

Register Number:

Date:

**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27**

**MCOM - II SEMESTER**

**SEMESTER EXAMINATION: APRIL 2022**

(Examination conducted in July-August 2022)

**MCO 8318/8320 - Operation Research**

**Time – 2 ½ hrs Max Marks – 70**

**This paper contains Three printed pages and four parts**

**SECTION A**

**Answer any TEN of the following questions. Each question carries two marks. (10x2=20)**

1. What is meant by Operation Research?
2. State any two tools in Operation Research.
3. Mention any two limitations of Operations Research.
4. Why Vogel’s Approximation Method (VAM) is the better choice among other methods in assuring basic feasible solution?
5. What is degeneracy in transportation problem?
6. List any two differences between PERT and CPM.
7. What is meant by EVPI?
8. What is pay off in Decision theory?
9. Mention any two areas of application of Decision tree analysis.
10. List out any four symbols and its notations in Network construction.
11. What is meant by Slack?
12. What is meant by dummy activity?

**SECTION B**

**Answer any THREE of the following questions. Each question carries five marks.**

**(3x5=15)**

1. A shop keeper prepares food at a total cost of ₹ 4/plate and sells it a price of ₹ 6. The food is prepared in the morning and is sold during the same day. Unsold food during the same day is spoilt and is to be thrown away. The number of plates is not less than 20 or greater than 23. Prepare Payoff table from the above information
2. Brief out the significance of Operation Research in business and industry.
3. A mobile phone manufacturing company has three branches located in three different regions, namely Jaipur, Udaipur and Mumbai. The company has to transport mobile phones to three destinations, say Kanpur, Pune and Delhi. The availability from Jaipur, Udaipur and Mumbai is 40, 60 and 70 units respectively. The demand at Kanpur, Pune and Delhi are 70, 40 and 60 respectively. The transportation cost is shown in the matrix below (in Rs). Use the North-West corner method to find a basic feasible solution.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Destinations** |  |
|  |  | **Kanpur** | **Pune** | **Delhi** | **Supply** |
| **Sources** | **Jaipur** | 4 | 5 | 1 | **40** |
| **Udaipur** | 3 | 4 | 3 | **60** |
| **Mumbai** | 6 | 2 | 8 | **70** |
|  | **Demand** | **70** | **40** | **60** | **170** |

1. Briefly explain the characteristics of Linear programming problems.
2. Given the following payoff tables: where the table represents profits:

|  |  |
| --- | --- |
| Alternatives | States of nature |
| **S1** | **S2** | **S3** | **S4** |
| **A1** | 3 | 5 | 8 | -1 |
| **A2** | 6 | 5 | 2 | 0 |
| **A3** | 0 | 5 | 6 | 4 |

State which can be chosen as the best act using:

1. Maximax
2. Maximin
3. Minimax regret (1+1+3)

**SECTION C**

**Answer any TWO of the following questions. Each question carries ten marks.**

**(2x10=20)**

1. Solve the following assignment problem.

|  |  |
| --- | --- |
| **Task** | **Men** |
|  | **1** | **2** | **3** |
| **P** | 9 | 26 | 15 |
| **Q** | 13 | 27 | 6 |
| **R** | 35 | 20 | 15 |
| **S** | 18 | 30 | 20 |

1. Draw a network diagram of the following schedule of activities and find its critical path. Also calculate slack and floats for each event.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Activity | 1-2 | 1-3 | 1-4 | 2-6 | 3-7 | 3-5 | 4-5 | 5-9 | 6-8 | 7-8 | 8-9 |
| Duration (in days) | 2 | 2 | 1 | 4 | 5 | 8 | 3 | 5 | 1 | 4 | 3 |

1. A small petroleum company owns two refineries. Refinery 1 costs $20,000 per day to operate, and it can produce 400 barrels of high-grade oil, 300 barrels of medium-grade oil, and 200 barrels of low-grade oil each day. Refinery 2 is newer and more modern. It costs $25,000 per day to operate, and it can produce 300 barrels of high-grade oil per day, 400 barrels of medium-grade oil, and 500 barrels of low-grade oil each day. The company has orders for a minimum of 25,000 barrels of high-grade oil, 27,000 barrels of medium-grade oil, and 30,000 barrels of low-grade oil. How many days should it run each refinery to minimize its costs and still refine enough oil to meet its orders?

 **SECTION D**

**Answer the following question. The question carries fifteen marks. (1x15=15)**

1. A manufacturer of a product has 3 factories. The matrix given below shows the Kms from each factory to each destination. The cost of transportation is Rs.10 per Km per unit. Find out the optimum quantity to be supplied from each factory to each warehouse with an objective of reducing the cost.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Warehouse1  | Warehouse2 | Warehouse3 | Supply |
| F1 | 50 | 30 | 220 | 1 |
| F2 | 90 | 45 | 170 | 3 |
| F3 | 50 | 200 | 50 | 4 |
| Demand | 3 | 3 | 2 |  |

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