

2056
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. 1 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 are Approximations in OR Models?
- (b) What do you understand by unbounded solution and no solution in LPP?
- (c) What is Primal and Dual in linear Programming. What is significance of duality?
- (d) Write Kendall's notation for Multiple - server model.
- (e) What are differences between PERT & CPM. (5x2)

UNIT - I

- 2. (a) Describe the classification schemes of OR models.
- (b) Discuss in brief the Methodology used in solving an OR Problem. (5,5)
- 3. A firm uses lathes, milling machines and grinding machines to produce two machine parts. Given table represents the machining times required for each part, the machining times available on different machines and the profit on each machine part.

Type of machine	Machining time required for the machine part (minutes)		Maximum time available per week (minutes)
	I	II	
Lathes	12	6	3000
Milling machines	4	10	2000
Grinding machines	2	3	900
Profit per unit	Rs 40	Rs 100	

Find the number of parts I and II to be manufactured per week to maximize the profit.

(10)

4. Solve the Linear programming problem using Big M method

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.

(2)

UNIT - II

5. Given below is the unit costs array with supplies and demands.

Source	Sink				Supply
	1	2	3	4	
1	8	10	7	6	50
2	12	9	4	7	40
3	9	11	10	8	30
Demand	25	32	40	23	

Find the optimal solution to above given transportation problem.

(10)

6. (a) Describe Shortest Cyclic Route models. What are different methods to solve them.

(b) A person repairing radios finds that the time spent on the radio sets has exponential distribution with mean 20 minutes. If the radios are repaired in the order in which they come in and their arrival is approximately Poisson with an average rate of 15 for 8-hour day, what is the repairman's expected idle time each day? How many jobs are ahead of the average set just brought in.

(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
Time in days :	5	4	6	7	8	10	11
Activity	4-5						
Time in days :	10						

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

(10)

x-x-x