

**Second Semester M.Tech. Degree Examination, May/June 2010**  
**Computer Aided Production and Operations Management**

Time: 3 hrs.

Max. Marks:100

**Note:1. Answer any FIVE full questions.****2. Use of statistical table is permitted.****3. Use of Random number table is permitted.**

- 1 a. Solve the following linear programming problem by the tabular method of simplex solution.  
 Maximise  $Z = 3x_1 - 1x_2 + 4x_3 + 2x_4$   
 Subject to constraints  $2x_1 - 1x_2 + 1x_3 + 1x_4 \leq 5$   
 $2x_1 + 1x_2 + 3x_3 + 2x_4 \leq 35$   
 $3x_1 + 1x_2 + 2x_3 + 4x_4 \leq 30$   
 $x_1, x_2, x_3, x_4 \geq 0$  (15 Marks)
- b. It is required to add four new machines to a machine shop, for which, four locations are available. The cost of assigning a machine to a location is given in the table below.

Location	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>
Machine M <sub>1</sub>	8	15	6	25
M <sub>2</sub>	12	18	9	7
M <sub>3</sub>	7	12	18	13
M <sub>4</sub>	9	10	15	5

Find the minimum cost of the assignment.

(05 Marks)

- 2 a. Explain the following forecasting techniques : (06 Marks)  
 i) Simple average ii) Simple moving average iii) Weighted moving average.
- b. The demand for a product during the last 10 years is given below. Estimate the demand for the next two years by the method of regression. (10 Marks)

Year	1	2	3	4	5	6	7	8	9	10
Units	125	135	145	150	167	157	161	170	187	168

- c. A cash certificate can be encashed for Rs 50,000 after four years. If the rate of interest is 14 percent, how much, at the most, will you pay, to purchase it today? (04 Marks)
- 3 a. A company has factories at cities A, B and C with respective plant capacities of 7000, 5000 and 8,000 units/year. The plants ship their output to warehouses located at cities P, Q and R with unit shipping cost as given in table Q3(a).

Unit Shipping Cost Table 3(a)

Plant	Warehouse			Capacity
	P	Q	R	
A	10	15	12	7000
B	12	13	11	5000
C	9	11	13	8000

The demand has increased and warehouses P, Q and R respectively require 6000, 10,000 and 9000 units per year. Because of the increased demand, the company wants to establish a new plant, with an annual capacity of 8000 units, for which, two feasible locations X and Y are under study. The unit shipment costs from locations X and Y to warehouses P, Q and R are given in the table below.

	P	Q	r
X	10	9	12
Y	12	8	10

The manufacturing cost of all plants remains the same. Which location, out of X and Y is more attractive and why?

(10 Marks)

- b. The operations to be performed in an assembly line, the task time in minutes and the preceding operations are given in the table 3(b). (10 Marks)

Table 3(b)

Operations	Preceding Operation	Time (min)
1	-	6
2	1	2
3	1	5
4	1	7
5	1	1
6	2	2
7	3, 4, 5	3
8	6	6
9	7	7
10	8	8
11	9, 10	4

- i) Draw the precedence diagram (06 Marks)  
 ii) Assign operation to work stations using ranked positional weight method, taking cycle time as 10 minutes (06 Marks)  
 iii) Calculate the delay. (05 Marks)
- 4 a. Discuss the costs associated with the inventory policy. (06 Marks)  
 b. A company needs 6000 units of a product per month. The product is purchased from outside for which, the setup cost is Rs 2000 per order. The cost of holding inventory, in terms of the capital tied up, amounts to Rs 1.50 per unit per month. How frequently should the company place orders for the product? (05 Marks)  
 c. An item for which the demand is 20 per day, is produced at the rate of 50 units per day. The setup cost is Rs 100 per cycle and the inventory holding cost is Rs 0.02 per unit per day. Find i) the economic lot size ii) the cycle time iii) the minimum cost per day. (09 Marks)
- 5 a. List the inputs to the MRP system and explain. (06 Marks)  
 b. List the heuristic rules of production scheduling. (06 Marks)  
 c. A printer has one printing press, one binding machine and manuscripts of six books for publication. The duration in days required for printing and binding the books are given in the table Q5(c).

Table Q5(c)

Book	1	2	3	4	5	6
Printing time (days)	30	120	50	20	90	110
Binding time (days)	80	100	90	60	30	10

- In what order should the books be selected, so as to minimize the total duration, to publish all the books? In how much time will the printing and binding of all the books be completed? Represent the sequence on the Gantt chart. (08 Marks)
- 6 a. What is TQM? What are the essential characters of TQM? (04 Marks)  
 b. Discuss any ten Deming's points for management. (10 Marks)  
 c. Discuss Juravis trilogy for continuous improvement. (06 Marks)
- 7 a. The daily demand for a product is normally distributed with a mean of 100 units and a standard deviation of 12 units. The company orders for 1000 units of the product whenever the stock level falls below 250. When an order is placed, the new stock arrives exactly after two days (on the third day after the order is placed). Simulate the stock position for next 24 days. Assume that a customer who does not get the product on demand does not wait. (14 Marks)
- 8 a. Explain the following TQM tools with suitable examples : i) Pareto principle ii) Scatter plots iii) Ishikawa diagram iv) Histogram. (16 Marks)  
 b. Define PERT and CPM and differentiate between them. (04 Marks)