Exam Code: 1383
Sub. Code: 9450

2123

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. I which is compulsory and selecting one question from each Unit.*

x-x-x

Q1. Attempt any four of the following questions. **(4 x 5)**

a) Explain the concept of optimization in the context of operations research.
b) Explain the principle of duality in linear programming.
c) What is a balanced matrix in assignment problem?
d) Differentiate between M/M/1 and M/M/S queuing models.
e) What do you understand by Simulation?
f) Differentiate between pure and mixed strategies.

Unit-I (1 x 15)

Q2. Explain the foundational principles and theories that underpin Operations Research. Discuss how these principles contribute to the systematic decision-making process in various industries.

Q3. Solve the following linear programming problem.

Max $Z = 30x_1 + 23x_2 + 29x_3$

Subject to the constraints,

$$6x_1 + 5x_2 + 3x_3 \leq 52$$
$$6x_1 + 2x_2 + 5x_3 \leq 14$$
$$x_1, x_2, x_3 \geq 0$$

Unit-II (1 x 15)

Q4. Explain the concept of the Assignment Problem in Operations Research. Provide a detailed overview of the Hungarian Algorithm as a method for solving Assignment Problems.

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Q5.

Solve the following TP to maximize the profit.

	Destination				
		A	B	C	D	Supply
Source	1	40	25	22	33	100
	2	44	35	30	30	30
	3	38	38	28	30	70
	Demand	40	20	60	30	

Unit-III (1 x 15)

Q6.

We have seven jobs, each of which has to go through the machines M_1 and M_2 in the order M_1 M_2. Processing time (in hours) are given as:

Job	1	2	3	4	5	6	7
Machine I	3	12	15	6	10	11	9
Machine II	8	10	10	6	12	1	3

Determine a sequence of these jobs that will minimize the total elapsed time.

Q7. Explore the key principles of Queuing Theory. Provide an example of a system where queuing theory can be applied to optimize performance.

Unit-IV (1 x 15)

Q8. Explore the process of decision analysis in operations research. Using a practical example, discuss the steps involved in decision analysis, including decision trees, probabilities, and utility functions, and highlight its applications in business decision-making.

Q9.

Reduce the following game to '3 × 2' by dominance principle and then solve it by graphical method:

Player B

Player A	y_1	y_2	y_3	y_4
x_1	19	6	7	5
x_2	7	3	14	6
x_3	12	8	18	4
x_4	8	7	13	–1

x-x-x