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Second Semester MBA Degree Examination, June/July 2026 Operation Research

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FOUR full questions from Q.No.1 to Q.No.7.
2. Question No. 8 is compulsory.
3. M : Marks , L: Bloom's level , C: Course outcomes.*

			M	L	C																										
Q.1	a.	Define Operation Research.	3	L2	C01																										
	b.	Discuss the application of Operation Research.	7	L2	C01																										
	c.	Briefly discuss the operations research models.	10	L2	C01																										
Q.2	a.	What is the basic feasible solution? Mention the type of basic feasible solution.	3	L1	C02																										
	b.	Vitamins B1 and B2 are found in two foods F1 and F2. 1 unit of F1 contains 3 units of B1 and 4 units of B2. 1 unit of F2 contains 5 units of B1 and 3 units of B2 respectively. Minimum daily prescribed consumption of B1 & B2 is 50 and 60 units respectively. Cost per unit of F1 & F2 is Rs. 6 & Rs. 3 respectively. Formulate as LPP.	7	L4	C02																										
	c.	Solve the following LPP by graphical method $Z_{\max} = 3x_1 + 4x_2$ Subject to $x_1 + x_2 \leq 450$ $2x_1 + x_2 \leq 600$ $x_1, x_2 \geq 0$	10	L4	C02																										
Q.3	a.	What are the objectives of scheduling?	3	L1	C02																										
	b.	What are the different criteria for decision making under uncertainty? Explain.	7	L1	C02																										
	c.	Four professors are each capable of teaching any one of the four different subjects. Class preparation time (in hrs) for different topics varies from professor to professor and is given in the table. Each professor should be assigned only one subject. Find the schedule so as to minimize the total subject preparation time for all subjects/ professor <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Subject</th><th>S1</th><th>S2</th><th>S3</th><th>S4</th></tr> </thead> <tbody> <tr> <td rowspan="4">Professor</td><td>P1</td><td>2</td><td>10</td><td>9</td><td>7</td></tr> <tr> <td>P2</td><td>15</td><td>4</td><td>14</td><td>8</td></tr> <tr> <td>P3</td><td>13</td><td>14</td><td>16</td><td>11</td></tr> <tr> <td>P4</td><td>3</td><td>15</td><td>13</td><td>8</td></tr> </tbody> </table>	Subject		S1	S2	S3	S4	Professor	P1	2	10	9	7	P2	15	4	14	8	P3	13	14	16	11	P4	3	15	13	8	10	L4
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Q.4	a.	What is Degeneracy?	3	L1	C02																																		
	b.	Solve the following transportation to find initial fisible solution by VAM. <table border="1"><thead><tr><th>Destination/ Source</th><th>D1</th><th>D2</th><th>D3</th><th>D4</th><th>Availability</th></tr></thead><tbody><tr><td>S1</td><td>21</td><td>16</td><td>25</td><td>13</td><td>11</td></tr><tr><td>S2</td><td>17</td><td>18</td><td>14</td><td>23</td><td>13</td></tr><tr><td>S3</td><td>32</td><td>27</td><td>18</td><td>41</td><td>19</td></tr><tr><td>Requirement</td><td>6</td><td>10</td><td>12</td><td>15</td><td>43</td></tr></tbody></table>	Destination/ Source	D1	D2	D3	D4	Availability	S1	21	16	25	13	11	S2	17	18	14	23	13	S3	32	27	18	41	19	Requirement	6	10	12	15	43	7	L4	C02				
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	c.	A company is Spending Rs 1,000 everyday on transportation of its units from three plants to four distributions centers. The supply and demand units with units cost of transportation are given below. What can be the maximum saving to the company by optimum scheduling? <table border="1"><thead><tr><th rowspan="2">Plant</th><th colspan="4">Distribution Centre</th><th rowspan="2">Capacity</th></tr><tr><th>D₁</th><th>D₂</th><th>D₃</th><th>D₄</th></tr></thead><tbody><tr><td>P₁</td><td>19</td><td>30</td><td>50</td><td>12</td><td>7</td></tr><tr><td>P₂</td><td>70</td><td>30</td><td>40</td><td>60</td><td>10</td></tr><tr><td>P₃</td><td>40</td><td>10</td><td>60</td><td>20</td><td>18</td></tr><tr><td>Demand</td><td>5</td><td>8</td><td>7</td><td>15</td><td></td></tr></tbody></table>	Plant	Distribution Centre				Capacity	D ₁	D ₂	D ₃	D ₄	P ₁	19	30	50	12	7	P ₂	70	30	40	60	10	P ₃	40	10	60	20	18	Demand	5	8	7	15		10	L4	C02
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Q.5	a.	What do you mean by pay off in decision theory?	3	L1	C02																											
	b.	What are the steps of decision- making process?	7	L1	C02																											
	c.	Five jobs pass through 3 machines x,y,z in the order xyz, processing times in each machines is given in minutes. Find the best sequence that will minimize the total elapsed time. Find the idle time of each machine. <table border="1"><thead><tr><th rowspan="2">Jobs</th><th colspan="3">Machines</th></tr><tr><th>x</th><th>y</th><th>z</th></tr></thead><tbody><tr><td>1</td><td>11</td><td>7</td><td>6</td></tr><tr><td>2</td><td>12</td><td>8</td><td>11</td></tr><tr><td>3</td><td>9</td><td>6</td><td>9</td></tr><tr><td>4</td><td>8</td><td>5</td><td>5</td></tr><tr><td>5</td><td>13</td><td>6</td><td>6</td></tr></tbody></table>	Jobs	Machines			x	y	z	1	11	7	6	2	12	8	11	3	9	6	9	4	8	5	5	5	13	6	6	10	L5	C02
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Q.6	a.	What is pure strategy and mixed strategy?	3	L1	C03
	b.	List out the differences between PERT & CPM.	7	L1	C04

	c.	Solve the following game by using the concept of dominance	10	L4	C03																																	
		<table><tr><td></td><td colspan="5">B</td></tr><tr><td></td><td></td><td>I</td><td>II</td><td>III</td><td>IV</td></tr><tr><td rowspan="4">A</td><td>I</td><td>3</td><td>2</td><td>4</td><td>0</td></tr><tr><td>II</td><td>3</td><td>4</td><td>2</td><td>4</td></tr><tr><td>III</td><td>4</td><td>2</td><td>4</td><td>0</td></tr><tr><td>IV</td><td>0</td><td>4</td><td>0</td><td>8</td></tr></table>		B							I	II	III	IV	A	I	3	2	4	0	II	3	4	2	4	III	4	2	4	0	IV	0	4	0	8			
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Q.7	a.	What is Network Analysis?	3	L1	C04																																	
	b.	Explain the phases of Project Management?	7	L2	C04																																	
	c.	Solve the following game by graphical method	10	L4	C03																																	
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Q.8	Compulsory Question :		20	L4	C04																																													
	XYZ company project has large number activities , but the management is interested in controlling a part of these activities, 7 in number. The following data is available for these 7 activities i) Draw a PERT network for the activities ii) Prepare the schedule of the 7 activities iii) Identify the critical path of the network iv) If the management puts a deadline of 47 days for completion of this part of the project, determine the probability that it will be completed in 47 days v) When should the management start these activities to get a confidence level of 99% for completion of these activities in the scheduled time? <table><tr><th>Activity</th><th>Preceding activity</th><th colspan="3">Time</th></tr><tr><td></td><td></td><th>t_o</th><th>t_m</th><th>t_p</th></tr><tr><td>A</td><td>None</td><td>4</td><td>6</td><td>8</td></tr><tr><td>B</td><td>A</td><td>6</td><td>10</td><td>14</td></tr><tr><td>C</td><td>A</td><td>8</td><td>15</td><td>22</td></tr><tr><td>D</td><td>B</td><td>9</td><td>9</td><td>9</td></tr><tr><td>E</td><td>C</td><td>10</td><td>14</td><td>18</td></tr><tr><td>F</td><td>A</td><td>5</td><td>5</td><td>5</td></tr><tr><td>G</td><td>D,E,F</td><td>8</td><td>10</td><td>12</td></tr></table>		Activity	Preceding activity	Time					t_o	t_m	t_p	A	None	4	6	8	B	A	6	10	14	C	A	8	15	22	D	B	9	9	9	E	C	10	14	18	F	A	5	5	5	G	D,E,F	8	10	12			
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