D-180602

B. Tech. EXAMINATION, 2018

Semester VI (CBS)

OPERATION RESEARCH

ME-604

Time : 3 Hours   Maximum Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt *Five* questions in all, selecting *one* question from each Units I, II, III and IV and all sub-parts of the Q. No. 9.

Unit I

1. What is meant by a mathematical model of a real situation ? Discuss the importance of models in the solution of OR problems.   **10**

2. Explain, how and why operations research methods have been valuable in aiding executive decisions. **10**

Unit II

3. A manufacturer produces four products, A, B, C and D by using two types of machines (lathes and milling machines). The times required on the two machines to manufacture 1 unit of each of the four products. The profit per unit of the product, and the total time available on the two types of machines per day are given below :

Machine	Time required per unit (min) for product				Total time available per day (min)
	A	B	C	D	
Lathe machine	7	10	4	9	1200
Milling Machine	3	40	1	1	800
Profit per unit (Rs).	45	100	30	50	

Find the number of units to be manufactured of each product per day for maximizing the profit using simplex method.   **10**

4. Find the optimal solution tio the following transportation problem in which the cells contain the transportation cost in rupees. **10**

	W_1	W_2	W_3	W_4	W_5	Available
F_1	7	6	4	5	9	40
F_2	8	5	6	7	8	30
F_3	6	8	9	6	5	20
F_4	5	7	7	8	6	10
Demand	30	30	15	20	5	

Unit III

5. A repair shop attended by a single mechanic has an average of 4 customers per hour who brings appliances for repair. The mechanic inspects them for defects and quite often can fix them right away or otherwise render a diagnosis. This takes him 6 minutes on an average. Assuming Poisson distribution for arrival rate and exponential distribution for the service rate, find :

(a) Proportion of time during which the shop is empty.

(b) Probability of finding at least one customer in the shop.

(c) Average number of customers in the system.

(d) Average time a customer spends in the system. **10**

**6.** Solve the following game by using the principle of dominance : **10**

Player B

		I	II	III	IV	V	VI
	I	4	2	0	2	1	1
	II	4	3	1	3	2	2
Player A	III	4	3	7	− 5	1	2
	IV	4	3	4	− 1	2	2
	V	4	3	3	− 2	2	2

Unit IV

7. (a) What is significance of floats used in CPM network ? Explain with example.

(b) In what specific ways are milestone charts superior to bar charts ? How is network superior to milestone chart ? **10**

8. Determine the critical path on most likely time estimate and the expected time for each activity. **10**
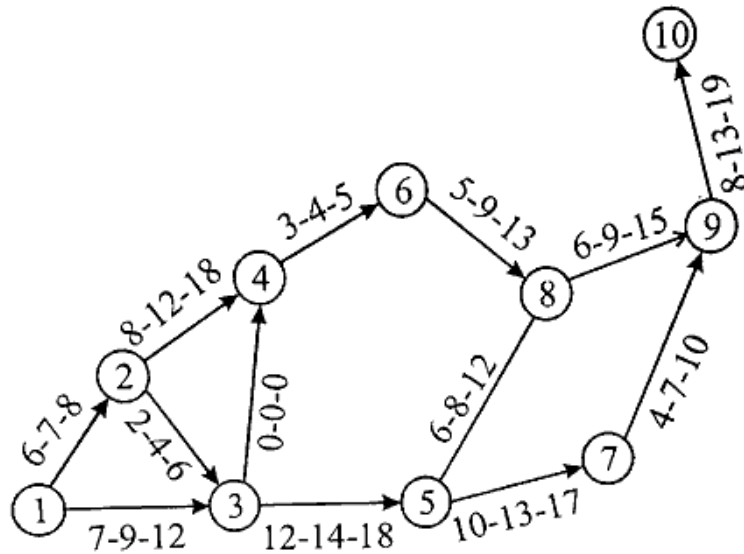
Unit V

9. (a) How do you detect an unbounded solution in the simplex procedure ? **2**

(b) What is physical significance of redundant constraints ? **2**

(c) How do you identify the prescence of multiple optima in the simplex method ? **2**

(d) What do you understand by a degeneracy in transportation problems ? **2**

(e) What is a saddle point ? **2**

(f) What is traffic intensity ? **2**

(g) What is finite queue ? Give an example. **2**

(h) What is float ? **2**

(i) What is difference between a transportation problem and an assignment problem ? **2**

(j) How do you identify existence of multiple solutions in assignment problem ? **2**