

**B.E. PRODUCTION ENGINEERING THIRD YEAR FIRST SEMESTER - 2025**  
**SUBJECT – Production Management**

Time: Three hours

Full Marks: 100

**Part I**  
**Marks 40**

**Answer Question No. 1 and any three from the rest.**

- Answer four from the following:
  - Define "Production Management".  
Classify production system according to the type of transformation processes and cite example for each.
  - Explain management approach to planning, analysis and control of production system.
  - Describe quantity control, quality control and productivity control of a production, system by a venn diagram.
  - Define "Scheduling". Differentiate between Master Scheduling and Detail Scheduling.  
Differentiate between Forward Scheduling and Backward Scheduling.
  - What are the different types of production control system? What are the static and dynamic situation in sequencing and state the objective to be achieved in both the cases? (4 X 4)
- Today in the 75<sup>th</sup> day of the year on the production calendar. Sequence the jobs listed below by: (i) Minimum process time, (ii) Due date rule, (iii) Critical Ratio technique. Are any of the jobs behind schedule?

| Jobs :                            | A  | B  | C  | D  | E   | F  | G  |
|-----------------------------------|----|----|----|----|-----|----|----|
| Processing time remaining (days)  | 5  | 2  | 10 | 3  | 17  | 15 | 9  |
| Production calendar date required | 90 | 78 | 84 | 81 | 104 | 86 | 85 |

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- A foreman is required to schedule four jobs. Four machines are available for loading and each of the machines can take up any job that would be schedule to it The time required for different machines to complete different jobs are given below:

| MACHINE        | JOB            |                |                |                |
|----------------|----------------|----------------|----------------|----------------|
|                | J <sub>1</sub> | J <sub>2</sub> | J <sub>3</sub> | J <sub>4</sub> |
| M <sub>1</sub> | 8              | 15             | 9              | 10             |
| M <sub>2</sub> | 5              | 12             | 18             | 20             |
| M <sub>3</sub> | 7              | 9              | 12             | 15             |
| M <sub>4</sub> | 14             | 4              | 16             | 6              |

Find the optimum loading so that all the jobs could be taken up simultaneously.

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[ Turn over

4. What is line balancing? Explain the terms:

- (i) Cycle time; (ii) Work station,
- (iii) Station time; (iv) Balance Delay.

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5. The work involved in assembling a small component can be described in terms of 10 minimum rational work elements whose elemental times and precedence relationship are given below:

| Work Elements          | 1 | 2 | 3 | 4   | 5 | 6 | 7   | 8   | 9   | 10 |
|------------------------|---|---|---|-----|---|---|-----|-----|-----|----|
| Immediate Predecessors | - | - | 2 | 1,3 | 4 | 4 | 5,6 | 5,6 | 7,8 | 9  |
| Tune (in min.)         | 4 | 4 | 3 | 2   | 2 | 3 | 5   | 7   | 9   | 2  |

Based on the heuristic method, assign work elements to work station in order to minimize the number of work stations on line and calculate the balancing loss of the proposed assembly line.

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**B.E. PRODUCTION ENGINEERING THIRD YEAR FIRST SEMESTER – 2025****Subject: PRODUCTION MANAGEMENT****Time: Three Hours****Part-II****Full Marks: 100****Marks: 60***(Use Separate Answer sheet for each part)***Answer any three questions.**

1. (a) How has the modern ERP system been evolved?  
 (b) Explain the Push & Pull type of Production Controls.  
 (c) Explain the ABC and VED inventory control policy.  
 (d) How do you know that the parameters of Moving Average (N) and exponential smoothing ( $\alpha$ ) are consistent?

 $(4 \times 5 = 20)$ 

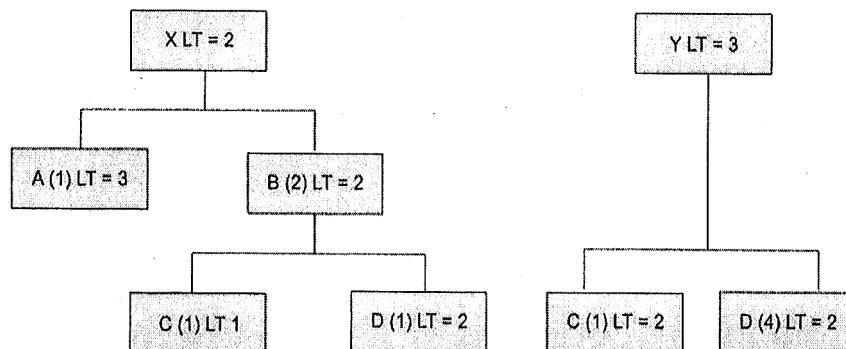
2. (a) Explain the characteristics of forecast.  
 (b) Customers' Calls to the Customer Service Care units of a Bank for the last twelve weeks have been given in the following table.

| Weeks      | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|
| Calls('00) | 50 | 35 | 25 | 40 | 45 | 35 | 20 | 30 | 35 | 20 | 15 | 40 |

- (i) Use a 3-year moving average to forecast calls from year 4 to year 12.  
 (ii) Compute the exponentially smoothed forecast of calls for each week. Assume an initial forecast of 50 calls in the first week, and use  $\alpha = 0.2$ .  
 (iii) Compare the effectiveness of these methods by computing the MSE, the MAD, and the MAPE. Note your observations.

 $(5 + 15)$ 

3. A manufacturing company produces products X and Y, which have demand, safety stock, and product structure levels as shown in the following figure. The on-hand inventories at the beginning of period 1 are as follows: X = 100, Y = 30, A = 70, B = 0, C = 200, and D = 800. The lot size for A is 250, and the lot size for D is 1,000 (or multiple of these amounts); all other items are specified on a lot-for-lot basis (assumption). The only scheduled receipts are 250 units of X due in period 2. The amount of safety stock to be maintained for X & Y for all the periods are 50 & 30 respectively. The safety stock can be shown in the row of on-hand inventory.



The MPS for X and Y are given below in the table:

| Products | Demand in Period |   |     |   |   |     |     |     |
|----------|------------------|---|-----|---|---|-----|-----|-----|
|          | 1                | 2 | 3   | 4 | 5 | 6   | 7   | 8   |
| X        |                  |   | 300 |   |   | 200 |     | 250 |
| Y        |                  |   |     |   |   |     | 400 |     |

Determine the order quantities &amp; planned order release for X, Y, C &amp; D.

 $(20)$

4. (a) Explain All-Units and Incremental order discount cost functions with suitable diagrams.

(b) A purchasing agent for a particular type of silicon wafer used in the production of semiconductors must decide among three sources. Source A will sell the silicon wafers for Rs. 25 per wafer, independently of the number of wafers ordered. Source B will sell the wafers for Rs. 24 each but will not consider an order for fewer than 3,000 wafers, and Source C will sell the wafers for Rs. 23 each but will not accept an order for fewer than 4,000 wafers. Assume an order setup cost of Rs. 1000 and an annual requirement of 20,000 wafers. Assume a 20 percent annual interest rate for holding cost calculations.

(i) Which source should be used, and what is the size of the standing order?

(ii) What is the optimal value of the holding and setup costs for wafers when the optimal source is used?

(iii) If the replenishment lead time for wafers is three months, determine the reorder point based on the on-hand level of inventory of wafers.

(5 + 15)