



R18 Regulation

Subject code:2P7CB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VII Semester Supplementary Examinations, November 2025

OPERATION RESEARCH

(ME)

Maximum Marks: 70

Date: 26.11.2025

Duration: 3 hours

- Note: 1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	What is Operations research?	2M	1	L1
2	What is a model? List the various classification schemes of Operations Research models.	2M	1	L1
3	How the assignment problem can be viewed as a linear programming problem?	2M	2	L1
4	Distinguish between assignment and allocation problem	2M	2	L1
5	What is dynamic programming	2M	3	L1
6	Explain the characteristics of processing n jobs through two machines?	2M	3	L1
7	What are the advantages of LPM.	2M	4	L1
8	Define assignment problem	2M	4	L1
9	What is the main limitation of graphical method of linear programming	2M	5	L1
10	What is the importance of queuing line theory in O.R	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL																																			
11	What are the characteristics and application of operation research	10M	1	L2																																			
OR																																							
12	Minimize $Z=5x_1+4x_2+3x_3$ subject to the constraints $x_1+x_2+x_3 = 100$; $x_1 \leq 20$; $x_2 \geq 30$; $x_3 \leq 40$ and $x_1, x_2, x_3 \geq 0$ Use big M method.	10M	1	L2																																			
13	Solve the following transportation problem. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>D1</th> <th>D2</th> <th>D3</th> <th>D4</th> <th>D5</th> <th>Supply</th> </tr> </thead> <tbody> <tr> <th>S1</th> <td>4</td> <td>2</td> <td>3</td> <td>2</td> <td>6</td> <td>8</td> </tr> <tr> <th>S2</th> <td>5</td> <td>4</td> <td>5</td> <td>2</td> <td>1</td> <td>12</td> </tr> <tr> <th>S3</th> <td>6</td> <td>5</td> <td>4</td> <td>7</td> <td>3</td> <td>14</td> </tr> <tr> <th>Demand</th> <td>4</td> <td>4</td> <td>6</td> <td>8</td> <td>8</td> <td></td> </tr> </tbody> </table>		D1	D2	D3	D4	D5	Supply	S1	4	2	3	2	6	8	S2	5	4	5	2	1	12	S3	6	5	4	7	3	14	Demand	4	4	6	8	8		10M	2	L2
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OR																																							

14	<p>Three jobs are to be done by 4 machines .Each job can be assigned to one machine only. The cost of each job on each machine is given in the following table</p> <table border="1"> <tr> <td></td> <td>M1</td> <td>M2</td> <td>M2</td> <td>M4</td> </tr> <tr> <td>J1</td> <td>18</td> <td>24</td> <td>28</td> <td>32</td> </tr> <tr> <td>J2</td> <td>8</td> <td>13</td> <td>17</td> <td>19</td> </tr> <tr> <td>J3</td> <td>10</td> <td>15</td> <td>19</td> <td>22</td> </tr> </table> <p>What are the job assignments which will minimize the total cost?</p>		M1	M2	M2	M4	J1	18	24	28	32	J2	8	13	17	19	J3	10	15	19	22	10M	2	L2																																				
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15	<p>Find the sequence that minimizes the total elapsed time required to complete the following jobs.</p> <table border="1"> <tr> <td></td> <td></td> <td colspan="6">Processing times in hours</td> </tr> <tr> <td>No. of jobs</td> <td></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>:</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Machine A</td> <td></td> <td>4</td> <td>8</td> <td>3</td> <td>6</td> <td>7</td> <td>5</td> </tr> <tr> <td>:</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Machine B</td> <td></td> <td>6</td> <td>3</td> <td>7</td> <td>2</td> <td>8</td> <td>4</td> </tr> <tr> <td>:</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>			Processing times in hours						No. of jobs		1	2	3	4	5	6	:								Machine A		4	8	3	6	7	5	:								Machine B		6	3	7	2	8	4	:								10M	3	L2
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16	<p>A truck owner finds from his past records that the maintenance cost per year of a truck whose purchase price is Rs.8000, are given below:</p> <p>Year:</p> <table border="1"> <tr> <td></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> <tr> <td>Maintenance cost (Rs):</td> <td>1000</td> <td>1300</td> <td>1700</td> <td>2200</td> <td>2900</td> <td>3800</td> <td>4800</td> <td>6000</td> </tr> <tr> <td>Resale Price :</td> <td>4000</td> <td>2000</td> <td>1200</td> <td>600</td> <td>500</td> <td>400</td> <td>400</td> <td>400</td> </tr> </table> <p>Determine at what time it is profitable to replace the truck?</p>		1	2	3	4	5	6	7	8	Maintenance cost (Rs):	1000	1300	1700	2200	2900	3800	4800	6000	Resale Price :	4000	2000	1200	600	500	400	400	400	10M	3	L2																													
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17	<p>(a) Write down limitations of game theory. (b) Distinguish between deterministic and probabilistic games.</p>	5M 5M	4	L2																																																								
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18	<p>Find the sequence that minimizes the total time required to perform the following jobs on three machines in the order ABC. The processing time (in hours) are given below.</p> <table border="1"> <tr> <td>Job</td> <td>Machine A</td> <td>Machine B</td> <td>Machine C</td> </tr> <tr> <td>1</td> <td>4</td> <td>9</td> <td>14</td> </tr> <tr> <td>2</td> <td>13</td> <td>7</td> <td>15</td> </tr> <tr> <td>3</td> <td>6</td> <td>5</td> <td>10</td> </tr> <tr> <td>4</td> <td>3</td> <td>7</td> <td>13</td> </tr> <tr> <td>5</td> <td>10</td> <td>4</td> <td>9</td> </tr> <tr> <td>6</td> <td>12</td> <td>2</td> <td>14</td> </tr> </table>	Job	Machine A	Machine B	Machine C	1	4	9	14	2	13	7	15	3	6	5	10	4	3	7	13	5	10	4	9	6	12	2	14	10M	4	L2																												
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19	<p>In a telephone booth the arrival follow poisson distribution with an average of 9 minutes between two consecutive arrivals, The duration of a telephone call is exponential with an average of 3 minutes.</p> <p>(a) find the probability that a person arriving at the booth has to wait (b) Find the average queue length (c)The company will install a second booth if a customer has to wait for a phone for at least 4 minutes. If so find the increase in the flow of arrivals in order that another booth will be installed.</p>	5M 5M	5	L2																																								
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20	<p>The owner of four fruit shops has purchased 6 boxes of apple .The quantity in demand and the profits are different at these sores .The following table gives the total profit at each store for various numbers of boxes allotted.</p> <table border="1"> <thead> <tr> <th>Number of boxes</th> <th>Stores 1</th> <th>Stores 2</th> <th>Stores 3</th> <th>Stores 4</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>4</td> <td>2</td> <td>6</td> <td>2</td> </tr> <tr> <td>2</td> <td>6</td> <td>4</td> <td>8</td> <td>3</td> </tr> <tr> <td>3</td> <td>7</td> <td>6</td> <td>8</td> <td>4</td> </tr> <tr> <td>4</td> <td>7</td> <td>8</td> <td>8</td> <td>4</td> </tr> <tr> <td>5</td> <td>7</td> <td>9</td> <td>8</td> <td>4</td> </tr> <tr> <td>6</td> <td>7</td> <td>10</td> <td>8</td> <td>4</td> </tr> </tbody> </table>	Number of boxes	Stores 1	Stores 2	Stores 3	Stores 4	0	0	0	0	0	1	4	2	6	2	2	6	4	8	3	3	7	6	8	4	4	7	8	8	4	5	7	9	8	4	6	7	10	8	4	10M	5	L2
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