 **Reg No**

 **Date:**

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| **ST. JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27** |
| **M.COM -II SEMESTER** |
| **SEMESTER EXAMINATION: APRIL 2019** |
| **CO 8318– OPERATIONS RESEARCH**  |
|  |  |  |  |  |  |  |
| **Time- 2.5 hrs** |  |  **Max Marks-70** |  |
|  |  |  |  |  |  |  |
| **This paper contains \_\_\_printed pages and four parts** |

**Section A**

**(Answer any 10 questions.)** **(10\*2=20 marks**)

1. What are artificial variables?
2. What do you mean by a dummy activity
3. Mention any two applications of OR
4. What is degeneracy in a transportation problem?
5. What do you mean by an infeasible solution
6. Graphically represent x=3
7. Give the meaning of Operations Research
8. State any two Features of LPP.
9. What is a Dual
10. Convert the following into its standard format

Max Z = 8x+6y

Sub to:

10x+3y >= 120

3x+5y<= 80

Where x,y >=0

1. What do you mean by dangling of a network?
2. What do you mean by regret in decision making?

**Section B**

**(Answer any three questions).** (**3\*5=15 marks)**

1. Briefly explain the merits of linear programming
2. G.J Co have two bottling plants,one located at G and the other at J.Each plant produces three drinks in 3 flavours-orange,mango and apple.The number of bottles of the drinks produced are as follows:

|  |  |  |
| --- | --- | --- |
|  | G plant | J plant |
| Orange | 1500 | 1500 |
| Mango | 3000 | 1000 |
| Apple | 2000 | 5000 |

A market survey indicated that there will be a minimum demand for 20,000 bottles of the orange drink,40,000 bottles of Mango drink and 44,000 bottles of the apple drink.The cost of operating plant G and J are 600 and 400 respectively.Formulate an LPP to determine how many days the plants should run in order to minimise the cost while meeting the demand.

1. Which strategy should an executive choose on the basis of

a.Maximin criteria b.Maximax Criteria c.Minimax Regret Criteria d.Laplace Criteria

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Strategy 1 | Strategy 2 | Strategy 3 | Strategy 4 |
| Nature 1 | 4000 | -100 | 6000 | 18000 |
| Nature 2 | 20000 | 5000 | 400 | 0 |
| Nature 3 | 20000 | 15000 | -2000 | 1000 |

Find the Basic Feasible solution using VAM

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | D1 | D2 | D3 | D4 | supply |
| F1 | 7 | 3 | 8 | 6 | 60 |
| F2 | 4 | 2 | 5 | 10 | 100 |
| F3 | 2 | 6 | 5 | 1 | 40 |
| Demand | 20 | 50 | 50 | 80 |  |

1. In a project,the following details are known.Draw the network diagram

Activities A,B,E may be started at the beginning of the project

When activity B is complete,D and G may start

When activity A is complete,F can start

C can start only when both F and D are complete and is a final activity

H can start after G is complete and is a final activity

K must follow the finish of E

L cannot start until G and K are complete

J can start when L is complete and is a final activity

**Section C**

 **Answer any two questions**  ( **2\*10=20 marks)**

1. A manufacturer wants to transport products from 3 different factories to three different destinations. The kms from each factory to each destination are given below and the costs of transportation is Rs 10 per unit per km.Find out the optimal transportation schedule.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | D1 | D2 | D3 | Supply |
| F1 | 50 | 30 | 220 | 1 |
| F2 | 90 | 45 | 170 | 3 |
| F3 | 50 | 200 | 50 | 4 |
| Demand | 3 | 3 | 2 | 8 |

1. The time estimates for the activities of a PERT network are given below: Draw a network diagram, determine the critical path and estimate the standard deviation and variance of the project.

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | TO | TM | TP |
| 1-2 | 1 | 1 | 7 |
| 1-3 | 1 | 4 | 7 |
| 1-4 | 2 | 2 | 8 |
| 2-5 | 1 | 1 | 1 |
| 3-5 | 2 | 5 | 14 |
| 4-6 | 2 | 5 | 8 |
| 5-6 | 3 | 6 | 15 |

1. Solve the Following LPP using Simplex Method:

Max Z=30x1+40x2+20x3

Sub to:

10x1+12x2+7x3<= 10,000

7x1+10x2+8x3<= 8000

x1+x2+x3<= 1000

Where x1,x2, x3 >= 0.

**Section D**

**COMPULSORY Question (1\*15=15 marks)**

1. A firm has 4 salesmen and 3 customers The probability that each salesman can sell the product to a customer is given below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Sales man 1 | Sales man2 | Salesman 3 | Salesman 4 |
| Customer1 | 0.5 | 0.8 | 0.5 | 0.3 |
| Customer2 | 0.6 | 0.2 | 0.6 | 0.4 |
| Customer 3 | 0.9 | 0.7 | 0.2 | 0.8 |

Given that the profit obtained by selling one unit to Customer 1 is 400,customer 2 is 250 and customer 3 is 320,find out the optimal assignment to maximise the profits.