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**Presidency University**

**Bengaluru**

 **SCHOOL OF COMMERCE & MANAGEMENT**

 **MAKE UP EXAMINATION – SEPTEMBER 2023**

**Course Code:** OE 145

**Course Name:** Optimization Techniques

**Program** : BBB/BBF/BBD/BBE

**Date**: 01.10.2023

**Time**: 9.30am – 12.30pm

**Max Marks**: 100

**Weightage**: 50%

 Instructions:

1. Read the all questions carefully and answer accordingly.
2. Answer all the questions.
3. Normal Graph Sheets are allowed.

**Part A [Memory Recall Questions]**

**Answer all the Questions. (10Qx 1M= 10M)**

1. Operations Research (OR), which is a very powerful tool for \_\_\_\_\_\_ (CO1) [Knowledge]

a) Research b) Decision – Making c) Operations d) None of the above

1. Operations Research has the characteristics the it is done by a team of \_\_\_\_

 (CO1) [Knowledge]

a) Scientists b) Mathematicians c) Academics d) All of the above

1. Which technique is used in finding a solution for optimizing a given objective, such as profit maximization or cost minimization under certain constraints (CO1) [Knowledge]

a) Quailing Theory b) Waiting Line c) Both A and B d) Linear Programming

1. The objective functions and constraints are linear relationship between \_\_\_\_\_

(CO1) [Knowledge]

a) Variables b) Constraints c) Functions d) All of the above

1. The transportation problem is basically a (CO3) [Knowledge]

a) Maximization model b) Minimization model c) Transshipment problem d) Iconic model

1. In a transportation problem where the demand or requirement is equal to the available resource is known as (CO3) [Knowledge]

a) Balanced transportation problem b) Regular transportation problem

c) Resource allocation transportation problem d) Simple transportation model

1. In transportation Problems, VAM stands for (CO3) [Knowledge]

a) Value Addition Method b) Vogel’s Approximation Method

c) Virginia Approximation Method d) None of these

1. The Assignment Problem is solved by (CO3) [Knowledge]

a) Complex method b) Graphical method c) Vector method d)Hungarian method

1. Which of the following methods is used to verify the optimality of the current solution of the transportation problem? (CO3) [Knowledge]

a) LCM b) VAM c) Modified distribution method d) All of the above

1. The solution to a transportation problem with m-rows (supplies) and n-columns (destination) is feasible if the number of positive allocations are (CO3) [Knowledge]

a) m+n b) m×n c) m+n-1 d) m+n+1

**Part B [Thought Provoking Questions]**

**Answer all the Questions. (5Qx10M=50M)**

1. State various phases of Operations Research and explain in brief.

(CO1) [Comprehension]

1. Briefly explain the formulation of LPP using Graphical Method. (CO2) [Application]

Minimize Z = 20 x + 10 y

Subject to the constraints x + 2 y ≤ 40

 3 x + y ≥ 30

 4 x + 3 y ≥ 60

 where x, y ≥ 0 using graphical method.

1. Find an optimal solution for the transportation methods using any two methods of your choice. (CO3) [Application]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | D1 | D2 | D3 | D4 | Supply |
| O1 | 6 | 4 | 1 | 5 | 14 |
| O2 | 8 | 9 | 2 | 7 | 6 |
| O3 | 4 | 3 | 6 | 2 | 3 |
| Demand | 6 | 10 | 6 | 2 |  |

1. Solve the assignment problem by Hungarian method (CO3) [Comprehension]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | A | B | C | D |
| P | 8 | 26 | 17 | 11 |
| Q | 13 | 28 | 4 | 26 |
| R | 38 | 19 | 18 | 15 |
| S | 19 | 26 | 24 | 10 |

1. Construct a network diagram for each of the projects whose activities and their precedence relationships are given below: (CO3) [Comprehension]

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Activity | A | B | C | D | E | F | G | H | I | J | K |
| Predecessors | -- | -- | A | A | I, J, K | B, D | B, D | F | A | G, H | F |

**Part C [Problem Solving Questions]**

**Answer both the questions. (2Qx20M=40M)**

1. A small maintenance project consists of the following jobs whose precedence relationships are given below

(CO4) [Application]

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Job | 1-2 | 1-3 | 2-3 | 2-5 | 3-4 | 3-6 | 4-5 | 4-6 | 5-6 | 6-7 |
| Duration (days) | 15 | 15 | 3 | 5 | 8 | 12 | 1 | 14 | 3 | 14 |

1. Draw an arrow diagram representing the project.
2. Find the total float and free float for each activity.
3. Find the critical path and the total project duration.
4. A small project is composed of seven activities whose time estimates are listed in the table as below

(CO4) [Application]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Activity | 1-2 | 1-6 | 2-3 | 2-4 | 3-5 | 4-5 | 6-7 | 5-8 | 7-8 |
| Optimistic | 1 | 2 | 2 | 2 | 7 | 5 | 5 | 3 | 8 |
| Most likely | 7 | 5 | 14 | 5 | 10 | 5 | 8 | 3 | 17 |
| Pessimistic | 13 | 14 | 26 | 8 | 19 | 17 | 29 | 9 | 32 |

1. Draw the Project network.
2. Find the expected duration and variance of each activity.
3. Find the Critical path and total duration of the project.
4. Calculate the Variance and standard deviation of project length.

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