Exam Code: 1383
Sub. Code: 46527

2124

B. Voc. (Logistic Management)
Fifth Semester
Paper-LEM-505: Operations Research

Time allowed: 3 Hours **Max. Marks: 80**

NOTE: *Attempt five questions in all, including Question No. 1 which is compulsory and selecting one question from each Unit. Use of non-programmable calculator is allowed.*

x-x-x

1. Attempt *any four* of the following:-
   a) Explain the principle of Duality with example.
   b) What is MODI method of optimizing transportation problem?
   c) Discuss unbalanced assignment problem. How do you handle it?
   d) How do you calculate arrival rate and service rate in queuing problems?
   e) Explain decision tree.
   f) Differentiate between pure and mixed strategies. (4x5)

UNIT - I

2. Discuss the significance of Operations Research in modern business and management. Provide examples of industries or sectors where OR has had a transformative impact.
3. Solve the following Linear Programming Problem.

$$\begin{aligned} \text{maximize } Z = {} & 5x - 2y + 3z, \\ \text{subject to} \quad & 2x + 2y - z \geq 2, \\ & 3x - 4y \leq 3, \\ & y + 3z \leq 5, \\ \text{where} \quad & x, y, z \geq 0. \end{aligned}$$

(15)

UNIT - II

4. Explain the concept of the transportation problem in operations research. Discuss the objectives of solving transportation problems and the key assumptions involved. How does the transportation model help in optimizing costs in logistics and supply chain management? (15)
5. Consider the problem of assigning of five operators to five machines. The assignment costs are given in the following table:

Contd....P/2

		Machine				
		M_1	M_2	M_3	M_4	M_5
Operator	A	7	7	–	4	8
	B	9	6	4	5	6
	C	11	5	7	–	5
	D	9	4	8	9	4
	E	8	7	9	11	3

Operator A cannot be assigned to machine M_3 and operator C cannot be assigned to machine M_4. Find the optimum assignment schedule. (15)

UNIT - III

6. Explain the key components of a basic queuing system and their significance.How do these components influence the performance of a queue? (15)
7. A machine operator has to perform two operations, turning and threading on 6 different jobs. The time required to perform these operations (in minutes) for each job is known. Determine the order in which the jobs should be processed in order to minimize the total time required to complete all the jobs. Also find the total processing time and idle times for turning and threading operations.

Job	*Time for turning (minutes)*	*Time for threading (minutes)*
1	*3*	*8*
2	*12*	*10*
3	*5*	*9*
4	*2*	*6*
5	*9*	*3*
6	*11*	*1*

(15)

UNIT - IV

8. What is sensitivity analysis, and how is it applied in decision-making under uncertainty? Discuss its significance in determining the robustness of decisions. (15)
9. Define a two-person zero-sum game. Explain the concept of the payoff matrix and how it is used to identify optimal strategies for both players. (15)

x-x-x