This question paper contains **4** printed pages]

Roll No. | | | | | | | | | | |

S. No. of Question Paper : **2433**

Unique Paper Code : **2362401** **F-4**

Name of the Paper : **Inventory and Production Management**

Name of the Course : **B.Sc. (H) Mathematics/Statistics : Allied Course**

Semester : **IV**

Duration : **3 Hours** Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any *Five* questions.

All questions carry equal marks.

Use of Simple Calculator is allowed.

1. (*a*) What are the different reasons for holding stock in any organization. Describe various types of stocks carried by the organization.

   (*b*) What are different types of costs involved in inventory system ? 8,7

2. (*a*) Formulate and derive a deterministic and continuous demand, lot size inventory model when production rate is finite and shortages are not allowed.

   (*b*) Comapny 'A' works for 50 weeks per year and stocks an electric motor with the following characteristics :

   Demand : 20/week

   Unit cost = Rs. 2500/unit

   Ordering cost = Rs. 50/order

   Holding cost = Rs. 600 per unit per year

   What is the optimal order quantity ? Would it make much difference if this number was rounded up or down to the nearest integer ? 8.7

P.T.O.

3. (*a*) What is meant by service level ?

A retailer guaranteed a 95% service level for all stock items. Stock is delivered from a wholesaler who has a fixed lead time of 4 weeks. What reorder level should the retailer use for an item that has normally distributed demand with mean 100 units a week and standard deviation of 10 units ? What is recorder level with 98% service level ?

(*b*) Discuss the newsboy problem. Formulate and derive the single period, discrete and stochastic demand model. 7,8

4. (*a*) Discuss the optimal inventory policy when there is (*i*) constraint on storage space (*ii*) constraint on average investment in stock.

(*b*) Last month, restaurant ABC was sent a new price list by their merchants. The cost of their most popular product X is now :

Order quantity	**Price per unit** (Rs.)
0—99	20
100—399	19.40
400—999	18.80
1000 or more	18

Demand for the product X is relatively constant at 2000 units per year, delivery cost Rs. 50 and the holding cost is Rs. 20 per unit per year. What ordering policy would you recommend for the restaurant ? 7.8

5. (*a*) Formulate a lot size production problem and discuss the Wagner and Whitin algorithm in detail.

(*b*) A store wants to improve the control of its stock and is looking at the possibility of using ABC analysis. Records from eight types of item show the current sales and costs as follows :

Item	No. of sales	Cost (Rs.)
1	25	1400
2	150	14
3	30	680
4	80	20
5	10	1020
6	40	150
7	1000	20
8	100	30

Perform the ABC analysis. 9,6

5. (*a*) What is the main feature of JIT and how JIT's approach to inventory management differ from other methods ? What is the difference between "Push" and "Pull" systems ?

(*b*) Mr. X looked at an inventory item and decided that the inventory carrying charge is 25% while the shortage cost for backorders is Rs. 600 per unit per year. Unit cost is Rs. 400 and ordering cost is Rs. 100 per order. Demand is constant at 300 units per year and all shortages are met by backorders. What is the best ordering policy for this item ? What proportion of time, the demand is met by backorders and what is the cost of this policy ? 10,5

7. (*a*) What is material requirement planning (MRP) ? What are its advantages and disadvantages ? Discuss in detail.

(*b*) Design an aggregate plan for the next year's production of families of products whose demands have been estimated as follows :

Month	Demand (units)
1	30
2	50
3	70
4	80
5	90
6	110
7	100
8	80
9	60
10	50
11	50
12	40

Any shortages are met by backorders and there are currently 70 units in the stock with backorders for 10 units outstanding. Keep the production constant at 30 for 3 months and then at 80 units. 9,6