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**Presidency University**

**Bengaluru**

**SCHOOL OF COMMERCE**

**MAKEUP EXAMINATION JULY 2024**

**Date**: 12/07/2024

**Time**: 9:30am – 12:30pm

**Max Marks**: 100

**Weightage**: 50%

**Semester**: 4

**Course Code:** OE145

**Course Name:** Optimization Techniques

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**Instructions:**

1. Read the all questions carefully and answer accordingly.
2. Answer all the questions.

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries 1 mark. (10Qx 1M= 10M)**

1. The solution to a transportation problem with ‘m’ rows and ‘n’ columns is feasible if the number of positive allocations are (CO3) [Knowledge]
2. m + n b) m x n c) m +n – 1 d) m +n + 1
3. \_\_\_\_\_\_\_\_use of this model it to investigate the outcomes of various alternative courses of action. (CO1) [Knowledge]
4. Predictive model b) Descriptive model c) Optimization model d) None of these
5. The Hungarian method for solving an assignment problem can also be used to solve:

(CO3) [Knowledge]

1. A transportation problem b) Salesman problem c) LPP d) Both (a) and (b)
2. All the parameters in the linear programming model are assumed to be (CO2) [Knowledge]
3. Variables b) Constraints c) Functions d) None of these
4. \_\_\_\_\_\_\_\_\_ are the restrictions or limitations imposed on the Linear Programming Problem. (CO2) [Knowledge]
5. Variables b) Costs c) Profits d) Constraints
6. Operations Research is a very powerful tool for \_\_\_\_\_\_\_\_ (CO1) [Knowledge]
7. Operations b) Research c) Decision making d) None of these
8. The region of feasible solution in Linear Programming problem method is called \_\_\_\_\_\_\_ (CO2) [Knowledge]
9. Infeasible Region b) Unbounded Region c) Infinite Region d) feasible Region
10. The graphical method if LPP uses (CO2) [Knowledge]
11. Linear equations b) Constraint equations c) Objective function d) All of the above
12. While solving a LPP graphically, the area bounded by constraints is called

(CO2) [Knowledge]

1. Feasible region b) Infeasible region c) Unbounded region d) None of these
2. \_\_\_\_\_\_\_\_\_\_\_\_ method is used to solve an assignment problem. (CO3) [Knowledge]
3. American method b) Hungarian method c) German method d) British method

**Part B [Thought Provoking Questions]**

**Answer all the Questions. Each question carries 10 marks. (5Qx10M=50M)**

1. Briefly explain the main phases of Operations Research? (CO1) [Comprehension]
2. A Manufacturer produces 3 models I, II and III of a certain product using raw materials A and B. The following table gives the data. Formulate this problem as a Linear programming model.

(CO2) [Comprehension]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Raw Material | Requirement per Unit | | | Availability |
| I | II | III |
| A | 2 | 3 | 5 | 4000 |
| B | 4 | 2 | 7 | 6000 |
| Min Demand | 200 | 200 | 150 | --- |
| Profit / Unit | 30 | 20 | 50 | --- |

1. Find the initial solution for the given transportation problem by any two methods of your choice. (CO3) [Comprehension]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | D1 | D2 | D3 | D4 | **Supply** |
| O1 | 19 | 30 | 50 | 10 | **7** |
| O2 | 70 | 30 | 40 | 60 | **9** |
| O3 | 40 | 8 | 70 | 20 | **18** |
| **Demand** | **5** | **8** | **7** | **14** |  |

1. Find the Optimal solution using 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 for the project whose activities and precedence relationships are as given below:

(CO4) [Comprehension]

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

**Part C [Problem Solving Questions]**

**Answer all the Questions. Each question carries 20 marks. (2Qx20M=40M)**

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

Maximize Z = 3 x + 5 y

Subject to the constraints x ≤ 4

2 y ≤ 12

3 x + 2 y ≤ 18

where x, y ≥ 0 using graphical method.

1. A project schedule has the following characteristics. (CO4) [Application]

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Activity | 1-2 | 1-3 | 2-3 | 2-5 | 3-4 | 3-6 | 4-5 | 4-6 | 5-6 | 6-7 |
| Time  (Days) | 15 | 15 | 3 | 5 | 8 | 12 | 1 | 14 | 3 | 14 |

From the following information, you are required to

1. Construct a network diagram.
2. Compute the earliest and latest event time.
3. Determine the critical path and project duration.
4. Compute total and free float for each activity.

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