

Hi-Tech Institute of Engineering & Technology

DEPARTMENT OF COMMERCE & MANAGEMENT

Course BBA

(SEM- 6th) EVEN SEMESTER MODEL PAPER 2022-23

Subject Code: KMBN-206

Subject Name: Quantitative Techniques for Managers

Faculty Name: Ms. Surbhi Agarwal

*Time: 90 Minutes**Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION-A

1. Attempt all question in brief.

2x 10 = 20

Q.No	Question	Marks	CO
a.	Explain phases of operations research.	2	1
b.	What is a rectangular game? Define pure strategy and mixed strategy in a game.	2	1
c.	Explain the vogel's approximate method.	2	1
d.	Define a Sequencing Problem.	2	1
e.	What is Replacement?	2	2
f.	What is Decision making Theory?	2	1
g.	Define the term Operation Research.	2	1
h.	Explain any Two Characteristics of Transportation problem.	2	2
i.	Discuss the Methodology of Operation Research.	2	1
j.	Define a saddle point in a game.	2	4

SECTION-B

2. Attempt any EIGHT of the following:

4x10 =40

Q.No	Question	Marks	CO
a.	A project network can have only one critical path method.	5	5
b.	What is the role of Network Analysis?	5	5
c.	Give the mathematical formulation of Assignment Model.	5	3
d.	What are the Techniques used to solve decision making problems under uncertainty?	5	1
e.	Give some important applications of queuing theory in industries.	5	4
f.	Solve the following linear programming problem by simplex method? Maximize $Z=5X_1+3X_2$ subject to constraints $3X_1+5X_2 \leq 15$, $5X_1+2X_2 \leq 10$ and $X_1, X_2 \geq 0$.	5	2
g.	What is meant by an optimality test in a transportation problem?	5	2
h.	Give the mathematical formulation of Game Theory.	5	4
i.	Discuss the Methodology of Operation Research.	5	1
j.	Define Decision Tree Analysis.	5	1

SECTION-C

3. Attempt any ONE part of the following:

1x10 = 10

Q.No	Question	Marks	CO																			
a.	<p>The Cost of a machine is Rs. 6100 & its scrap value is Rs. 100. The maintenance cost is found from experience to be:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="width: 10%;">Year</th> <th style="width: 10%;">1</th> <th style="width: 10%;">2</th> <th style="width: 10%;">3</th> <th style="width: 10%;">4</th> <th style="width: 10%;">5</th> <th style="width: 10%;">6</th> <th style="width: 10%;">7</th> <th style="width: 10%;">8</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">mainte nance cost</td> <td style="text-align: center;">100</td> <td style="text-align: center;">250</td> <td style="text-align: center;">400</td> <td style="text-align: center;">600</td> <td style="text-align: center;">900</td> <td style="text-align: center;">1200</td> <td style="text-align: center;">1600</td> <td style="text-align: center;">200 0</td> </tr> </tbody> </table>	Year	1	2	3	4	5	6	7	8	mainte nance cost	100	250	400	600	900	1200	1600	200 0	10	5	
Year	1	2	3	4	5	6	7	8														
mainte nance cost	100	250	400	600	900	1200	1600	200 0														
b.	<p>Use the graphical method for solving the following game and find the value of game?</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th rowspan="2" style="width: 15%;"></th> <th colspan="4" style="text-align: center;">Player B</th> </tr> <tr> <th style="width: 15%;">B1</th> <th style="width: 15%;">B2</th> <th style="width: 15%;">B3</th> <th style="width: 15%;">B4</th> </tr> </thead> <tbody> <tr> <th style="text-align: center;">A1</th> <td style="text-align: center;">2</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">-2</td> </tr> <tr> <th style="text-align: center;">A2</th> <td style="text-align: center;">4</td> <td style="text-align: center;">3</td> <td style="text-align: center;">2</td> <td style="text-align: center;">6</td> </tr> </tbody> </table>		Player B				B1	B2	B3	B4	A1	2	2	3	-2	A2	4	3	2	6	10	3
	Player B																					
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4. Attempt any ONE part of the following:

1x10 = 10

Q.No	Question	Marks	CO																																		
a.	Expain Techniques of Operation Research & OR Models.	10	3																																		
b.	<p>Find an Optimal solution to following transportation problem:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th rowspan="2" style="width: 15%;">Origin</th> <th colspan="4" style="text-align: center;">Destination</th> <th rowspan="2" style="text-align: center;">Supply</th> </tr> <tr> <th style="width: 15%;">A</th> <th style="width: 15%;">B</th> <th style="width: 15%;">C</th> <th style="width: 15%;">D</th> </tr> </thead> <tbody> <tr> <th style="text-align: center;">X</th> <td style="text-align: center;">2</td> <td style="text-align: center;">2</td> <td style="text-align: center;">2</td> <td style="text-align: center;">1</td> <td style="text-align: center;">30</td> </tr> <tr> <th style="text-align: center;">Y</th> <td style="text-align: center;">10</td> <td style="text-align: center;">8</td> <td style="text-align: center;">5</td> <td style="text-align: center;">4</td> <td style="text-align: center;">70</td> </tr> <tr> <th style="text-align: center;">Z</th> <td style="text-align: center;">7</td> <td style="text-align: center;">6</td> <td style="text-align: center;">6</td> <td style="text-align: center;">8</td> <td style="text-align: center;">50</td> </tr> <tr> <th style="text-align: center;">Demand</th> <td style="text-align: center;">40</td> <td style="text-align: center;">30</td> <td style="text-align: center;">40</td> <td style="text-align: center;">40</td> <td></td> </tr> </tbody> </table>	Origin	Destination				Supply	A	B	C	D	X	2	2	2	1	30	Y	10	8	5	4	70	Z	7	6	6	8	50	Demand	40	30	40	40		10	2
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5. Attempt any ONE part of the following:

1x10 = 10

Q.No	Question	Marks	CO																																				
a.	<p>Solve the following problem by using Hungarian assignment problem?</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="width: 10%;"></th> <th style="width: 15%;">D1</th> <th style="width: 15%;">D2</th> <th style="width: 15%;">D3</th> <th style="width: 15%;">D4</th> <th style="width: 15%;">D5</th> </tr> </thead> <tbody> <tr> <th style="text-align: center;">O1</th> <td style="text-align: center;">4</td> <td style="text-align: center;">6</td> <td style="text-align: center;">7</td> <td style="text-align: center;">5</td> <td style="text-align: center;">11</td> </tr> <tr> <th style="text-align: center;">O2</th> <td style="text-align: center;">7</td> <td style="text-align: center;">3</td> <td style="text-align: center;">6</td> <td style="text-align: center;">9</td> <td style="text-align: center;">5</td> </tr> <tr> <th style="text-align: center;">O3</th> <td style="text-align: center;">8</td> <td style="text-align: center;">5</td> <td style="text-align: center;">4</td> <td style="text-align: center;">6</td> <td style="text-align: center;">9</td> </tr> <tr> <th style="text-align: center;">O4</th> <td style="text-align: center;">9</td> <td style="text-align: center;">12</td> <td style="text-align: center;">7</td> <td style="text-align: center;">11</td> <td style="text-align: center;">10</td> </tr> <tr> <th style="text-align: center;">O5</th> <td style="text-align: center;">7</td> <td style="text-align: center;">5</td> <td style="text-align: center;">9</td> <td style="text-align: center;">8</td> <td style="text-align: center;">11</td> </tr> </tbody> </table>		D1	D2	D3	D4	D5	O1	4	6	7	5	11	O2	7	3	6	9	5	O3	8	5	4	6	9	O4	9	12	7	11	10	O5	7	5	9	8	11	10	3
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b.	<p>Solve the following linear programming problem by Big-M method? Maximize $Z=X_1+2X_2+3X_3-X_4$ and subject to constraints $X_1+2X_2+3X_3=15,$ $2X_1+X_2+5X_3=20, X_1+2X_2+X_3+X_4=10$ and $X_1, X_2, X_3, X_4 \geq 0.$</p>	10	2																																				

6. Attempt any ONE part of the following:

1x10 = 10

Q.No	Question	Marks	CO																					
a.	<p>A harbor has a single dock to unload the containers from the incoming ships. The arrival rate of ships at the harbor follows Poisson distribution and the unloading time for the ships follow exponential distribution and hence, the service rate also follows Poisson distribution. The arrival rate and service rate are 8 ships per week and 14 ships per week, respectively. Find the following</p> <p>a) Utilization factor of the dock b) Average number of waiting ships in the queue c) Average number of waiting ships in the system d) Average waiting time per ship in the queue e) Average waiting time per ship in the system</p>	10	4																					
b.	<p>In a factory, there are six jobs to process, each of which should go to machine A & machine B in order AB. The processing timings in minutes are given. Determine the optimal sequence & total elapsed time.</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Jobs</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> </tr> </thead> <tbody> <tr> <td>Machine A</td> <td>7</td> <td>4</td> <td>2</td> <td>5</td> <td>9</td> <td>8</td> </tr> <tr> <td>Machine B</td> <td>3</td> <td>8</td> <td>6</td> <td>6</td> <td>4</td> <td>1</td> </tr> </tbody> </table>	Jobs	1	2	3	4	5	6	Machine A	7	4	2	5	9	8	Machine B	3	8	6	6	4	1	10	4
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