Total No. of Pages: 2

Register Number: **7190**

Name of the Candidate:

DIPLOMA EXAMINATION, 2010

(PRODUCTION MANAGEMENT)

(PAPER-IV)

140. QUANTITATIVE METHODS IN MANAGEMENT

Dec] [Time : 3 Hours

Maximum : 100 Marks

Answer any FIVE questions

1. Solve the following LP problem using Simplex method.

Maximize $z=3x_1+2x_2+5x_3$

Subject to constraints $x_1+2x_2+x_3 \leq 430$

$x_1+2x_3 \leq 460$

$x_1+4x_3 \leq 420$

and $x_1, x_2, x_3 \geq 0$

2. Find the optimal transporation cost of the following

Shop \ Warehouse	I	II	III	IV	V	Supply
A	6	4	4	7	5	100
B	5	6	7	4	8	125
C	3	4	6	3	4	175
Demand	60	80	85	105	70	400

3. A travelling salesman has to visit five cities. He wishes to start from a particular city, visit each city once and then return to his starting point. The travelling cost (in thousands of Rupees) of each city from a particular city is given below:

From City \ To City	A	B	C	D	E
A	α	2	5	7	1
B	6	α	3	8	2
C	8	7	α	4	7
D	12	4	6	α	5
E	1	3	2	8	α

What is the sequence of visit of the salesman so that the cost is minimum?

4. Find the sequence that minimizes the total elapsed time required to complete the following tasks on two machines.

Task	A	B	C	D	E	F	G	H	I
Machine-I	2	5	4	9	6	8	7	5	4
Machine-II	6	8	7	4	3	9	3	8	11

5. A truck owner finds from his past records that maintenance costs per year of a truck whose purchase price is Rs.8,000 are as given below:

Year	1	2	3	4	5	6	7	8
Maintenance cost (Rs)	1,000	1,300	1,700	2,000	2,900	3,800	4,800	6,000
Resale price (Rs)	4,000	2,000	1,200	600	500	400	400	400

Determine at which time it is profitable to replace the truck?

6. The following mortality rates have been observed for a special type of light bulbs:

Month	1	2	3	4	5
% failing at the end of month	10	25	50	80	100

If individual replacement cost is Rs.10 per bulb and group replacement costs are Rs3 per bulb, find the optimal replacement plan.

7. A R & D department is developing a new power supply for a console TV set. It has broken the job down into the following:

Job	Description	Immediate predecessors	Expected Time (days)
A	Determine output voltages	-	5
B	Determine whether to use solid state rectifiers	A	7
C	Choose rectifiers	B	2
D	Choose filters	B	3
E	Choose transformers	C	1
F	Choose chassis	D	2
G	Choose rectifier mounting	C	1
H	Layout chassis	E, F	3
I	Build and Test	G, H	10

Construct the network. Find the critical path. Find the three floats.

8. Following are the manpower requirements for each activity in a project.

Activity	Normal time	Manpower required per day
1-2	10	2
1-3	11	3
2-4	13	4
2-6	14	3
3-4	10	1
4-5	7	3
4-6	17	3
5-7	13	5
6-7	9	8
7-8	1	11

Construct the project network. Find the critical path. Find the minimum duration.

9. Explain the following

a) Monte carlo simulation.

b) Application of inventory models with the usage of Dynamic programming.

10. In a railway yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter arrival time follows an exponential distribution and the service time (the time taken to hump a train) distribution is also exponential with an average of 36 minutes. Calculate

a) Expected queue size

b) Probability that the queue size >10.

If the input of trains increases to an average of 33 per day what will be the change in (a) and (b)?
