B.E. PRODUCTION ENGINEERING THIRD YEAR FIRST SEMESTER – 2024
Subject: PRODUCTION MANAGEMENT

Time: Three Hours **Full Marks: 100**

Answer Question No. 1 and any three from the rest

1. Answer any five questions from the following:
   (a) Define "Production System" and explain Production considering Input and Output System. State various parameters by which you can measure the performance of profit making and non-profit making organizations. What characteristics can be used to describe a production system. Explain in brief. (4 + 2 + 2)
   (b) Explain the cycle of production functions and indicate their relative positions. What is lead time and how it influences the cycle as a whole? (4 + 4)
   (c) What is Queuing theory? Describe briefly various characteristics of queue. Explain different basic structures of the waiting-line system. (4 + 4)
   (d) What is the importance of a Product Structure diagram? Compare Production & Sales Bills-of-Materials (BOM). What is indented BOM? (4 + 4)
   (e) Explain the Push & Pull type of Production Controls. Mention the aims of JIT and Lean Manufacturing. (5 + 3)
   (f) Explain the role of MRP in manufacturing planning and control system with suitable diagram. (8)
   (g) Explain the ABC and VED inventory control policy. (8)

2. (a) Explain the characteristics of forecast.

   (b) The demand for the disposable plastic tubing for a general Hospital is 300 units and 350 units for September and October respectively. Using 200 units as the demand for September and October respectively. Using 200 units as the demand for Sept. compute the forecast for the month of November. Assume the value of α as 0.7.

   (c) Two forecasting methods have been used to evaluate the same economic time series.

Forecasting Method 1	Forecasting Method 2	Realized Value of the Series
223	210	256
289	320	340
430	390	375
134	112	110
190	150	225
550	490	525

   Compare the effectiveness of these methods by computing the MSE, the MAD, and the MAPE. Do each of the measures of forecasting accuracy indicate that the same forecasting technique is best? If not, why?

   (5 + 5 + 10)

3. (a) ABC corporation currently practices the following system for the procurement of an item. No. of orders placed in a year = 8, ordering cost = 750 / order, each time order quantity = 250, carrying cost = 40%, comment on the ordering policy of the company and estimate the loss to the company in not practising scientific inventory policy.

   (b) The Toppex Chemical Company produces a chemical compound that is used as a lawn fertilizer. The compound can be produced at a rate of 10,000 Kgs per day. Annual demand for the compound is 0.6 million Kgs per year. The fixed cost of setting up for a production run of the chemical is Rs. 15,000, and the variable cost of production is Rs. 35 per Kg. The

company uses an interest rate of 22 percent to account for the cost of capital, and the costs of storage and handling of the chemical amount to 12 percent of the value. Assume that there are 250 working days in a year.

(i) What is the optimal size of the production run for this particular compound?

(ii) What proportion of each production cycle consists of uptime and what proportion consists of downtime?

(iii) What is the average annual cost of holding and setup attributed to this item? If the compound sells for Rs. 39 per Kg, what is the annual profit the company is realizing from this item?

(5 + 15)

4. (a) A schedular has four jobs that can be performed in any four machine centers. The profit per job is listed in the table below, if they performed in those machine centers. Determine the allocation of jobs to machine centers that results in maximum profit if jobs cannot be splitted.

Job	Machine Center			
	M/Cl	M/C2	M/C3	M/C4
A	19	14	17	16
B	12	15	18	19
C	16	22	14	13
D	17	18	21	14

(b) Auto painters and Tinkers (APT) are planning for short term on a daily basis. They have four lines for tinkering and painting jobs through lines 1, 2, 3 and 4. Today, they have seven jobs A, B, C, D, E, F and G to be allocated to the lines. The following table gives the estimates of job-times in hours. While line 1 and 2 have a capacity of 12 hours each, the line 3 and 4 work longer, 18 hours each. The jobs are classified in order of priority as: A, B, C, D, E, F, and G. How would you allocate the jobs to different lines?

Job	Line			
	1	2	3	4
A	7	14	11	18
B	19	9	14	10
C	15	25	20	10
D	6	9	7	14
E	4	8	9	5
F	10	12	11	15
G	8	5	4	7

(10 + 10)

5. (a) What is balancing loss, how is it caused and how can it be reduced?

(b) A company works an 8-hour day for 5 days per week. The production line is operated for only seven hours per day to allow for needs as rest and delays. The information are depicted in the table below.

Task	a	b	c	d	e	f	g	h	i	j	k	l	m
Immediate Predecessor	—	a	b	—	d	e	e	e	c,f,g,h	i	j	k	L
Task time (Second)	14	10	30	3	5	15	14	14	6	7	3	4	7

(i) Determine the theoretical minimum number of stations if the line is designed for an

output of 8400 units per week. Can be the theoretical minimum number of stations attained?

(ii) Show a schematic of the minimum number of stations.

(iii) What is the maximum possible efficiency? What is the actual possible efficiency?

(5 + 15)

6. (a) How has the modern ERP system been evolved?

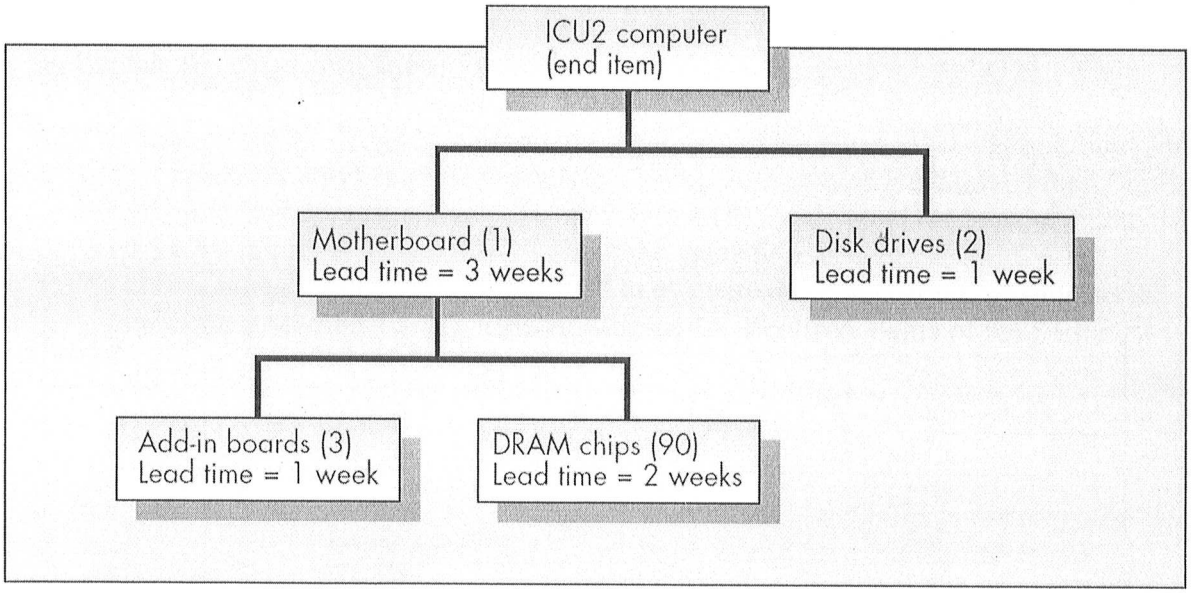
(b) The Apex Computer Company builds a computer designated model ICU2. It imports the motherboard of the computer from Taiwan, but the company inserts the sockets for the chips and boards in its plant in Bangalore, India. Each computer requires a total of ninety 64K dynamic random-access memory (DRAM) 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.



(5 + 15)

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