

**23-0009-AP TEST BOOKLET  
MANAGEMENT**

**Time Allowed: 3 hours**

**PAPER – II**

**Maximum Marks: 300**

**INSTRUCTIONS TO CANDIDATES**

*Read the instructions carefully before answering the questions: -*

1. This Test Booklet consists of **24(twenty four)** pages and has **75 (seventy-five)** items (questions).
2. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS BOOKLET **DOES NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
3. Please note that it is the candidate's responsibility to fill in the Roll Number and other required details carefully and without any omission or discrepancy at the appropriate places in the OMR Answer Sheet and the Separate Answer Booklet. Any omission/discrepancy will render the OMR Answer Sheet and the Separate Answer Booklet liable for rejection.
4. Do not write anything else on the OMR Answer Sheet except the required information. Before you proceed to mark in the OMR Answer Sheet, please ensure that you have filled in the required particulars as per given instructions.
5. Use only **Black Ball Point Pen** to fill the OMR Answer Sheet.
6. This Test Booklet is divided into 4 (four) parts – **Part – I, Part – II, Part - III and Part – IV.**
7. All three parts are **Compulsory.**
8. **Part-I consists of Multiple Choice-based Questions.** The answers to these questions have to be marked in the OMR Answer Sheet provided to you.
9. **Part-II, Part-III and Part-IV consist of Conventional Essay-type Questions.** The answers to these questions have to be written in the separate Answer Booklet provided to you.
10. In Part-I, each item (question) comprises of 04 (four) responses (answers). You are required to select the response which you want to mark on the OMR Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
11. After you have completed filling in all your responses on the OMR Answer Sheet and the Answer Booklet(s) and the examination has concluded, you should hand over to the Invigilator **only the OMR Answer Sheet and the Answer Booklet(s).** You are permitted to take the Test Booklet with you.
12. **Penalty for wrong answers in Multiple Choice-based Questions:**  
THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE.
  - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third** of the marks assigned to the question will be deducted as penalty.
  - (ii) If a candidate gives more than one answer, it will be treated as a wrong answer even if one of the given answers happens to be correct and there will be same penalty as above to the question.
  - (iii) If a question is left blank. i.e., no answer is given by the candidate, there will be **no penalty** for that question.

**PART - I**  
**(Multiple Choice-based Questions)**

**Instructions for Questions 1 to 50:**

- Choose the correct answers for the following questions.
- Each question carries 3 marks.

**[3x50=150]**

1. If the regression coefficient of the independent variable in a simple regression equation is negative, then which of the following statement is correct?
  - (a) The coefficient of correlation between the variables is zero.
  - (b) The coefficient of correlation between the variables is the positive square root of the coefficient of determination.
  - (c) The coefficient of correlation between the variables is the negative square root of the coefficient of determination.
  - (d) None of the above.
2. Examine the following statements and answer choose the correct answer using the codes given below:
  - (i) In PERT, it is assumed that the activity times follow the beta distribution
  - (ii) In CPM, two time and cost estimates are made for each activity, which are called the optimistic and pessimistic estimates
  - (iii) Time is the only variable used in PERT
  - (iv) While in PERT the emphasis is on event, in CPM the emphasis is on activity

**Codes:**

- (a) All of the above are true
- (b) While (i) and (ii) are false, (iii) and (iv) are true
- (c) Only (i), (iii) and (iv) are true
- (d) All of the above are false

3. Match List - I with List – II with the help of the given codes:

<u>List-I</u>		<u>List-II</u>
(i) Wealth of Nations	I	Robert Giffen
(ii) Income and Substitution effect	II	Paul M. Sweezy
(iii) Kinked Demand Curve	III	Cobb-Douglas
(iv) Production function	IV	Adam Smith

**Codes:**

- |     |     |      |       |      |
|-----|-----|------|-------|------|
|     | (i) | (ii) | (iii) | (iv) |
| (a) | IV  | II   | I     | III  |
| (b) | IV  | I    | III   | II   |
| (c) | IV  | II   | III   | I    |
| (d) | IV  | I    | II    | III  |

4. Taylor differential piece rate system is related to-

- (a) Time wage system
- (b) Piece wage system
- (c) Incentive wage system
- (d) None of the above

5. When the sum of exponents exceeds one ( $a+b>1$ ) in the Cobb-Douglas production function, it causes which one of the following?

- (a) Constant return to scale
- (b) Increasing return to scale
- (c) Decreasing return to scale
- (d) Variable return to scale

6. Attributes or benefits that consumers strongly associate with a brand, positively evaluate, and believe they could not find to the same extent with a competitive brand is known as -

- (a) Competitive points-of-parity
- (b) Relational points-of-parity
- (c) Correlational points-of-parity
- (d) Points-of-difference

7. Match the items of List I with List II and select the correct code:

**List-I**

**List-II**

- |   |                       |       |  |
|---|-----------------------|-------|--|
| a | H.M.L. classification | (i)   | To determine the criticality of an item and its effect on production and other services. It is specially used for classification of spare parts. |
| b | V.E.D. classification | (ii)  | Based on the pattern of issues from stores and is useful in controlling obsolescence and helpful in identifying active items and surplus items.  |
| c | SDE classification    | (iii) | The classification unit value is the criterion and not the annual consumption.   |
| d | FSN classification    | (iv)  | Based on problems faced in procurements, availability of items and useful in the context of scarcity of supply.                                  |

**Codes:**

- |     | a     | b     | c    | d     |
|-----|-------|-------|------|-------|
| (a) | (ii)  | (iii) | (iv) | (i)   |
| (b) | (iv)  | (i)   | (ii) | (iii) |
| (c) | (ii)  | (iv)  | (i)  | (iii) |
| (d) | (iii) | (i)   | (iv) | (ii)  |

8. A positioning strategy should include the following strategies *except* -

- (a) Product strategy
- (b) Personnel strategy
- (c) Promotion strategy
- (d) Advertising strategy

9. Currency swap is a method of -

- (a) Hedging against foreign exchange risk
- (b) Speculation in foreign exchange
- (c) Leverage instrument used by cooperative banks
- (d) Mode of payment in international trade

10. Bath tub curve is encountered in -

- (a) Process control
- (b) Acceptance sampling
- (c) Both a and b
- (d) Maintenance management

11. From the following statements, identify the *correct* answer -

**Statement I:** The chi-square and 't' distributions are always symmetrical distributions.

**Statement II:** If sample sizes are large enough, the assumption that "the samples are drawn from a normal population" can be discarded with ANOVA testing.

**Codes:**

- (a) Both the Statements I and II are correct.
- (b) Statement I is correct, but Statement II is wrong.
- (c) Statement II is correct, but Statement I is wrong.
- (d) Both the Statements I and II are wrong.

12. For years Converse had a major share in the athletic shoe market. Then, in the 1980's, Nike and Reebok re-invented the athletic shoe industry and Converse changed nothing. Now Converse is a minor brand in growth industry. According to the BCG matrix, Converse is an example of -

- (a) Cash Cow
- (b) Dog
- (c) Star
- (d) Question mark

13. A machine on the average produces 5% defective items. What are the mean and variance in a set of 32 items?

- (a) 16, 8
- (b) 16, 4
- (c) 4, 16
- (d) None of the above

14. Indicate the correct code matching the items of List – I with those in List – II: -

**List – I**

**List – II**

- |   |                               |     |   |
|---|-------------------------------|-----|---|
| a | Resorting to New Technology   |     | Cost reduction through output expansion |
| b | Excess Capacity of the Plant  | ii  | Constant cost despite output expansion  |
| c | Employees' Training Centres   | iii | Internal Economies                      |
| d | Reserve Capacity of the Plant | iv  | External Economies                      |

**Codes:**

- |     | a   | b   | c   | d   |
|-----|-----|-----|-----|-----|
| (a) |     | iii | ii  | iv  |
| (b) | iii | i   | iv  | ii  |
| (c) | iv  | ii  | i   | iii |
| (d) | ii  | iv  | iii |     |

15. Which among the following components is calculated as the sum of the fixed costs that happen each time an item is ordered?

- (a) Carrying cost
- (b) Order cost
- (c) Holding cost
- (d) Storing cost

16. For estimating an equation to be a perfect estimator of the dependent variable, which of the following is *true*?

- (i) The standard error of the estimate is zero.
- (ii) All the data points are on the regression line.
- (iii) The co-efficient of determination is (–1).

**Codes:**

- (a) (i) and (ii)
- (b) (ii) and (iii)
- (c) (i) and (iii)
- (d) (i), (ii) and (iii)

17. The arrival rate of customers at a service window of a cinema hall follows a probability distribution with a mean rate of 45 per hour. If the service rate of the clerk follows Poisson distribution with a mean of 60 per hour, what is the probability of having no customer in the system?

- (a) 0.75
- (b) 0.60
- (c) 0.25
- (d) 0.45

18. Which of the following is true about India Trade Policy (Export-Import), 2015-2019?

- (a) Doubling the exports (both merchandise and services)
- (b) Achieving 3.5% share in global exports
- (c) Introduction to new schemes (MEIS and SEIS)
- (d) Introduced simplified Aayat-Niryat form

**Codes:**

- (a) (a) and (b) only
- (b) (a) and (c) only
- (c) (a), (b) and (c) only
- (d) All are correct

19. If the equation  $y = 5 + 0.6x$  is graphed, the -

- (a) Slope would be  $-5$
- (b) Vertical intercept would be  $+0.6$
- (c) Slope would be  $+5$
- (d) Slope would be  $+0.6$

20. Indicate what is *not* correct in the context of Consumer Protection Act, 1986.

- (a) No complaint can be entertained in respect of a product purchased more than 2 years back.
- (b) A complaint against medical negligence can be filed by legal heir or representative of the deceased.
- (c) A complaint involving a claim of Rs. 1 crore is to be filed before the State Commission.
- (d) Both (a) and (c)

21. Forming a fixed opinion or attitude towards a single person or object is termed as -

- (a) Perceptual defence
- (b) Stereo typing
- (c) The halo effect
- (d) The perceptual set

22. Cars are parked in a very big parking lot. A researcher is required to estimate the proportion of cars that are red or the proportion of cars that are from a Japanese manufacturer. Which of the following statement is *not* correct?

- (a) A convenience sample of cars parked near the gate may give a biased estimate of the proportion of cars which are from a Japanese Manufacturer.
- (b) Different investigators may get different estimates for the proportion of cars that are not red.
- (c) The sample proportion of cars that are red is an unbiased estimate of the population proportion if the sampling method is simple random.
- (d) A sample of 100 cars in a convenience sample is always better than a sample of 20 cars from a proper random sampling method

23. Match the following:

- |   |                 |   |  |
|---|-----------------|---|--|
| a | Stability       | 1 | Number of subordinates that report to one supervisor.                                  |
| b | Strategy        | 2 | The whole is greater than the sum of its parts.  |
| c | Synergy         | 3 | Plans for the allocation of firm's scarce resources to reach identified goals in time. |
| d | Span of Control | 4 | Employees should not be moved frequently from one job to another                       |

**Codes :**

- |     | a | b | c | d |
|-----|---|---|---|---|
| (a) | 4 | 3 | 2 | 1 |
| (b) | 3 | 4 | 1 | 2 |
| (c) | 2 | 3 | 4 | 1 |
| (d) | 1 | 2 | 3 | 4 |

24. Which one of the following is a disadvantage of having expatriate employees to staff international subsidiaries?

- (a) Brings cultural similarities with parent company.
- (b) Gives employees a multinational cultural orientation.
- (c) Attempts to establish a foreign culture to the company.
- (d) Provides broader global perspective.

25. When does horizontal integration occur?

- (a) When a firm acquires or merges with a major competitor
- (b) When a firm acquires or merges with an unrelated business
- (c) When a firm acquires or merges with a distributor
- (d) When a firm acquires or merges with a supplier firm

26. Examine the given Assertion and Reason and answer using the codes given below:

**Assertion (A):** One of the trends to build a sustainable competitive advantage is "innovations" and "innovation management".

**Reasoning (R):** Human Resource Management has to be able to connect innovations with the traditional change management to design a true powerful weapon against competitors in the market.

**Codes:**

- (a) Both (A) and (R) are correct; and (R) is the right explanation of (A).
- (b) Both (A) and (R) are correct; but (R) is not the right explanation of (A).
- (c) (A) is correct but (R) is incorrect.
- (d) (R) is correct but (A) is incorrect.

27. Distributive bargaining can be explained as -

- (a) Bargaining wherein both parties are willing to negotiate over wages, hours and conditions of employment.
- (b) Bargaining that focuses on convincing the other party that the cost of disagreeing with the proposed terms would be very high.
- (c) Bargaining that focuses on convincing the other party that the benefits of agreeing with the proposed terms would be very high.
- (d) None of the above.

28. Which of these is Foreign Direct Investment?

- (a) Tangible goods
- (b) Intangible goods
- (c) Intellectual properties
- (d) Human resources

29. If the minimum stock level and average stock level of Material A are 4000 and 9000 units respectively, what is the reorder quantity?

- (a) 8,000 units
- (b) 10,000 units
- (c) 11,000 units
- (d) 9,000 units

30. "The difference between the forward rate and the spot rate is just enough to offset the difference between the interest rate in the two currencies." This concept is known as -

- (a) Purchasing power parity
- (b) Fisher effect
- (c) Interest rate parity
- (d) International Fisher effect

31. Which of the following schemes is not a part of India's Foreign Trade Policy 2009-14?

- (a) DFIA (Duty-Free Import Authorization)
- (b) TFITES (Tax-Free IT Export Scheme)
- (c) VKGUY (Vishesh Krishi and Gram Udyog Yojana)
- (d) FMS (Focus-Market Scheme)



32. Which of the following conditions is *true* about determinants and strengths of positioning strategy?
- There should be competition warranting positioning.
  - The market segment to be served should be sizeable and profitable.
  - The market segment should be able to effectively receive communication messages transmitted by the company.
  - All of these.
33. Two statements are given below relating to the consumer brand selection model.
- Statement I:** As per disjunctive decision rule, consumers set a minimum acceptable cut off level for each attribute and choose the first alternative that meets the minimum standard for all selected attributes.
- Statement II:** As per lexicographic decision rule, consumers choose the best brand on the basis of its perceived most important attribute.
- Choose the correct option about the statements from the options given below:**
- Statement I alone is correct.
  - Statement II alone is correct.
  - Both statements are correct.
  - Both statements are wrong.
34. According to India's FDI policy, 100 percent FDI in equity *via* the automatic method is not permitted in which of the following areas?
- Maintenance and repair organization
  - Private security agencies
  - Industrial Park
  - Construction development project
35. Arrange the following steps of Dispute Settlement Mechanism under the WTO in the systematic order:
- |       |                   |
|-------|-------------------|
| (i)   | Panel Proceedings |
| (ii)  | Appellate Body    |
| (iii) | Consultations     |
| (iv)  | Compliance Panel  |
| (v)   | Arbitration Panel |
- Codes:**
- iii i ii iv v
  - v iv iii ii i
  - iv ii iii v i
  - i ii iii iv v

36. From the following statements, identify the *correct* answer:

**Statement I:** One of the key factors impacting Production Managers is that the country's borders no longer provide protection from foreign imports due to globalization.

**Statement II:** To succeed in global competition, Production Management team of Companies must make a commitment to innovate products and services with high quality at low prices.

- (a) Both the statements are incorrect.
- (b) Statement I is correct, but II is incorrect.
- (c) Statement I is incorrect, but II is correct.
- (d) Both statements are correct.

37. Coefficient of determination (R-squared) indicates-

- (a) Percentage of variation in the dependent variable that can be explained by independent variable.
- (b) Percentage of variation in the dependent variable that cannot be explained by independent variable.
- (c) Percentage variation in the independent variable that can be explained by dependent variable.
- (d) Percentage variation in the independent variable that cannot be explained by the dependent variable.

38. Edwards Deming, one of the Quality Gurus, introduced a concept of cycle for continuous improvement of quality. This cycle consists of (i) Act (ii) Plan (iii) Do (iv) Check. **The correct order of this cycle of activities is -**

- (a) (i), (iii), (iv), (ii)
- (b) (ii), (iv), (iii), (i)
- (c) (ii), (iii), (iv), (i)
- (d) (i), (ii), (iii), (iv)

39. The practice of delaying receipts from the foreign currency designated receivables whose currencies are likely to appreciate and delaying foreign currency designated payables whose currencies are likely to depreciate is known as -

- (a) Leading
- (b) Netting
- (c) Lagging
- (d) Risk hedging

40. From the following statements, identify the *correct* answer:

**Statement 1:** The IE Matrix is similar to the BCG Matrix in that both tools involve plotting organisation divisions in a schematic diagram.

**Statement 2:** The BCG Matrix requires more information about the divisions than the IE Matrix.

- (a) Statements 1 and 2 both are correct.
- (b) Statements 1 and 2 both are incorrect.
- (c) Statement 1 is correct, but statement 2 is incorrect.
- (d) Statement 1 is incorrect, but statement 2 is correct.

41. Match the following :

<u>List-I</u>		<u>List-II</u>	
a	Individual within (Psychological)	1	Interpretations that third parties make regarding contractual terms.
b	Group within (Normative)	2	Broad beliefs and obligations associated with society's culture.
c	Individual outside (implied)	3	Beliefs that individuals hold, regarding promises made, accepted and relied on between and another themselves.
d	Group outside (Social)	4	The shared psychological contract that emerges when members of a social group/organization/work unit hold.

**Codes:**

	a	b	c	d
(a)	1	2	3	4
(b)	3	4	1	2
(c)	2	3	4	1
(d)	4	3	2	1

42. The exchange rate between the currencies of two countries will be equal to the ratio of the price indices in these countries is explained by \_\_\_\_\_

- (a) Inflation parity
- (b) Purchase power parity
- (c) Interest rate parity
- (d) Transaction parity

43. The following are the two statements relating to the theory of probability. Indicate the statements being correct or incorrect using the given codes.

**Statement (I):** The probability of the joint occurrence of independent events A and B is equal to the probability of A multiplied by the probability of B or vice versa.

**Statement (II):** The probability of the joint occurrence of independent event A and dependent event B is equal to the probability of event A multiplied by the conditional probability of B when A has occurred or vice versa.

**Codes:**

- (a) Both the statements are correct.
- (b) Both the statements are incorrect.
- (c) Statement (I) is correct while Statement (II) is incorrect.
- (d) Statement (I) is incorrect while Statement (II) is correct.

44. Identify the decision-support system(s) with the help of given codes:

- (i) Status inquiry system
- (ii) Data analysis system
- (iii) Accounting system
- (iv) Information system

**Codes:**

- (a) i, ii and iii
- (b) ii, iii and iv
- (c) only iii
- (d) i, ii, iii and iv

45. Which of the following is the first step in SDLC (System Development management life-cycle) framework?

- (a) Feasibility Study
- (b) Requirement Gathering
- (c) Communication
- (d) System Analysis

46. Complete the following DSS model



- (a) Output
- (b) Process
- (c) Database
- (d) None of the mentioned above

47. What is the most frequent internal motive for a strategic alliance?

- (a) Resource need
- (b) Risk limitation
- (c) Cost minimization
- (d) Current poor performance

48. 'VAT' is imposed -

- (a) Directly on consumers
- (b) On the first stage of production
- (c) On all the stages between production and sale
- (d) On the final stage of production

49. Examine the given Assertion and Reason and answer using the codes given below:

**Assertion (A):** The main reason for companies to move to global markets is to take advantages of the economies of scope.

**Reasoning (R):** Economies of production arise due to the Competitiveness index of the country in which the companies produce.

**Codes:**

- (a) Both (A) and (R) are correct, and (R) is the right explanation of (A).
- (b) Both (A) and (R) are correct, but (R) is not the right explanation of (A).
- (c) (A) is correct, but (R) is not correct.
- (d) (R) is correct, but (A) is not correct.

50. A joint venture is likely to be more attractive than an acquisition in which of the following scenarios?

- (a) Horizontal integration
- (b) Vertical integration
- (c) New market entry
- (d) Larger resource pool

## PART – II

### (Short Answer-type Questions)

**Instructions for Questions 51 to 63:**

- *Write the answers in short for any 10 (TEN) out of the thirteen questions.*
- *Each question carries 5 marks.* **[5x10=50]**

51. Why should managers consider a technology road map before buying a technology?
52. How are management information systems different from transaction processing systems?
53. “The difference of factor endowments among the nations is the basis of international trade.” Explain.
54. How do trade blocks function? Illustrate with an example.
55. In a survey of 200 girls of which 40% were intelligent, 30% had uneducated fathers, while 20% of the unintelligent girls had educated fathers. Do these figures support the hypothesis that the educated fathers have intelligent girls? Test at 5% level of significance.
56. What is ‘Statistical Decision Theory’?
57. A newly constructed house can collapse due to fault in its design. It can also collapse even if it does not have a design fault. The probability that the design of the newly constructed house is faulty is 0.1. The probability that this house collapses if the design is faulty is 0.95, whereas, the probability that the house collapses without any fault in design is 0.45. It is seen that the house has collapsed. What is the probability that it is due to fault in design?
58. Explain the concept of product design and development and its characteristics.
59. Write a short note on **any one** of the following -
  - (a) Chamber of Commerce
  - (b) Business Association
60. Explain the various types of business combinations.
61. What are the stages of Activity Based Costing?
62. Bring out the difference between Target Costing v/s Kaizen Costing.
63. Explain the problem of overhead absorption in the traditional system.

**PART - III**  
**(Long Answer-type Questions)**

**Instructions for Questions 64 to 71:**

- **Answer any 5 (FIVE) out of the eight questions.**
- **Each question carries 10 marks.**

**[10x5=50]**

64. Suppose a simple random sample of size  $n = 36$  is obtained from a population that is skewed right with  $\mu = 89$  and  $\sigma = 12$ .
- (a) Describe the sampling distribution of  $\bar{x}$ .
  - (b) What is  $P(\bar{x} > 91.3)$ ?
  - (c) What is  $P(\bar{x} < 84)$ ?
65. Explain the term 'Margin of Safety' and 'Angle of incident'. How is it related to break even analysis?
66. "The difference between management of manufacturing (goods) and service operations is reducing." Discuss this statement in the light of the fundamental differences existing between goods and service operations.
67. How do information systems help businesses use synergies, core competencies and network-based strategies to achieve competitive advantages?
68. Take the case of Hindustan Unilever Limited (HUL). Assume that HUL emphasizes on sustainability in its products and operations at global level. Are you in agreement that the company is successful because it could effectively embed sustainability into its products and operations? Give your arguments for or against the issue.
69. Critically examine the various initiatives taken by the Government of India in respect of export-import policy. Give examples from India's trade with the African countries.
70. In the context of State participation in business, the government efforts to make business and commerce easy have been widely acknowledged. The next frontier on ease of doing business is addressing pendency, delays and backlogs in appellate and judicial areas. Suggest ways to address the "law's delay" and boost the economy.
71. The services of Mr. MacMohan and a number of his co-workers were terminated when the company in which he was working as Operations Manager took a decision to downsize the company. In the recent past, the company has improved its functioning, customer orders were increasing and quality and productivity had improved dramatically from what they had been only a few years earlier due companywide quality improvement program. Therefore, it was very shocking to Mr. MacMohan and his co-workers who were terminated. Unable to find any job, and due to financial issues, Mr. MacMohan decided to go into business for himself taking care of neighbourhood lawns.



At first, business was a little slow, but once people realized Mr. MacMohan was available, many asked him to take care of their lawns. Some people were simply glad to turn the work over to him; others switched from professional lawn care services. By the end of his first year in business, Mr. MacMohan knew that he could earn a living this way. He also performed other services such as fertilizing lawns, weeding gardens, and trimming shrubbery. Business became so good that Mr. MacMohan hired ten part-time workers to assist him and he believed he could even expand further if he wanted to.

What are some of the trade-offs that Mr. MacMohan probably considered relative to -

- a. Working for a company instead of for himself?
- b. Expanding the business?

#### PART - IV (Essay-type Questions)

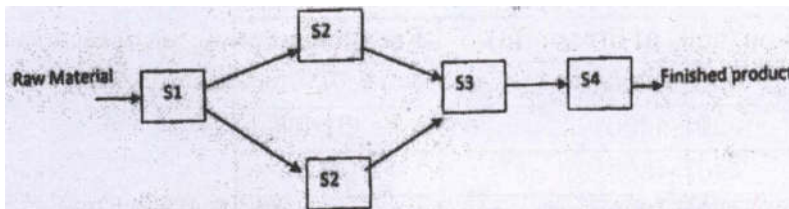
**Instructions for Questions 72 to 75:**

- Answer any 2 (TWO) out of the four questions.
- Each question carries 25 marks.

**[25x2= 50]**

**72. There are two parts to this question. You are required to attempt both parts.**

- A. Consider a production process given below involving, processing in four workstations S1, S2, S3, S4. The processing time for processing one unit of product in each of the workstations is given in table below. You can ignore the move time between the workstations. As shown in the figure, 2 units of S2 are available



Workstation	S1	S2	S3	S4
Processing Time (in mins)	10	16	12	6

1. How many units are produced in an 8-hour day?
  2. If the processing time in S3 is reduced to 8 minutes, will there be any reduction in work process? Why?
- B. A fast food outlet stocks frozen pizzas in a refrigerated display case. The average daily demand for the pizzas is normally distributed with a mean of 8 pizzas and a standard deviation of 2.5 pizzas. The outlet operates for 300 days in a year. A vendor for packaged food distributor checks the market's inventory of frozen foods every 10 days. The lead time to receive the order is 3 days. If the purchase cost of one pizza is Rs. 300, the cost of placing an order for pizza is Rs. 200, what will be the optimal order quantity? What will be the reorder point with a lead time of 3 days and service level of 99%?



**73. There are two parts to this question. You are required to attempt both parts.**

A. "JIT is not for India. We have poor supplier reliability; country is so vast that to get some parts here in Gurgaon, I have to source it all the way from Thane down south. How can I achieve JIT in such a context? Impossible! And ... then we have a pathetic logistics system. Truck owners take you for ransom once your load is with them. I expect an item in 6 days and get it in 16 days and you suggest JIT to me ... I tried it once and my clients got their orders at least a month late." These were some words spoken to you, a JIT (Just in Time) consultant by a machine tool manufacturer located in North India.

- a) Do you think JIT is feasible in his plant? The machine tools are generally made to order and order fulfilment time is around 2-3 weeks. The assembly takes a maximum of 3 days. There are around 20 major parts for the product.
- (b) What are the aspects you have to concentrate on to ensure JIT's success?
- (c) What structural modifications do you suggest in this case? State your assumptions clearly and prepare a proposal indicating the methodology you would adopt to implement JIT (if you decide in favour) or a proposal why JIT cannot be implemented (if you decide against it).

B. Prior to construction of a dam on a river, the organization entrusted with the task of construction of the dam performed a series of tests to measure the water flow past the proposed location of the dam. The results of the tests were used to construct data shown in the Table below. Compute the mean, standard deviation and the coefficient of variation of the river flow in litres per minute. What portion of the water flow occurs at less than 5200 litres per minute?

**Table: Results of Test**

<b>River Flow (000s of litres/min)</b>	<b>Frequency</b>
4001-4200	7
4201-4400	21
4401-4600	32
4601-4800	49
4801-5000	58
5001-5200	41
5201-5400	27
5401-5600	11

**74. There are two parts to this question. You are required to attempt both parts.**

- (i) Company 'A' is a leader in creating online auctions for buyers of industrial parts, raw materials, commodities and service around the globe. The company has created auctions for goods and services for hundreds of industrial product categories. It auctions more than Rs. 500 crores worth of purchase orders a year and saves buyers an estimated 2 to 25% of total expenses. The company operates two types of market places. First, the company helps the customers purchase goods and services through its global B2B market place where reverse auctions usually take place. Second, the company helps companies improve their asset recovery results by getting timely market prices for surplus assets through the company's Asset Exchange, employing a forward auction process, as well as other selling models. The company's Onsite Auctions include: (1) asset disposal recovery and (2) sourcing (e-procurement) functions. These functions provide: Assets disposal analysis; detailed sales offering; Targeted market outreach; Event coordination and Sales implementation. The company helped several companies make asset recoveries. For example, QR Corporation needed a channel for end of life, old models and refurbished power protection products. These were difficult to sell in regular distribution channels. Before using auctions, the company used special liquidation sales, which were not very successful. Company A deployed the auction site and helped QR Corporation determine the auction strategies (such as starting bid price and auction running length), which were facilitated by Decision Support System modelling. The site became an immediate success.
- (a) What makes company 'A' different from other online B2B portal for online auction?
- (b) Discuss in detail the technological considerations in designing such portals.
- (c) Why does company 'A' concentrate on asset recovery and on e-procurement?
- (ii) Three models of a product, namely A, B, C are to be supplied by a manufacturing factory to a distribution centre. Since the product is shipped by sea, it takes 2 months transportation time for the product to reach the distribution centre from the factory. The means and standard deviations of annual demand for the three models are given in Table below. The manufacturing cost of each model in the factory is Rs. 20,000 per unit. The manufacturing cost of the generic, non-customized product is also Rs. 20,000 per unit. The inventory carrying cost is Rs. 0.24/Re. /Year. The company would like to provide a service level of 99% for each of the models at the distribution centre. The company is weighing two options:

**Option 1:** Make each model in the factory and ship to distribution centre.

**Option 2:** Build the generic product in the factory and customize the models at the distribution centre to make each of the three models.

- (a) Calculate the safety stocks to be provided under each option and their corresponding total annual inventory carrying costs.
- (b) Upto how much amount per year can the company spend in customizing the models at the distribution centre?

Annual Demand Data for Three Models		
Model	Mean Annual Demand, Units	Standard Deviation of Annual Demand, Units
A	20,00,000	200000
B	10,00,000	150000
C	40,00,000	200000

**75. There are two parts to this question. You are required to attempt both parts.**

A. Vanguard's decision support system software is used by thousands of companies for enterprise decision analysis. The software makes it possible to apply decision analysis techniques throughout an organization to problems ranging from simple projects to enterprise-wide strategic plans. The Vanguard System is a comprehensive business solution for improving the quality, reliability, and speed of management decisions. It does this by helping collaborate with colleagues on important plans, analyze alternatives using state-of-the-art modelling and simulation techniques, automate routine decisions using expert system technology, and improve overall management effectiveness by adding structure to a normally chaotic process. Vanguard's collaboration abilities go well beyond simple communication strategies like Web conferencing. Rather, Vanguard is based on principles of knowledge capture. The Vanguard System can combine the knowledge captured by many individuals to create a Collective Intelligence that is useful for testing business plans and automating routine operations. Vanguard combines all of the most powerful and essential quantitative methods in management with features of spreadsheets, artificial intelligence tools, and math applications to produce an advanced business modelling system. Vanguard improves the speed, reliability, and quality of routine decisions by combining its business modelling capabilities with Expert System technology. Vanguard has the potential to transform business by improving management team decisions rather than simply analyzing operational data. Vanguard supports a wide variety of methods for integrating data and it can connect to virtually any business system, e.g. Support for Customizable Functions, etc.

- (a) Identify the main capabilities of the DSS software from the narrative.
- (b) Why should DSS support data integration as mentioned?
- (c) The Vanguard System has been dubbed also as a KMS and an Expert System. Why do you think a DSS should also be a KMS and an Expert system?

B. The Director of continuing education at SUV University has just approved the planning of a sales seminar. His administrative assistant has identified various activities and their relationships to each other. In view of the uncertainty involved in planning the seminar, the assistant has provided three time estimates (in days) for each activity, namely; pessimistic time (b), optimistic time (a) and most likely time (m). Three activities—

1. Design brochure and course announcement (5, 7, 8);
2. Identify prospective teachers (6, 8, 12);
3. Prepare detailed outline (3, 4, 5) can start without any other activity being completed.

Activity 4. Send brochure and student applications (11, 17, 25) can start after activity 1 has been completed.

Activity 5. Send teacher applications (8, 10, 12) depends on the completion of activity 2.

Activity 6. Select teacher for the seminar (3, 4, 5) can start after activities 3 and 5 are complete.

Activity 7. Accept students (4, 8, 9) depends on the completion of Activity 4. Activity

8. Select text (5, 7, 9) depends on completion of Activity 6.

Activity 9. Order and receive texts (8, 11, 17) can start after activities 7 and 8 have been completed.

Activity 10. Prepare room for the class (4, 4, 4) can start after Activity 7 is completed.

(Figures in brackets give the values of a, m, b in days for each respective activity)

- a) Draw the network diagram for the project.
- b) What is the expected duration and standard deviation of the duration of the project?
- c) The Director wants to conduct the seminar in 47 working days. What is the probability of doing this?