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**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

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

**End Semester Examination – Nov/Dec - 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **12MA215** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **Operations Research** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Marks** |
| **PART-A(10X1=10 MARKS)** | | |
| 1. | Define basic feasible solution. | (1) |
| 2. | In two phase method, the cost of an artificial variable is \_\_\_\_\_\_\_\_\_\_\_. | (1) |
| 3. | If dual has an unbounded solution, then the primal has an \_\_\_\_\_\_\_\_\_\_\_\_\_ solution. | (1) |
| 4. | Define balanced transportation problem. | (1) |
| 5. | \_\_\_\_\_\_\_\_\_\_\_\_ method is used to determine assignment schedule. | (1) |
| 6. | The optimum length of time between orders is \_\_\_\_\_\_\_\_\_\_. | (1) |
| 7. | Define sequencing problem. | (1) |
| 8. | The probability that no unit in the queue is \_\_\_\_\_\_\_\_\_\_\_\_. | (1) |
| 9. | Define Monte – Carlo simulation. | (1) |
| 10. | Define group replacement policy. | (1) |

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| **PART B(5 X 3= 15 MARKS)** | | |
| 11 | Reduce the following L.P.P to its standard form :  Maximize z = 3x1 + 4x2 + 6x3  subject to the constraints 2x1 + x2 + 2x3 ≥ 6, 3x1 + 2x2 = 8, 7x1 - 3x2 + 5x3 ≤ 9, x1, x2, x3≥ 0 . | (3) |
| 12 | Obtain an initial basic feasible solution to the following transportation problem using the north-west corner rule :   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | D | E | F | G | Available | | A | 3 | 7 | 6 | 4 | 5 | | B | 2 | 4 | 3 | 2 | 2 | | C | 4 | 3 | 8 | 5 | 3 | | Requirement | 3 | 3 | 2 | 2 |  | | (3) |
| 13 | Solve the following assignment problem :   |  |  |  |  | | --- | --- | --- | --- | |  | M1 | M2 | M3 | | J1 | 120 | 100 | 80 | | J2 | 80 | 90 | 110 | | J3 | 110 | 140 | 120 | | (3) |
| 14 | In a railway marshalling yard, goods train arrive at a rate of 30 trains per day. Assuming that the inter-arrival time follows an exponential distribution and the service time distribution is also exponential with an average 36 minutes. Calculate the mean queue length. | (3) |
| 15 | Describe the various types of replacement situations | (3) |

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| **PART C(5 X 15= 75 MARKS)** | | | |
| 16. | a. | Use simplex method to Maximize z = 4x1 + 10x2  subject to the constraints 2x1 + x2 ≤ 50, 2x1 + 5x2 ≤ 100, 2x1 + 3x2 ≤ 90,  x1, x2 ≥ 0. | 15 |
| (OR) | | | |
| 17. | a. | Use Big-M method to Maximize z = 3x1 - x2  subject to the constraints 2x1 + x2 ≥ 2, x1 + 3x2 ≤ 3, x2 ≤ 4, x1, x2 ≥ 0. | 15 |
| 18. | a. | Using duality method, solve Min z = 4x1 + 3x2 + 6x3  subject to the constraints x1 + x3 ≥ 2, x2 + x3 ≥ 5, x1, x2 , x3 ≥ 0. | 15 |
| (OR) | | | |
| 19. | a. | Solve the following transportation problem :   |  |  |  |  |  | | --- | --- | --- | --- | --- | | From | To | | | Available | | A | B | C | | I | 50 | 30 | 220 | 1 | | II | 90 | 45 | 170 | 3 | | III | 250 | 200 | 50 | 4 | | Requirement | 4 | 2 | 2 |  | | 15 |
| 20. | a. | Solve the following assignment problem :   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | M1 | M2 | M3 | M4 | | J1 | 10 | 25 | 15 | 20 | | J2 | 15 | 30 | 5 | 15 | | J3 | 35 | 20 | 12 | 24 | | J4 | 17 | 25 | 24 | 20 | | 15 |
| (OR) | | | |
| 21. | a. | The demand for an item in a company is 18000 units/year, and the company can produce the item at a rate of 3000/month. The cost of one set up is Rs. 500 and the holding cost is 1 unit/month is 15 paise. Determine the optimum manufacturing quantity and the total cost per year assuming the cost of 1 unit as Rs. 2.00. | 15 |
| 22. | a. | An item is produced at the rate of 50 items per day. The demand occurs at the rate of 25 items per day. If the set up cost is Rs. 180 per set up and holding cost is Rs 0.01 per unit of item per day, find the economic lot size for one run, assuming that the shortages are not permitted. Also find the time of cycle and minimum total cost for one run. | 15 |
| (OR) | | | |
| 23. | a. | Determine the optimal sequence of jobs that minimizes the total elapsed time based on the following information processing time on machines is given in hours and passing is not allowed:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Job | A | B | C | D | E | F | G | | Machine M1 | 30 | 120 | 50 | 20 | 90 | 100 | 7 | | Machine M2 | 80 | 100 | 90 | 60 | 30 | 10 | 3 | | 15 |
| 24. | a. | The cost of a new machine is Rs 5000. The maintenance cost of nth year is given by cn = 500(n-1), n = 1,2,… Suppose that the discount rate per year is 0.5. After how many years it will be economical to replace the machine by a new one? | 15 |
| (OR) | | | |
| 25. | a. | Bright Bakery keeps stock of a popular brand of cake. Previous experience indicates the daily demand is given here.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Daily Demand | 0 | 10 | 20 | 30 | 40 | 50 | | Probability | 0.01 | 0.2 | 0.15 | 0.5 | 0.12 | 0.02 |   Consider the following sequence of random numbers 48, 78, 19, 51, 56, 77, 15, 14, 68, 09. Using this sequence, stimulate the demand for next 10 days and the daily average demand for the cakes on the basis of stimulated data. | 15 |

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