**Code No.MB203C**

**METHODIST COLLEGE OF ENGINEERING & TECHNOLOGY**

**(An Autonomous Institution)**

**M.B.A II-Semester (Supplementary) Examination, FEB-2024**

**Subject: OPERATIONS RESEARCH**

**Time: 3 hours Max.Marks:60**

**Note: Missing data, if any, maybe suitably assumed.**

**PART-A**

**Answer All the questions.(05X2M=10M)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q.No** | **Questions** | **Marks** | **CO** | **BTL** |
| **1 a** | What is Linear Programming Problem or LPP? | **2** |  **I** |  **BL1** |
| **b** | What is an Artificial variable? | **2** | **II** | **BL1** |
| **c** | Explain Degenerate Transportation Problem | **2** | **III** | **BL2** |
| **d** | Define FULKERSON'S RULE | **2** | **IV** | **BL1** |
| **e** | Explain Queueing theory | **2** | **V** | **BL2** |

**PART-B**

**Answer Any Five questions**.**(5X10M=50M)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q.No.** |  | **Questions** | **Marks** | **CO** | **BTL** |
| **2** | **a** | Scope and Application of Operations Research | **10** | **I** | **BL3** |
| **b** | **Solve the given linear programming problems graphically:****Maximize: Z = 50x + 15y****and the constraints are:****5x + y ≤ 100,****x + y ≤ 50,****x ≥ 0, y ≥ 0** |  | **I** | **BL4** |
| **3** | **a** | **Find solution using Simplex methodMAX Z = 3x1 + 5x2 + 4x3subject to2x1 + 3x2 <= 82x2 + 5x3 <= 103x1 + 2x2 + 4x3 <= 15and x1,x2,x3 >= 0** | **10** | **II** | **BL5** |
| **b** | **Find solution using Simplex methodMAX Z = 30x1 + 40x2subject to3x1 + 2x2 <= 6003x1 + 5x2 <= 8005x1 + 6x2 <= 1100and x1,x2 >= 0** |  | **II** | **BL6** |
| **4** | **a** | The Hungarian algorithm: An exampleWe consider an example where four jobs (J1, J2, J3, and J4) need to be executed by four workers (W1, W2, W3, and W4), one job per worker. The matrix below shows the cost of assigning a certain worker to a certain job. The objective is to minimize the total cost of the assignment.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *J1* | *J2* | *J3* | *J4* |
| *W1* | 82 | 83 | 69 | 92 |
| *W2* | 77 | 37 | 49 | 92 |
| *W3* | 11 | 69 | 5 | 86 |
| *W4* | 8 | 9 | 98 | 23 |

 | **10** | **III** | **BL4** |
| **b** | Vogel’s Approximation Method Vogel’s Approximation Method Steps |  | **III** | **BL5** |
| **5** | **a** | **Critical path, Total float, Free float, independent float**

|  |  |
| --- | --- |
| 1-2 | 4 |
| 2-3 | 6 |
| 2-4 | 2 |
| 3-4 | 0 |
| 3-6 | 2 |
| 4-5 | 7 |
| 5-6 | 4 |
| 6-7 | 8 |
| 7-8 | 3 |

 | **10** | **IV** | **BL6** |
| **b** | Draw the network diagram and determine the critical path for the following project: | **IV** | **BL6** |  |
| **6** | **a** | **Example-1****Find Solution of game theory problem using dominance method**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Player A\Player B | B1 | B2 | B3 | B4 |
| A1 | 3 | 5 | 4 | 2 |
| A2 | 5 | 6 | 2 | 4 |
| A3 | 2 | 1 | 4 | 0 |
| A4 | 3 | 3 | 5 | 2 |

 | **10** | **V**V | **BL6**BL4 |
| **b** | **What is Simulation? Scope of Simulation Techniques** |  |  |  |
| **7** | **a** | **What is Operations Research and Why is it Important?** | **10** | **I** | **BL3** |
| **b** | Find dual from primal conversionMIN z = 3x1 - 2x2 + 4x3subject to3x1 + 5x2 + 4x3 >= 76x1 + x2 + 3x3 >= 47x1 - 2x2 - x3 <= 10x1 - 2x2 + 5x3 >= 34x1 + 7x2 - 2x3 >= 2and x1,x2,x3 >= 0 |  | **II** | **BL4** |
| **8** | **a** | **Find Solution of Travelling salesman problem (MIN case)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Work\Job | A | B | C | D | E |
| A | x | 5 | 8 | 4 | 5 |
| B | 5 | x | 7 | 4 | 5 |
| C | 8 | 7 | x | 8 | 6 |
| D | 4 | 4 | 8 | x | 8 |
| E | 5 | 5 | 6 | 8 | x |

 | **10** | **III**IV | **BL5**BL4 |
| **b** | Advantages and Disadvantages of Critical Path Method (CPM) |  |  |  |
| **9** | **a** | **Find Solution of game theory problem using saddle point**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Player A\Player B | B1 | B2 | B3 | B4 |
| A1 | 20 | 15 | 12 | 35 |
| A2 | 25 | 14 | 8 | 10 |
| A3 | 40 | 2 | 10 | 5 |
| A4 | -5 | 4 | 11 | 0 |

 | **10** | **V**I | **BL5** |
| **b** | **what is unboundedness in linear programming show graphically** |  |  | **BL3** |

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