**18MED11**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
| **February, 2021** | **Mechanical Engineering** | | |
| **Third Semester** | **OPERATIONS RESEARCH** | | |
| **Time:** Three Hours | | **Maximum :** 50 Marks | |
| *Answer ALL Questions from PART-A.* | | | (1X10=10 Marks) |
| *Answer* ***ANY FOUR*** *questions from PART-B.* | | | (4X10=40 Marks) |

**PART-A**

1**.** Answer all questions

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| a | What are the different phases of Operation Research |
| b | Write the essential characteristics of the LPP model |
| c | What is the use of artificial variable |
| d | Write the difference between balanced problem and unbalanced problem |
| e | What is degeneracy? |
| f | Define the term Reneging in queuing theory |
| g | Discuss the basic elements of waiting line situation |
| h | What is saddle point |
| i | Define simulation |
| j | Write the expression of congruence method |
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**PART-B**

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| 2. | Using graphical procedure, solve the following LPP    subjected to      and | 10 M |
| 3. | Use Big-M method to solve the following LPP  Maximize  subjected to      and | 10 M |
| 4. | Solve the following Transportation problem to maximize the profit.     |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Factory** | **Profit/Rs Unit** | | | | **Supply** | | **A** | **B** | **C** | **D** | | **1** | 40 | 25 | 22 | 33 | **100** | | **2** | 44 | 35 | 30 | 30 | **30** | | **3** | 38 | 38 | 28 | 30 | **70** | | **Demand** | **40** | **20** | **60** | **30** |  |   **P.T.O**.  **18MED11** | 10 M |
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| 5. | Solve the following assignment problem   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **J1** | **J2** | **J3** | **J4** | | **W1** | 10 | 15 | 24 | 30 | | **W2** | 16 | 20 | 28 | 10 | | **W3** | 12 | 18 | 30 | 16 | | **W4** | 9 | 24 | 32 | 18 | | 10M |
| 6. | On the average 96 patients per 24 hr day require the service of an emergency clinic. Also, on the average, a patient requires 10 minutes of active attention. Assume that the facility can handle only one emergency at a time. Suppose that it costs the clinic Rs 100 per patient treated to obtain an average servicing time of 10 minutes, and that each minute of decrease in this average time would cost the clinic Rs 10 per patient treated. How much would have to be budgeted by the clinic to decrease the average size of the queue from  patients to  patient? | 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 person repairing cell phones finds that the time spent on the cell phones has exponential distribution with mean 20 minutes. If the cell phones 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 cell phone just brought in? | 5 M |

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| 8. | Solve using dynamic Programming  Maximize  subjected to constraints    and | 10 M |
| 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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