

**GUJARAT UNIVERSITY****BE ATKT EXAM 2013****Branch: IT Engineering****Semester: VI****Subject: Elective – OPERATION RESEARCH**

<b>1</b>	Define dual of LPP.																																				
<b>2</b>	What is the importance of the duality concept?																																				
<b>3</b>	State the optimality condition in dual simplex method.																																				
<b>4</b>	What is the difference between regular simplex method and dual simplex method?																																				
<b>5</b>	What do you understand by transportation problem?																																				
<b>6</b>	List any three approaches used with T.P for determining the starting solution. What do you mean by degeneracy in a T.P?																																				
<b>7</b>	Explain Basic Feasible Solution with suitable example.																																				
<b>8</b>	Explain Optimal Solution with suitable example.																																				
<b>9</b>	Explain Occupied cells and non- Occupied cells with suitable example. Basic Feasible Solution																																				
<b>10</b>	Explain Rim condition with suitable example.																																				
<b>11</b>	Explain Unbalanced Transportation Problem with suitable example.																																				
<b>12</b>	A manufacturer has to supply his customer with 600 units of his product per year. Shortages are not allowed and the storage cost amounts to Rs 0.60 per unit per year. The set up cost per run is Rs 80. Find the optimum run size and the minimum average yearly cost.																																				
<b>13</b>	The standard weight of a special purpose brick is 5 kg and it contains two basic ingredients B1 and B2. B1 costs Rs. 5 per kg and B2 costs Rs 8 per kg. Strength considerations dictate that the brick should contain not more than 4 kg of B1 and a minimum of 2 kg of B2. Since the demand for the product is likely to be related to the price of the brick, find out graphically the minimum cost of the brick satisfying the above conditions.																																				
<b>14</b>	<p>A small project is composed of seven activities whose time estimates are listed in the table as follows:</p> <table border="1" data-bbox="571 1444 1157 1713"> <thead> <tr> <th colspan="4">Estimated duration (weeks)</th> </tr> <tr> <th>Activity</th> <th>Optimistic</th> <th>Most likely</th> <th>Pessimistic</th> </tr> </thead> <tbody> <tr> <td>1-2</td> <td>1</td> <td>1</td> <td>7</td> </tr> <tr> <td>1-3</td> <td>1</td> <td>4</td> <td>7</td> </tr> <tr> <td>2-4</td> <td>2</td> <td>2</td> <td>8</td> </tr> <tr> <td>2-5</td> <td>1</td> <td>1</td> <td>1</td> </tr> <tr> <td>3-5</td> <td>2</td> <td>5</td> <td>14</td> </tr> <tr> <td>4-6</td> <td>2</td> <td>5</td> <td>8</td> </tr> <tr> <td>5-6</td> <td>3</td> <td>6</td> <td>15</td> </tr> </tbody> </table> <p>Draw the project network</p> <ol style="list-style-type: none"> <li>Calculate the variance and standard deviation of project length</li> <li>What is the probability that the project will be completed 4 weeks earlier than expected?</li> </ol>	Estimated duration (weeks)				Activity	Optimistic	Most likely	Pessimistic	1-2	1	1	7	1-3	1	4	7	2-4	2	2	8	2-5	1	1	1	3-5	2	5	14	4-6	2	5	8	5-6	3	6	15
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	<p>Draw network diagram and find out floats for all the activities. Calculate the variance and standard deviation of the project length. Find out the probability of completing the project at least 4 weeks earlier than expected time.</p>																																		
<b>16</b>	<p>Formulate the given LP problem by applying simplex method. <math>MAX Z = 4x + 3y</math> Subject to constraints, <math>2x + y \leq 1000, x + y \leq 800, x \leq 400, y \leq 700</math> and <math>x, y \geq 0</math> (140) and solve by any method.</p>																																		
<b>17</b>	<p>What is OR? Explain the role of OR in Decision Making process with its applications.</p>																																		
<b>18</b>	<p>Determine an initial basic feasible solution to the following transportation problem by using a NWCM method.</p> <table border="1"> <thead> <tr> <th></th> <th>D1</th> <th>D2</th> <th>D3</th> <th>D4</th> <th>Supply</th> </tr> </thead> <tbody> <tr> <th>S1</th> <td>11</td> <td>13</td> <td>17</td> <td>14</td> <td>250</td> </tr> <tr> <th>S2</th> <td>16</td> <td>18</td> <td>14</td> <td>10</td> <td>300</td> </tr> <tr> <th>S3</th> <td>21</td> <td>24</td> <td>13</td> <td>10</td> <td>400</td> </tr> <tr> <th>Demand</th> <td>200</td> <td>225</td> <td>275</td> <td>250</td> <td></td> </tr> </tbody> </table>						D1	D2	D3	D4	Supply	S1	11	13	17	14	250	S2	16	18	14	10	300	S3	21	24	13	10	400	Demand	200	225	275	250	
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<b>19</b>	<p>Explain Degenerate Solution with suitable example.</p>																																		
<b>20</b>	<p>Explain Non- Degenerate Solution with suitable example.</p>																																		
<b>21</b>	<p>Define Operation Research. Write Characteristics and limitation of Operation Research.</p>																																		
<b>22</b>	<p>A firm manufacture 3 Products A, B and C. The Profits are Rs.3, Rs.2, and Rs.4 respectively. The firm has two machine C and D which requires processing time 4,3,6 and 3,2,4 minutes respectively on each machine for each product. Machine C and D have 2000 and 2500 machine minutes, respectively. The firm must manufacture 100 A's, 200 B's and 500 C's, but not more than 150 A's. Set up linear programming Problem to maximize the profit.</p>																																		
<b>23</b>	<p>Use simplex method to solve following LPPs Maximize <math>Z = 3X_1 + 2X_2</math> Subject to <math>X_1 + X_2 \leq 4, X_1 - X_2 \leq 2, X_1 \geq 0</math> and <math>X_2 \geq 0</math></p>																																		
<b>24</b>	<p>What is an assignment model? Explain difference between a transportation and an assignment problem</p>																																		
<b>25</b>	<p>Define PERT. What is Critical Path ? Explain Difference between C.P.M and P.E.R.T.</p>																																		
<b>26</b>	<p>A machine costs Rs. 10,000. The following table shows the scrap value of the machine at the end of different years and its maintenance cost up to the end of</p>																																		

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	<p>the given year. You are required to find the economical year of replacement.</p> <table border="1"><tr><td><b>1</b></td><td><b>500</b></td><td><b>5000</b></td></tr><tr><td><b>2</b></td><td><b>500</b></td><td><b>4500</b></td></tr><tr><td><b>3</b></td><td><b>600</b></td><td><b>3500</b></td></tr><tr><td><b>4</b></td><td><b>650</b></td><td><b>3000</b></td></tr><tr><td><b>5</b></td><td><b>700</b></td><td><b>2500</b></td></tr><tr><td><b>6</b></td><td><b>800</b></td><td><b>2500</b></td></tr></table>	<b>1</b>	<b>500</b>	<b>5000</b>	<b>2</b>	<b>500</b>	<b>4500</b>	<b>3</b>	<b>600</b>	<b>3500</b>	<b>4</b>	<b>650</b>	<b>3000</b>	<b>5</b>	<b>700</b>	<b>2500</b>	<b>6</b>	<b>800</b>	<b>2500</b>
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<b>27</b>	<p>Explain Characteristics of the queuing system. Explain the queuing models indicated by the following notations.</p> <p>i) (M/D/1): (FCFS/<math>\infty/\infty</math>) ii) (M/M/1): (FCFS/N/N) iii) (D/D/1): (FCFS/<math>\infty/\infty</math>)</p>																		
<b>28</b>	<p>What is a replacement problem ? Describe some important replacement situation. Also discuss group replacement problem.</p>																		
<b>29</b>	<p>What is queue ? Explain basic element of queues. Give some application of queuing theory.</p>																		
<b>30</b>	<p>A self service store employs one cashier at its counter. An average of nine customers arrive every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service rate, find</p> <p>a) Avg. number of customer in the system. b) Avg. number of customer in queue or average queue length. c) Avg. time a customer spends in the system. d) Avg. time a customer waits before being served.</p>																		
<b>31</b>	<p>What is Monte-Carlo Simulation? Explain any two method for random number generation.</p>																		
<b>32</b>	<p>A chemical mixture consists of three raw materials A, B and C costing Rs. 20, Rs. 30 and Rs. 40 per kg. The specifications of the mixture are as follows:</p> <p>i) The mix must contain at least 20% of B ii) The mix should not contain more than 40% of A iii) The mix must contain at least 10% of C</p> <p>Determine the LP model only, to find the least cost mix for a batch of 1000 kg of the chemical mixture.</p>																		
<b>33</b>	<p>Explain Characteristics of the queuing system. Explain the queuing models indicated by the following notations.</p> <p>i) (M/D/1): (FCFS/<math>\infty/\infty</math>) ii) (M/M/1): (FCFS/N/N) iii) (D/D/1): (FCFS/<math>\infty/\infty</math>)</p>																		

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<b>34</b>	Explain the procedure for determining Minimal Spanning tree
<b>35</b>	Explain Individual replacement versus group replacement.
<b>36</b>	A manufacture of furniture makes two products chairs and tables. Processing these Products is done on two machine A and B. A chair requires 2 hours on machine A and 6 hours on Machine B. A table requires 5 hours on Machine A and No time on machine B. There are 16 hours of time per day available on Machine A and 30 hours on Machine B. Profit gained by the manufacturer from a Chair and a table is Rs 2 and Rs 10 respectively. Solve this problem graphically to maximize the profit.
<b>37</b>	Explain BIG-M Method with suitable example.
<b>38</b>	What is an assignment model ? Explain difference between a transportation and an assignment problem
<b>39</b>	Define PERT. What is Critical Path? Explain Difference between C.P.M and P.E.R.T.
<b>40</b>	What is queue? Explain basic element of queues. Give some application of queuing theory.