**18MED11**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular / Supplementary) DEGREE EXAMINATION** | | | |
| **January, 2022** | **Mechanical Engineering** | | |
| **Fifth Semester** | **OPERATIONS RESEARCH** | | |
| **Time:** Three Hours | | **Maximum :** 50 Marks | |
| *Answer Question No.1 compulsorily.* | | | (10X1 = 10 Marks) |
| *Answer ONE question from each unit.* | | | (4X10=40 Marks) |

1**.** Answer all questions

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| a | Define Operation Research |
| b | Write the applications of the LPP model |
| c | What is an artificial variable |
| d | Explain unbalanced transportation problem |
| e | What is degeneracy? |
| f | Define the term Reneging in queuing theory |
| g | Difference between pure and mixed strategy games |
| h | What is payoff matrix |
| i | Write the limitations of simulation |
| j | List the application areas of dynamic programming |
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**Unit - I**

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| 2. | Using graphical procedure, solve the following LPP  Min Z = –x1 + 2x2  Subject to –x1 + 3x2≤ 10  x1+ x2≤ 6  x1- x2≤ 2  x1, x2≥ 0  and x1, x2 ≥0 | 10 M |
| **(OR)** | | |
| 3. | Use Big-M method to solve the following LPP  Max Z= 4x1+5x2 -3x3  Subjected to x1+x2+x3=10  x1-x2 ≥1  2x1+3x2+x3≤40  and x1, x2,x3 ≥0 | 10 M |
| **Unit - II** | | |
| 4. | Solve the following Transportation problem to find minimum cost.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | A | B | C | D | E |  | | X | 5 | 8 | 6 | 6 | 3 | 80 | | Y | 4 | 7 | 7 | 6 | 6 | 50 | | Z | 8 | 4 | 6 | 6 | 3 | 90 | |  | 40 | 40 | 50 | 40 | 80 |  |   **P.T.O**.  **18MED11** | 10 M |
|  | **(OR)** |  |

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| 5. | A company has five jobs V, W, X, Y and Z and five machines A, B, C, D and E. The given matrix shows the return in Rs. of assigning a job to a machine. Assign the jobs to machines so as to maximize the total returns.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Jobs | A | B | C | D | E | | V | 5 | 11 | 10 | 12 | 4 | | W | 2 | 4 | 6 | 3 | 5 | | X | 3 | 12 | 5 | 14 | 6 | | Y | 6 | 14 | 4 | 11 | 7 | | Z | 7 | 9 | 8 | 12 | 5 | | 10M |
| 6. | **Unit – III**  A person repairing radios find that the time spent on the radio sets has exponential distribution with mean 20 minutes. If the radios are repaired in the order in which they come in and their arrival is approximately. Poisson with an average rate of 15 for 8-hour day. What is the repairman’s expected idle time each day? How many jobs are ahead of the average set just brought in?  **(OR)** | 10 M |
| 7.a | Solve the Game with the payoff matrix   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | B1 | B2 | B3 | B4 | | A1 | 1 | 7 | 3 | 4 | | A2 | 5 | 6 | 4 | 5 | | A3 | 7 | 2 | 0 | 3 | | 5 M |
| 7.b | A and B play a game in which each has three coins a 5P, a 10P and 20P. Each player selects a coin without the knowledge of the other’s choice. If the sum of the coins is an odd amount, A wins B’s coin, if the sum is even, B win’s A’s coin. Find the best strategy for each player and the value of game. | 5 M |

**Unit - IV**

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| 8. | Solve using dynamic Programming  Max Z=3x1+4x2  Subjected to constraints2x1+5x2≤ 120  2x1-+x2≤ 40  and x1, x2 ≥0 | 10 M |
| **(OR)** | | |
| 9. | A bakery keeps stock of a popular brand of cake. Daily demand based on the past experience is given below:   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Daily Demand | 0 | 15 | 25 | 35 | 45 | 50 | | Probability | 0.01 | 0.15 | 0.20 | 0.5 | 0.12 | 0.02 |   Consider the following sequence of random numbers.  48,78,9,51,56,77,15,14,68 and 9.   1. Using the sequence, simulate the demand for the next 10 days. 2. Find the stock situation if the owner of the bakery decides to make 35 cakes every day.   Also, estimate the daily average demand for the cakes on the basis of the simulated data.  **download** | 10 M |
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