



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/M.Tech(IEM)/SEM-1/IEM-104/2009-10  
2009**

**PRODUCTION PLANNING AND MATERIALS  
MANAGEMENT**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

Answer any *five* questions.

5  $\times$  14 = 70

1. Write short notes on any *two* of the following :

2  $\times$  7

- a) Critical ratio in scheduling
- b) Synchronous manufacturing
- c) Co-ordination in order processing and planning.
- d) Selective inventory control.



2. a) Draw out the aggregate plan considering mixed strategy of regular and overtime production, inventory holding and offloading and also determine the optimal cost of plan for the refrigerator division of Koolwell Corporation with a projected demand for twelve months for a product range as given below alongwith other details. 9

Monthwise demand in units ( in hundreds ) are :

12, 16, 25, 30, 32, 20, 14, 12, 16, 27, 29 and 15.

Maximum regular time production per month = 20 units

Maximum sub-contracting per month = 3 units

Maximum overtime production per month = 4 units.

Cost of regular time production = Rs. 40,000/unit

Cost of overtime production = Rs. 45,000/unit

Cost of sub-contracting = Rs. 48,000/unit

Inventory carrying cost per period = Rs. 1,000/unit.

- b) Discuss the concerns of long and short range plans and also the challenges of intermediate range plans. 5



3. a) Excell Manufacturing Company has six jobs awaiting processing. Processing time and due dates are presented in the following table. Assume that the jobs arrive in the order shown. Using the measures of effectiveness as

- i) Average completion time
- ii) Utilisation
- iii) Average number of jobs in the system
- iv) Average job lateness.

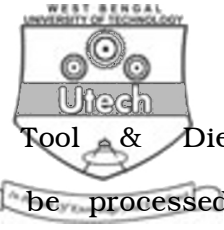
Compare the results of FCFS, SPT, LPT and EDD priority rules for despatching jobs and draw conclusion :

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<b>Job</b>	<b>Job work (Processing) Time ( days )</b>	<b>Job Due Date ( days )</b>
A	6	22
B	12	14
C	14	30
D	2	18
E	10	25
F	4	34.

- b) Elucidate the elements of production planning and control process.

5



4. a) Five speciality jobs of Magnum Tool & Die Manufacturing Corporation needs to be processed through 'Turning Centre' and 'Milling Centre'. The processing time for each job is as follows : 8

**Work (Processing) Time for Jobs ( in hours )**

<b>Job</b>	<b>Turning Centre</b>	<b>Milling Centre</b>
A	5	2
B	3	6
C	8	4
D	10	7
E	7	12

Determine the completion time of the above jobs and idle time of work centres using Johnson's rule.

- b) Elucidate the steps in applying Theory of Constraints ( ToC ) with an example. Also mention the measurement parameters at the operational levels. 6
5. a) Why do we need to maintain inventory ? What are the various costs associated with inventory management ?

3 + 4



- b) Plasma Cosmetics sources 9000 units of special glass bottles from a supplier for its nail polish brand Glitter and Glow. The procurement cost is Rs. 10 per order and each bottle costs Rs. 20. The carrying cost is 10% of the bottle cost. The supplier offers the following discounts :

<b>Quantity</b>	<b>Discount</b>
100 – 449	2%
450 – 899	4%
900 and above	5%

Evaluate the various discount options and advise the management of Plasma Cosmetics about the best inventory policy for the bottles. 7

6. a) When do we use qualitative method of forecasting ? Explain how Delphi method is different from the method of "jury of executive opinion". 6
- b) The annual demand figures from 2001 to 2008 are 340, 352, 348, 358, 364, 375, 370 and 376. Forecast the demand for 2009 based on the following methods :
- i) Smoothing exponential method, if forecast value for 2001 is 350 and  $\alpha = 0.3$ .
- ii) Find the Trend equation and hence forecast the demand for 2009.

Comment on the above two methods based on the values of MAPE for each of the above methods employed. 8



7. a) Discuss the importance of "Stores Management" in Materials Management. 5

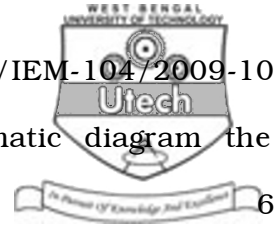
b) A firm has experienced the probability distribution for inventory demand during the reorder period as recorded in the following table :

<b>Number of units :</b>	30	40	50	60	70
<b>Probability :</b>	0.2	0.2	0.3	0.2	0.1

The firm is paying carrying cost per unit per year at the rate of Rs. 60 while stock-out cost is estimated to be Rs. 400 per unit. Find the reserve stock level that will minimize the total annual expected cost. 9

8. a) Elucidate the benefits of variety reduction in a manufacturing firm. Suggest a few areas of application of variety reduction in such a firm. 8

b) Explain why procurement is considered as a very important function of materials management. What factors are usually taken under consideration for vendor evaluation. 6



9. a) Explain with the help of a schematic diagram the concept of MRP. 6
- b) The following information is available on the product structure tree of a product *X*. *X* requires 5 units of *A*, 4 units of *B*, 8 units *C* and 1 unit of *D*. *A* requires 3 units of *E* requires 6 units of *G*. The inventory on hand is 10 units of *A*, 20 units of *B*, 25 units of *C*, 5 units of *D*, 40 units of *E* and 10 units of *G*. Calculate the no. of units required to be ordered for each of the components to manufacture 5 units of item *X*. 8
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