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Your Roll No.....

Sr. No. of Question Paper : 990

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Unique Paper Code : 2362201102

Name of the Paper : Production and Inventory Management (DSC)

Name of the Course : B.A (Program)

Semester : I

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any Five Questions.
3. Each question carries equal marks.
4. Use of non-programmable scientific calculator is allowed.

1. (a) Why are inventories kept in an organization? What are the various ways in which the inventory is classified? (9)

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- (b) Q^* is the optimal order quantity of Q and K^* is the corresponding minimum annual variable cost K . If $Q = (1 + \alpha) Q^*$, then Show that

$$\frac{K}{K^*} = 1 + \frac{\alpha^2}{2(1+\alpha)} \text{ where } \alpha \text{ is any positive constant.}$$

(9)

P.T.O.

2. Formulate and solve a deterministic, continuous and uniform demand inventory model when shortages are not allowed, and production rate is finite. Also discuss the all possible cases to determine reorder levels when lead time is positive and constant. (18)
3. (a) The manager of the *Daily Needs* Store is reviewing the demand and costs associated with the store's most popular three products. The inventory carrying charge for all the items is 20 percent per unit a year. The data of these products is given below :

Product	Demand	Unit cost (Rs.)	Ordering Cost per order (Rs.)	Floor area required (sq. feet / unit)
X	5000	10	100	0.7
Y	2000	15	200	0.8
Z	10,000	5	75	0.4

Determine the best ordering policy, if the store has a limited floor space of 1000 sq. feet. (9)

- (b) The demand for a product is 600 units per week, and the items are withdrawn at a constant rate. The setup cost for placing an order to replenish inventory is Rs. 25. The unit cost of each item is Rs. 3, and the inventory holding cost is Rs. 0.05 per item per week. If shortages are allowed but cost Rs. 2 per item per week, determine how often to order and what size the order should be. (9)

4. A small store holds 10 different products with the following costs and annual demands :

Product	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
Unit cost	20	25	30	1	4	6	10	15	20	22
Annual demand	300	200	200	1,000	800	700	3,000	2,000	600	400

Carry out the ABC classification for the items and represent the findings graphically also. (18)

5. (a) A manufacturer of engines is required to purchase 4,800 castings per year. The requirement is assumed to be known and fixed. These castings are subject to quantity discounts. The price schedule is as follows :

Quantity	Unit cost (Rs.)
$0 \leq q < 500$	Rs. 150.00
$500 \leq q < 750$	Rs. 138.75
$750 \leq q$	Rs. 131.25

The cost of storage per unit per year is 20% of the unit cost and the ordering cost is Rs. 750 per order. Find the optimum purchase quantity. (9)

- (b) Demand for an item is steady at 1200 units per year with an ordering cost of Rs. 16 and holding cost of Rs. 0.24 per unit per year. Describe an appropriate ordering policy if the lead time is constant at 2 months. (9)

P.T.O.

6. (a) Derive the optimum order quantity for a probabilistic continuous inventory model with instantaneous demand, no set-up cost and shortages are allowed which are fully backlogged. (9)

- (b) A newsvendor boy purchases paper for Rs.4/- each and sells them for Rs.7/- each. He can't return the unsold newspapers. Daily demand has the following distribution :

X	30	31	32	33	34	35	36
P(x)	0.15	0.20	0.25	0.22	0.10	0.05	0.03

If each day's demand is independent of the previous day, how many newspapers he should order. (9)

7. (a) Discuss the various costs involved in an inventory system for an organization. (8)

- (b) The demands for next four months are given by $r_1 = 20$, $r_2 = 50$, $r_3 = 10$, $r_4 = 50$. The set-up cost is Rs. 100 per set up. The production cost is Rs. 10 per unit and the monthly holding cost is 10% of the unit production cost. Determine the optimal production schedule satisfying the given demand. (10)