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Total Number of Pages : 02

Course IMBA
Sub_Code 16IMN1001D

10th Semester Regular/Back Examination: 2022-23

SUBJECT: Operations Research Applications

BRANCH(S): IMBA

Time : 3 Hour

Max Marks : 100

Q.Code : M028

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1

Answer the following questions:

(2 x 10)

- Give two management applications of Operations Research.
- Explain decision variables in a LP problem?
- What are the assumptions commonly made in queuing theory models?
- What is integer programming?
- Name two applications of traveling sales man problem.
- What is "SPT" rule in scheduling system?
- Define the term "Jockeying" in queuing theory.
- What is staff transfer problem?
- What is the bin packing problem?
- Give two objectives of the two-stage supply chain distribution problem.

Part-II

Q2

Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Discuss the scope operations Research in management.
- What are the essential steps involved in applying dynamic programming to solve a problem?
- Discuss the challenges in solving large-scale integer programming problems.
- Give the mathematical formulation of Transportation problem.
- What is a traveling salesman problem? Explain.
- How can queuing theory be applied to optimize service levels and resource allocation in various industries?
- Discuss the resource constraint project scheduling.
- Discuss Vehicle routing problem.
- Discuss two real-world applications of the bin packing problem.
- What are the key components of a two-stage supply chain distribution system?

- k) Test whether the function $f(x) = x^4 + 6x^2 + 12x$ is convex, concave or neither.
- l) What do you mean by quadratic programming? Give its mathematical formulation.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 What is Dynamic Programming Problem? Discuss the distinguishing characteristics of dynamic programming and give the mathematical formulation of dynamic programming problem. **(16)**

Q4 A salesman wants to visit cities 1, 2, 3 and 4. He does not want to visit any city twice before completing the tour of all cities and wishes to return to his home city, the starting station. Cost of going from one city to another in rupees is give in table below. Find the least cost route. **(16)**

		To City			
		1	2	3	4
From City	1	-	30	80	50
	2	40	-	140	30
	3	40	50	-	20
	4	70	80	130	-

Q5 Solve the following NLPP using the Kuhn-Tucker conditions: **(16)**

$$\text{Maximize } Z = 2x_1^2 - 7x_2^2 + 12x_1x_2$$

$$\text{Subject to; } 2x_1 + 5x_2 \leq 98$$

$$x_1, x_2 \geq 0$$

Q6 Discuss the two-stage supply chain distribution problem. How does the performance of the two-stage supply chain distribution system impact customer satisfaction and overall profitability? **(16)**