Avinashilingam Institute for Home Science and Higher Education for Women

Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD (now MoE)
Re-accredited with A++ Grade by NAAC. CGPA 3.65/4, Category I by UGC
Coimbatore - 641 043, Tamil Nadu, India

Master's Degree Examination – May 2025
II Semester

Class: I M.B.A. /2023 Batch **Time: 3hours**
Major: Business Administration/ Information Technology and Systems Management **Max. Marks: 100**

23MBAC14/24MBMC14 Applied Operations Research

Course Outcome:
CO1: Identify and develop operational research models from the verbal description of the real system. Further students would understand and apply the mathematical tools that are needed to solve optimization problems.
CO2:Demonstrate insight with respect to solution techniques namely transportation and assignment for resource and facility allocation.
CO3:Develop mathematical skills to analyze and solve network models arising from a wide range of applications.
CO4:Model a dynamic system as a queuing model and compute important performance measures.
CO5:Simulate the business scenario using random numbers and dynamic programming for model building

Part A **10 x 1 = 10**
Choose the Correct Answer

1. The mathematical model of an LP problem is important because CO1K1
   a. it helps in converting the verbal description and numerical data into mathematical expression
   b. decision-makers prefer to work with formal models
   c. it captures the relevant relationship among decision factors
   d. it enables the use of algebraic technique

2. When we solve the maximization problem by the simplex method the elements of the net evaluation row of the optimal solution must be (when we use the opportunity cost concept) CO1K1
   a. Either zeros or positive numbers b. Either zeros or negative numbers
   c. All are negative numbers d. All are zeros

3. To convert the transportation problem into a maximisation model we have to CO2K1
   a. Write the inverse of the matrix b. Multiply the rim requirements by –1
   c. Subtract all the values from the maximum value of the matrix
   d. We cannot convert the transportation problem into a maximization problem, as it is basically, a minimization problem

4. The following character dictates that the assignment matrix is a square matrix CO2K1
   a. The allocations in assignment problem are one to one
   b. Because we find row opportunity cost matrix
   c. Because we find column opportunity matrix
   d. Because make allocations, one has to draw horizontal and Vertical lines

5. Float or slack analysis is useful for CO3K1
   a. projects behind or ahead of the schedule b. reduction in cost
   c. resource optimization d. minimize total project cost

6. Which of the following criterion is not used for decision-making under uncertainty? CO3K1
   a. maximin b. maximax c. minimax d. minimize expected loss

7. The replacement policy that is imposed on an item irrespective of its failure is CO4K1
   a. Group replacement b. Individual replacement
   c. Repair spare replacement d. Successive replacement

8. Which of the cost estimates and performance measures are not used for economic analysis of a queuing system? CO4K1
   a. cost per server per unit of time
   b. cost per unit of time for a customer waiting in the system
   c. the average number of customers in the system
   d. average waiting time of customers in the system

9. All simulations involve CO5K1
a. The passage of time b. A model on a computer
c. An imitation of a system d. A visual display

10. If the outcome at any decision stage is unique and known for the problem, then the Dynamic programming problem is known as CO5K1
a. Probabilistic dynamic programming problem b. Stochastic dynamic programming problem
c. Static dynamic programming problem d. Deterministic dynamic programming problem

Part B 5 x 6 = 30

Answer ALL questions

Each answer should not exceed 400 words or two pages

11.a. Describe the limitations of applied operations research. CO1K1

(or)

11.b. Explain the various uses of slack. CO1K3

12.a. How to solve unbalanced transportation problems? CO2K2

(or)

12.b. Describe the various steps of the Hungarian Method. CO2K1

13.a. Distinguish between PERT and CPM. CO3K3

(or)

13.b. Discuss the Hurwicz criteria of decision making under uncertainty. CO3K2

14.a. Describe the subject to random total failure. CO4K1

(or)

14.b. Illustrate the basic characteristics of queuing system. CO4K1

15.a. Classify the different steps of Monte Carlo simulation. CO5K2

(or)

15.b. Explain the various applications of dynamic programming. CO5K2

Part C 5 x 12 = 60

Answer ALL questions

Question No 20. Case is Compulsory

Each answer should not exceed 800 words or four pages

16.a. Solve the given linear programming problems graphically: Maximize: $Z = 8x + y$ CO1K5

Constraints are,

$x + y \leq 40$

$2x + y \leq 60$

$x \geq 0, y \geq 0$

(or)

16.b. Summarize the procedure for simplex algorithm in linear programming. CO1K5

17.a. Assemble the several methods for finding an initial feasible solution for a transportation problem. CO2K6

(or)

17.b. A computer centre has four expert programmers and needs to develop four application programmes. The head of the computer centre, estimates the computer time (in minutes) required by the respective experts to develop the application programmes as follows: CO2K5

	Programmes				
Programmers		A	B	C	D
	1	120	100	80	90
	2	80	90	110	70
	3	110	140	120	100
	4	90	90	80	90

Find the assignment pattern that minimises the time required to develop the application programmes.

18.a. Summarize the various steps for crashing of CPM network. CO3K6

(or)

18.b. Categorize the six steps in decision tree analysis. CO3K4

19.a. Discuss the replacement problem at replacement of assets that deteriorate with time. CO4K5

(or)

19.b. Illustrate the key components of Kendall's notation. CO5K5

20. **Case Study:(Compulsory question)** CO5K6

A small bakery is struggling with inconsistent demand, leading to spoilage and wasted resources. Provide proper suggestions to betterment of bakery and use simulation model to daily demand and production, helping them optimize inventory, staffing, and resource allocation to minimize waste and maximize efficiency.

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