

M.E. PRODUCTION ENGINEERING, 1ST YEAR, 1ST SEMESTER EXAM 2025**SUBJECT: PRODUCTION AND OPERATIONS MANAGEMENT****Time : Three hours****Full Marks : 100****Use a Separate Answer Script For Each Part****PART I (40 Marks)****(Answer any Two Question)**

1. a) Explain study of production systems briefly with suitable figure 10
- b) With the help of a suitable example of your own explain the Cause and Effect diagram. 6
- c) Explain briefly: Cycle of production functions; 4
2. a) Explain the followings in connection with time series analysis: 6
- (i) Cyclic Variation; (ii) Seasonal Variation.
- b) Quarterly unit demands for a product are given below : 14

YEAR	WINTER	SPRING	SUMMER	FALL
1	65	63	50	57
2	75	89	63	79
3	94	76	85	85
4	89	72	54	75
5	99	58	94	75

Using centre point moving average technique, determine the seasonal adjusted index for each quarter.

3. a) Explain economic production quantity briefly. 8
- b) The production department for a company requires 3,600 kg of raw material for manufacturing a particular item per year. It has been estimated that the cost of placing an order is Rs 36/- and the cost of carrying inventory is 25 percent of the investment in the inventories. The price is Rs 10/- per kg. Determine an ordering policy for raw material in the following aspects: 12
1. The optimal order lot size;
 2. The optimum order cycle time;
 3. The minimum yearly variable inventory cost;
 4. The minimum yearly total cost.

[Turn over

M.E. PRODUCTION ENGINEERING FIRST YEAR FIRST SEMESTER EXAM– 2025**Subject: PRODUCTION AND OPERATIONS MANAGEMENT****Time: Three Hours (Part I & Part II)****Full Marks: 100****Part II (60 Marks)****Use Separate Answer scripts for each part.****Answer any THREE questions from Part II.**

1. a) Mention the various types of operations scheduling problems. State the major objectives of job shop scheduling.

b) Four trucks, 1, 2, 3, and 4, are waiting on a loading dock at Apex Company that has only a single service bay. The trucks are labelled in the order that they arrived at the dock. Assume the current time is 1:00 PM. The times required to unload each truck and the times that the goods they contain are due in the plant are given in the following table. Determine the schedules that result for the rules First-Come, First-Served (FCFS), and Shortest Processing Time (SPT).

Truck	Unloading time (minutes)	The Material is Due
1	20	1:25 PM
2	14	1:45 PM
3	35	1:50 PM
4	10	1:30 PM

In each case compute the mean flow time, average tardiness, and number of tardy jobs.

(12 + 8)

2. a) What is “Push” and “Pull” Production Control Systems? Explain with examples.
b) Find the optimal solution to an assignment problem of four jobs (J1, J2, J3, J4) and four machines (M1, M2, M3 and M4) with the following cost matrix.

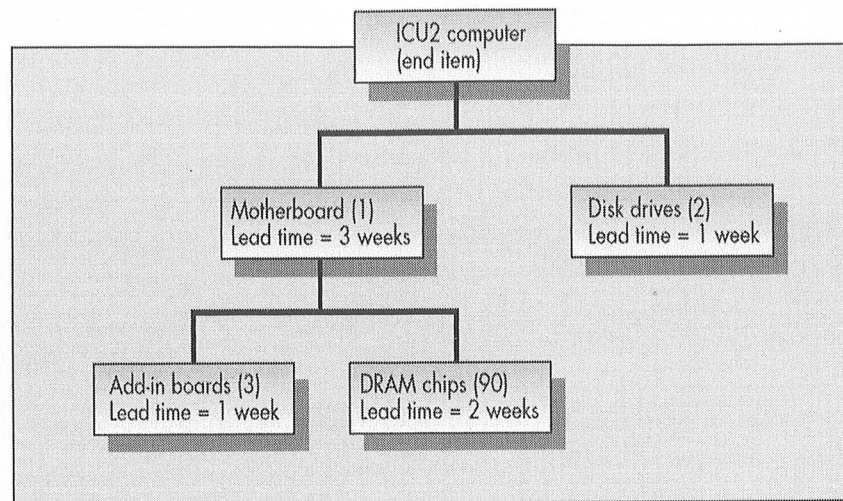
	J1	J2	J3	J4
M1	10	9	7	8
M2	5	8	7	7
M3	5	4	6	5
M4	2	3	4	5

(8+12)

3. a) What is the role of MRP in a Production Planning & Control System? How has the modern ERP system been developed?
b) The Apex Computer Company builds a computer designated model ICU2. It imports the motherboard of the computer from Taiwan, but the company inserts the sockets for the chips and boards in its plant in Bangalore, India. Each computer requires a total of ninety 64K dynamic random-access memory (DRAM) chips. Apex sells the computers with three add-in boards and two disk drives. The company purchases both the DRAM chips and the disk drives from an outside supplier. The product structure diagram for the ICU2 computer is given in the Figure.

Suppose that the forecasted demands for the computer for weeks 6 to 11 are 220, 165, 180, 120, 75, 300. The starting inventory of assembled computers in week 6 will be 75, and the production manager anticipates returns of 30 in week 8 and 10 in week 10.

- a. Determine the MPS for the computers.
- b. Determine the planned order release for the motherboards assuming a lot-for-lot scheduling rule.
- c. Determine the schedule of outside orders for the disk drives.



- (8 + 12)
4. a) Eight jobs are to be processed through a single machine. The processing times and due dates are given here.

Job	1	2	3	4	5	6	7	8
Processing time	2	3	2	1	4	3	2	2
Due date	5	4	13	6	12	10	15	19

Furthermore, assume that the following precedence relationships must be satisfied:

$2 \rightarrow 6 \rightarrow 3$ and $1 \rightarrow 4 \rightarrow 7 \rightarrow 8$.

Determine the sequence in which these jobs should be done in order to minimize the maximum lateness subject to the precedence restrictions.

- b) Elaborate Sequencing Theory for a Single Machine for scheduling rule SPT.

(12 + 8)

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