Exam. Code: 0944
Sub. Code: 33917

2015
B.E. (Mechanical Engineering)
Eighth Semester
MEC-801: Operation Research

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: ***Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Section. For any missing data, make the suitable assumptions.***

x-x-x

1. (a) What is objective function in OR model.
   (b) What is need of Simulation techniques in OR.
   (c) What is unbounded solution in LPP?
   (d) What is degeneracy in simplex method?
   (e) What is Assignment problem?
   (f) What is scope of network models?
   (g) What is unbalanced transportation problem?
   (h) What is Kendall's notation?
   (i) Explain Reneging in queuing.
   (j) What is Optimistic time estimate in PERT? (10x1)

Section - A

2. (a) Explain the different types of models used in OR. Explain briefly the general methods for solving these OR models.
   (b) What are different phases of OR study. (7, 3)

3. A manufacturing company makes three products X_1, X_2 and X_3 with contribution per unit to profit Rs. 2, Rs. 4 & Rs. 3 respectively. Each of these products passes through three centres as a part of production process. Time required in each centre to produce one unit of each product is as given below:

Product	***Hours per unit***		
	Centre 1	**Centre 2**	**Centre 3**
X_1	3	2	1
X_2	4	1	3
X_3	2	2	2
Time Available (Hours)	60	40	80

Determine the optimal mix for next week production. Formulate LPP and solve. (10)

4. Consider the problem of assigning five operators to five machines. The assignment costs are given below:

	Operators				
Machines	**1**	**2**	**3**	**4**	**5**
A	10	5	13	15	16
B	3	9	18	3	6
C	10	7	2	2	2
D	5	11	9	7	12
E	7	9	10	4	12

Assign the operators to different machines so that total cost is minimized. (10)

P.T.O.

Section - B

5. What is traveling salesman problem? Explain branch & bound method taking suitable example for 5 x 5 matrix. (10)

6. A project has the following time schedule:

Activity	0-1	1-2	1-3	2-4	2-5	3-4	3-6
Time in weeks :	2	8	10	6	3	3	7
Activity	4-7	5-7	6-7				
Time in weeks :	5	2	8				

Construct network and determine the total, free, independent and interfering floats and identify the critical path. (10)

7. Cars arrive at a drive-in restaurant with a mean arrival rate of 24 cars per hour and the service rate of cars is 20 cars per hour. The arrival rate and the service rate follow poisons distribution. The number of parking space for cars is only 4. Find the effective arrival rate of customers, average number of customers waiting in queue & in the system and average waiting time of customers in the queue and in the system. (10)