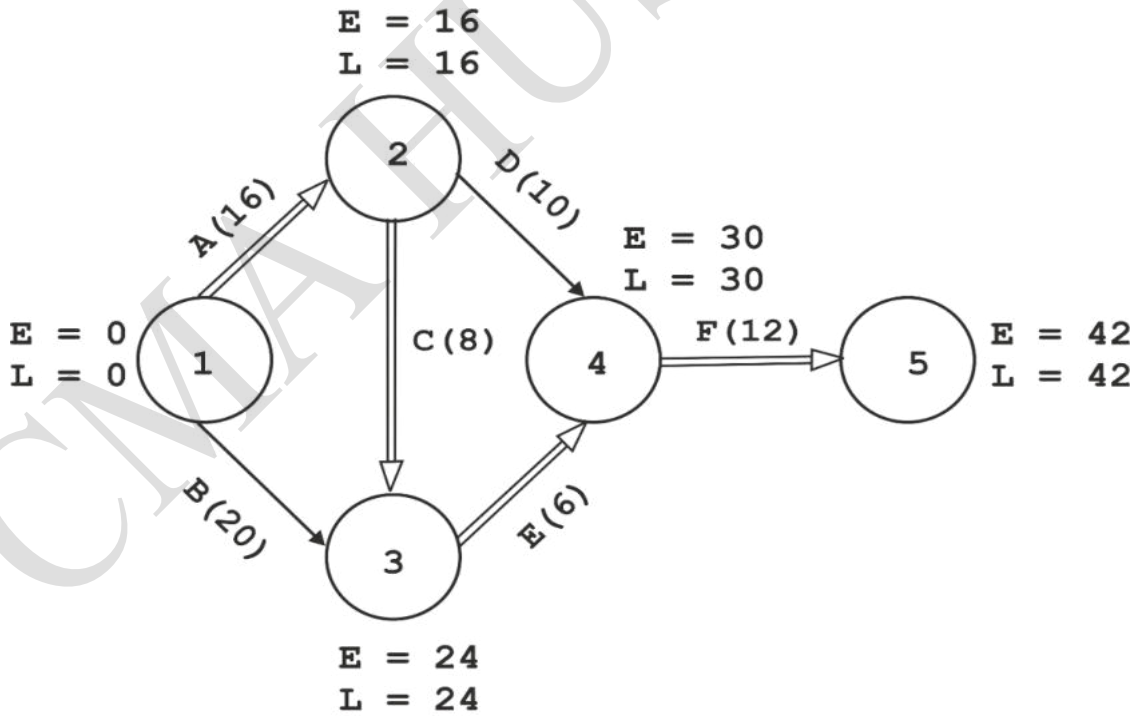
Month	Replacement Cost	Cumulative Replacement Cost	Group Replacement Cost	Total Cost	Average Monthly Cost
	(D)	(D)	(D)	(D)	(D)
1.	150 x 100 = 15000	15000	40000	55000	55000
2.	172.50 x 100 = 17250	32250	40000	72250	36125
3.	448.38 x 100 = 44838	77088	40000	117088	39029.33
4.	453.13x100 = 45313	122401	40000	162401	40600.25

Hence all bulbs to be replaced every two months as the average cost per month (36125) is minimum.

(iv) **RECOMMENDATION:**
Since cost of individual replacement is 35088 per month is less than Group (average monthly cost) the policy for individual replacement of bulbs as and when they fail will be economical.

5 (b):

(i)



NETWORK

(ii) Critical Path: A → C → E→ F (1 – 2 – 3 – 4 – 5)

(iii) Minimum Time (in days) for completion of the project is = (16 + 8 + 6 + 12) = 42 Days

(iv) Total float, free float and Independent float for each activity

Activity & Identification		Normal time (Days)	EST	EFT	LST	LFT	Total Float	Free Float	Independent Float
A	(1 – 2)	16	0	16	0	16	0	0	0
B	(1 – 3)	20	0	20	4	24	4	4	4
C	(2 – 3)	8	16	24	16	24	0	0	0
D	(2 – 4)	10	16	26	20	30	4	4	4
E	(3 – 4)	6	24	30	24	30	0	0	0
F	(4 – 5)	12	30	42	30	42	0	0	0

6. (a)

The Strategic Management Consists of four basic elements. The four basic elements are appended below:

(i) **Environmental scanning:**

It refers to the monitoring, evaluating and disseminating of information from the external and internal environments to key people within the organisation. The purpose is to identify the strategic factors both internal and external elements that will shape the future of the organisation. The range of methods and techniques available for environmental scanning is wide. There are formal and systematic techniques as well as intuitive methods available.

(ii) **Strategy Formulation:**

It refers to the development of long-range plans for the effective management of environmental opportunities and threats, in the light of corporate strengths and weaknesses (SWOT). It includes defining the mission, setting objectives, developing strategies and setting policy guidelines.

(iii) **Strategy Implementation:**

It is the process by which strategies and policies are put into practice though the development of programs, budgets and procedures. This includes day to day decisions in resource allocation and is typically conducted by the middle and lower-level managers with review by the top management. It involves taking actions at the functional, business and corporate levels to execute a strategic plan. Implementation include, for example, putting quality improvement programs changing the way product is designed.

(iv) **Evaluation and control:**

It involves the process through which organisational activities and performances are monitored. The actual performances are compared to the desired performances and corrective actions are taken to resolve problems. The process of evaluation and control helps to identify the weakness and lacunae of the previously implemented strategic plan and thereby, stimulates the entire process to begin again.

6. (b)

There are three Levels of Artificial Intelligence (AI)

(I) Narrow AI (II) General AI / human – Level AI and (III) Super AI

(I) Narrow AI:

Narrow AI refers to the current state-of-the-art with existing software that automates a traditionally human activity and often outperforms humans in efficiency and endurance in one specialized area, e.g., forecasting the weather, autonomous driving, etc.

(II) General Al / human-level AI:

General Al / human-level AI describes the capacity of machines to understand their environment and reason and act accordingly, just as a human would in all activities across all dimensions, including scientific creativity, general knowledge, and social skills.

(III) Super AI:

Super AI, the highest level of AI, is reached when AI becomes much smarter than the best human brains in practically every field.

Super AI systems can make deductions about unknown environments.

Analysis of Concepts Machine Learning (ML), Deep Learning and Block Chain:

(IV) Machine learning (ML):

describes automated learning of implicit properties of, or underlying rules for data. It is a major component for implementing AI since its output is used as the basis for recommendations, decisions, and feedback mechanisms with regards to a previously unknown situation.

ML is an approach to creating AI. As most AI systems today are ML-based, the terms are often used interchangeably – particularly in a business context.

ML involves training algorithms on sample input data to optimize its performance on a specific task so that the machine gains a new capability.

(V) Deep learning is a branch of AI:

It mainly deals with neural networks that consist of many layers, hence the name ''deep''. In the last years, deep neural networks have been the most successful AI approach in many areas.

(VI) Blockchain is a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network. An asset can be tangible (house, car, cash, land, etc.) or intangible (intellectual property, patents, copyrights, branding). Virtually anything of value can be tracked and traded on a blockchain network, reducing risk and cutting costs for all involved.

7. (a)

The activities involved in Porter's Value Chain can be broadly divided into two types namely, primary activities and secondary or support activities.

Primary activities are directly concerned with the creation or delivery of a product or service. For example, for a manufacturing organisation the primary activists are as follows:

(i) Inbound logistics are activities concerned with receiving; storing and distributing inputs to the product or service including materials handling, stock control, transport, etc.

(ii) Operations transform these inputs into the final product or service. Operations include machining, packaging, assembly, testing, etc.

(iii) Outbound logistics collect, store and distribute the product to customers, for example warehousing, materials handling, distribution, etc.

(iv) Marketing and sales provide the means whereby consumers / users are made aware of the product or service and are able to purchase it. This includes sales administration, advertising and selling.

(v) Service includes those activities that enhance or maintain the value of product or service, such as installation, repair, training and spares.

Support activities help to improve the effectiveness or efficiency of primary activities. The following are the support or secondary activities:

(i) Procurement: It refers to the processes that occur in many parts of the organisation for acquiring the various resource inputs to the primary activities.

(ii) Technology development: All value activities have a 'technology', even if it is just know-how. Technologies may be concerned directly with a product or with processes or with a particular resource.

(iii) **Human resource management:** This transcends all primary activities. It is concerned with those activities involved in recruiting, managing, training, developing and rewarding people within the organisation.

(iv) **Infrastructure:** The formal systems of planning, finance, quality control, information management, and the structures and routines that are part of an organisation's culture.

7. (b)

Rockart has identified four major sources of Critical Success Factors (CSFs) which are appended below:

(i) **Structure of the Industry:**

Some CSFs are specific to the structure of the industry for e.g., the extent of service support expected by the customers. Automobile companies have to invest in building a national network of authorizes service stations to ensure service delivery to their customers.

(ii) **Competitive strategy, industry position and geographic location:**

CSFs also arise from the above factors for e.g. the large pool of English- speaking manpower makes India an attractive location for outsourcing the BPO needs of American and British firms.

(iii) **Environmental Factors:**

CSFs may also arise out of general / business environment of a firm, like the deregulation of Indian industry. With the deregulation of telecommunication industry, many private companies had opportunities of growth.

(iv) **Temporal factors:**

Certain short-term organisational developments like sudden loss of critical manpower (like the charismatic CEO) or break-up of the family-owned business, may necessitate CSFs like 'appointment of a new CEO' or 'rebuilding the company image'. Temporarily such CSFs would remain CSFs till the time they are achieved.

In the process of developing alternatives, it may be useful to narrow down the range of options by identifying the more promising alternatives, in the light of the Critical Success Factor (CSFs). The options relevant to those factors may be analyzed along with a forecast of their outcome.

8 (a):

According to David (2005) the following are the differences between strategy formulation and strategy implementation:

Strategy Formulation	Strategy Implementation
It involves positioning forces before the action	It involves managing forces during the action.
The focus is on effectiveness.	The focus is one efficiency.
It is primarily an intellectual process.	It is primarily an operational process.
It requires good intuitive and analytical skills.	It requires motivation and leadership skills.
Requires coordination among few individuals.	Requires coordination among many individuals

8. (b)

The guidelines, a strategic Manager should keep in mind while implementing the proper strategic Control are aligned below:

(i) Control should involve only the minimum amount of information needed to give a reliable picture of events: Too many controls create confusion. Focus on the strategic factors by following Pareto's 80/20 rule: Monitor those 20% of the factors determines 80% of the results.

(ii) Control must be reasonable Frequent reporting and rapid reporting may frustrate control.

(iii) Controls do not work unless they are acceptable to those who apply them.

(iv) Controls should monitor only meaningful activities and results, regardless of measurement difficulty. If cooperation between divisions is important to corporate performance, some form of qualitative or quantitative measure should be established to monitor cooperation.

(v) Controls must be flexible to take care of changing circumstances.

(vi) Controls should be timely so that corrective action can be taken before it is too late: Steering controls, controls that monitor or measure the factors influencing performance, should be stressed so that advance notice of problems is given.

(vii) Long-term and short-term controls should be used: If only short-term measures are emphasized, a short-term managerial orientation is likely.

(viii) Controls should aim at pinpointing exceptions: Only activities or results that fall out- side a predetermined tolerance range should call for action.

(ix) Emphasize the reward of meeting or exceeding standards rather than punishment for failing to meet standards. Heavy punishment of failure typically results in go displacement. Managers will fudge reports and lobby for lower standards.

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