Exam. Code: 0944
Sub. Code: 33917

2055
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 Unit. For any missing data, make the suitable assumptions.*

x-x-x

1. Attempt the following:-

   (a) What is Queuing model?

   (b) What are Approximations in OR models.

   (c) Write difference between standard form & canonical form of LPP.

   (d) What is meaning of no solution in LPP.

   (e) What is Degeneracy in simplex method?

   (f) What is unbalanced transportation problem?

   (g) Write Kendall's notation for Queuing models.

   (h) What is symmetrical Travelling salesman problem.

   (i) What is dummy activity?

   (j) What is Slack & float. (10x1)

UNIT - I

2. (a) Discuss the various phases in solving an OR problem

   (b) Discuss scientific method in OR. (7,3)

3. A Company is manufacturing products Y and Z. One unit of Product Y requires 4.8 minutes of machining and 10 minutes of assembly time. The profit for product Y is Re. 0.70 per unit. Product Z requires 6 minutes of machining time and 5 minutes of welding time for manufacturing one unit. Profit for Z is Re. 0.90 per unit. The capacity of the machining department available for these products is 1400 minutes per week. The welding department has an idle capacity of 800 minutes/week and assembly department has 1800 minutes/week. Determine the quantities of Y and Z so that total profit is maximized.

   (10)

4. Use Big-M method to solve

   Maximize $Z= 4x_1+5x_2 +2x_3,$
   Subject to: $2x_1+x_2 +x_3 \leq 10$
   $x_1 + 3x_2 + x_3 \leq 12$
   $x_1+x_2 + x_3 = 6$
   $x_1, x_2, x_3 \geq 0$

   (10)

P.T.O.

UNIT - II

5. A company has one surplus truck in each of the cities A, B, C, D, E and one deficit truck in each of the cities 1, 2, 3, 4, 5 and 6. The distance between the cities in kilometers is shown in the matrix given below. Find the assignment of trucks from cities in surplus to cities in deficit so that the total distance covered by vehicles is minimum.

	1	2	3	4	5	6
A	12	10	15	22	18	8
B	10	18	25	15	16	12
C	11	10	3	8	5	9
D	6	14	10	13	13	12
E	8	12	11	7	13	10

(10)

6. (a) Describe the role of branch & bounding to solve the traveling salesman Problem.

   (b) At a railway station only one train is handled at a time. The railway yard is sufficient only for two trains to wait while the other is given signal to leave the station. Trains arrive at the station at an average rate of 6 per hour and the railway station can handle them on average of 12 per hour. Assuming Poisson arrival and exponential service distribution, find the steady-state probabilities for the various number of trains in the system. Also find the average waiting time of a train coming into the yard. (4,6)

7. A project consisting of following activities and time (days) is given in table below:

Activity	1-2	1-3	1-4	2-3	2-4	2-5	3-5	4-5
Time in days :	5	4	6	7	8	10	11	10

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

x-x-x