Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov/Dec – 2018**

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| --- | --- | --- | --- |
| **Code :** | **14MS3014** | **Duration :** | **3hrs** |
| **Sub. Name :** | **APPLIED OPERATIONS RESEARCH** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div** | **Questions** | | **Course outcome** | **Marks** |
| 1. | a. | Write a historical note in brief about Operation Research. Describe the stages of development of Operations Research? | | CO1 | 10 |
| b. | What are the various applications of Operations Research? What are the limitations of the same? | | CO1 | 10 |
| (OR) | | | | | |
| 2. |  | An agriculturist has a farm with 126 acres. He produces Radish, Muttar and Potato. Whatever he raises is fully sold in the market. He gets Rs. 5 for Radish per kg, Rs. 4 for Muttar per kg and Rs 5 for Potato per kg. The average yield is 1,500 kg of Radish per acre, 1,800 kg of Muttar per acre and 1,200 kg of Potato per acre. To produce each 100 kg of Radish and Muttar and o produce each 80 kg of Potato, a sum of Rs. 12.50 has to be used for manure. Labour required for each acre to raise the crop is 6 man - days for Radish and Potato each and 5 man - days for Muttar. A total of 500 men - days at a rate of Rs. 40 per man - day are available. Formulate this problem as a linear programming problem to maximize the agriculturist's total profit. Write steps in details. | | CO3 | 20 |
| 3. | a. | How do you calculate penalties in Vogel's Approximation Method in a transportation problem? | | CO2 | 5 |
| b. | In U-V method, how will you calculate the Us and the Vs? | | CO2 | 5 |
| c. | Solve the below Assignment Problem using Hungarian Method. The table consists of processing time.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Operator | | | | | | | | Jobs |  | A | B | C | D | E | | 1 | 9 | 11 | 14 | 11 | 7 | | 2 | 6 | 15 | 13 | 13 | 10 | | 3 | 12 | 13 | 6 | 8 | 8 | | 4 | 11 | 9 | 10 | 12 | 9 | | 5 | 7 | 12 | 14 | 10 | 14 | | | CO2 | 10 |
| (OR) | | | | | |
| 4. |  | Using Vogel’s Approximation Method, find the Initial Basic Feasible Solution.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | **D1** | **D2** | **D3** | **D4** | **Capacity** | | **P1** | 20 | 30 | 50 | 15 | 7 | | **P2** | 70 | 35 | 40 | 60 | 10 | | **P3** | 40 | 12 | 60 | 25 | 18 | | **Demand** | 5 | 8 | 7 | 15 | 35 | | | CO3 | 20 |
|  | | | | | |
| 5. |  | | Explain the steps involved in Simplex Method for a Maximization Problem. | CO2 | 20 |
| (OR) | | | | | |
| 6. |  | | Solve the following Transportation problem using North west Corner Rule and find the optimal solution using MODI method.   |  |  |  |  | | --- | --- | --- | --- | | 5 | 1 | 8 | 12 | | 9 | 4 | 0 | 14 | | 17 | 6 | 7 | 4 | | 9 | 10 | 11 |  | | CO3 | 20 |
|  | | | | | |
| 7. | a. | | Define the term project management. Describe the steps in CPM/PERT techniques. | CO1 | 10 |
| b. | | How will you represent an event in a network diagram? Explain with an example. | CO2 | 10 |
| (OR) | | | | | |
| 8. |  | | A firm is considering replacement of a machine, whose cost price is Rs.1,20,000/- and the scrap value is Rs.20,000/-. The running (maintenance and operating) costs of the machine are as follows. Find when the machine needs to be replaced.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Year** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | **Running Cost** | 2,000 | 5,000 | 8,000 | 12,000 | 18,000 | 25,000 | 32,000 | 40,000 | | CO3 | 20 |
| **Compulsory:** | | | | | |
| 9. |  | | Details of a project given below.   1. Construct the CPM network. 2. Determine the critical path and project completion time. 3. Compute total floats and free floats for non-critical activities  |  |  |  | | --- | --- | --- | | Activity | Immediate Predecessor | Duration (Months) | | A | - | 2 | | B | - | 5 | | C | - | 4 | | D | B | 5 | | E | A | 7 | | F | A | 3 | | G | B | 3 | | H | C, D | 6 | | I | C, D | 2 | | J | E | 5 | | K | F, G, H | 4 | | L | F, G, H | 3 | | M | I | 12 | | N | J, K | 8 | | CO3 | 20 |