Roll No. | | | | | | | | | | | | |

Total No. of Pages : 03

Total No. of Questions : 09

B.Tech. (ME) (2011 Onwards E-II) (Sem.–7,8)

OPTIMIZATION TECHNIQUES

Subject Code : DE/PE-3.2

Paper ID : [A3086]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Q1. Answer briefly :

a) Mathematics of OR is the mathematics of optimization. Discuss briefly.

b) What is meant by shadow price?

c) Briefly explain the similarities between dynamic programming and linear programming.

d) What is a transportation problem? How is it useful in business and industry?

e) List applications of queuing model.

f) What is the relationship between primal and dual?

g) Differentiate between slack & float.

h) What is the need of sensitivity analysis?

i) Give examples of non-linear programming models.

j) State some of the simple replacement policies.

SECTION-B

Q2. "*Simplex method is an improvement over graphical method*". Explain.

Q3. Explain the different types of models used in Operations Research.

Q4. With respect to queue system, explain the following terms : (i) Queue discipline (ii) Capacity of the system (iii) Balking (iv) Jockeying (v) queue length.

Q5. Distinguish between deterministic and probabilistic dynamic programming model.

Q6. Explain non-linear programming models along with suitable examples.

SECTION-C

Q7. Explain how the theory of replacement is used in the following problems :

a) Replacement of items whose maintenance cost varies with time.

b) Group replacement policy

Q8. An air-line operates 7 days a week has time table shown below. Crews must have a minimum layover 5 hours between flights. Obtain the pairing of flights that minimizes the layover time away from home assuming that crews flying from Delhi to Jaipur can be based either at Delhi or Jaipur for any given pairing; the crew will be based at the city that results in smaller layover.

Flight No.	Delhi	Jaipur	Flight No.	Jaipur	Delhi
	Depart	Arrive		Depart	Arrive
101	7 am	**8** am	201	8.00 am	9.15 am
102	8 am	9 am	202	8.30 am	9.45 am
103	1.30 pm	2.30 pm	203	12 noon	1.15 pm
104	6.30 pm	7.30 pm	204	5.30 pm	6.45 pm

Q9. A project consists of activities A, B, C & D ….. H, I. Construct the network diagram for the following constraints :

$$A < D,\ A < E,\ B < F,\ C < G,\ D < H, \text{ and } E, F < I.$$

The project has the following time schedules for the above activities.

Task	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
Optimistic Time	5	18	26	16	15	6	7	7	3
Pessimistic Time	10	22	40	20	25	12	12	9	5
Most Likely Time	8	20	33	18	20	9	10	8	4

Determine the following :

a) Expected task time and their variance

b) The critical path