

Internal Assessment Test – II

Sub:	OPERATIONS RESEARCH	Code:	22MBA24
Date:	08-10-2024	Duration:	90 mins
		Max Marks:	50
		Sem:	II
		Branch:	MBA
SET – II			

		Marks	OBE																											
			CO	RBT																										
<p>Part A - Answer Any Two Full Questions (2* 20 = 40 marks) Part B – Compulsory – Case Study (1*10 = 10 marks)</p>																														
1	(a) Explain the term Decision of a Game.	[03]	CO3	L2																										
	(b) Outline the importance of Game Theory.	[07]	CO3	L4																										
	(c) Examine the Situations of two-person zero sum pure strategy games, Concept of Saddle Point or Equilibrium point and Principle of Dominance method.	[10]	CO3	L3																										
2	(a) Explain the term Minimax in Decision Theory.	[03]	CO3	L2																										
	(b) Solve the problem and Determine the optimal Provide the optimal job sequencing involving three machines M1, M2 and M3 in that order for the following data:	[07]	CO3	L3																										
	<table border="1" style="margin-left: 20px; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">Job</th> <th>J1</th> <th>J2</th> <th>J3</th> <th>J4</th> <th>J5</th> </tr> </thead> <tbody> <tr> <td rowspan="3" style="writing-mode: vertical-rl; transform: rotate(180deg);">Time on Machines</td> <td>M1</td> <td>7</td> <td>12</td> <td>11</td> <td>9</td> <td>8</td> </tr> <tr> <td>M2</td> <td>8</td> <td>9</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>M3</td> <td>11</td> <td>13</td> <td>9</td> <td>10</td> <td>14</td> </tr> </tbody> </table>	Job		J1	J2	J3	J4	J5	Time on Machines	M1	7	12	11	9	8	M2	8	9	5	6	7	M3	11	13	9	10	14			
Job		J1	J2	J3	J4	J5																								
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	(c) Outline the case of and write the interpretation for the same. A businessman from Chennai wishes to sell his products in Bangalore. He can set up a showroom in the city or can sell through a wholesaler. Setting up a showroom will entail costs of Rs. 6,00,000 with a 55% probability of success. If the showroom succeeds, he can gain a net profit of Rs. 10,00,000 per year. If it fails, he can either shutdown the showroom or rent it out for an annual rent of Rs. 3,60,000 (for the rest of the year). The probability that he gets rent for the showroom is 40%. If he sells through a wholesaler, he incurs Rs. 3, 00,000 initial costs. The chances of selling successfully are 45% with a net profit of Rs. 5, 50,000 per year.	[10]	CO3	L4																										
	a) Advise the businessman on the best decision.																													
	b) How is the decision tree analysis useful in business decision?																													
3	(a) Infer the term Payoff Matrix.	[03]	CO3	L3																										
	(b) Summarize the given case as given below. Consider the payoff matrix of Player A as shown in below table and solve it optimally using graphical method.	[07]	CO3	L5																										
	<table border="1" style="margin-left: 20px; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">PLAYER A</th> <th colspan="5">PLAYER B</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <th>1</th> <td>3</td> <td>0</td> <td>6</td> <td>-1</td> <td>7</td> </tr> <tr> <th>2</th> <td>-1</td> <td>5</td> <td>-2</td> <td>2</td> <td>1</td> </tr> </tbody> </table>	PLAYER A	PLAYER B					1	2	3	4	5	1	3	0	6	-1	7	2	-1	5	-2	2	1						
PLAYER A	PLAYER B																													
	1	2	3	4	5																									
1	3	0	6	-1	7																									
2	-1	5	-2	2	1																									

(c) Judge the case and formulate the Equation for the same. [10]

A small maintenance project consists of the following jobs, whose precedence relationships are given below:

Job	1-2	1-3	2-3	2-5	3-4
Duration (Days)	15	15	3	5	8
Job	3-6	4-5	4-6	5-6	6-7
Duration (Days)	12	1	14	3	14

From the above information, you are required to:

- Draw an arrow diagram representing the project.
- Find the total float for each activity.
- Find the critical path and the total project duration.

Part B - Compulsory (01*10=10 marks)

4 **Case Study**

Analyze the case given below. [10]

The time estimates (in weeks) for the activities of a PERT network are given below:

Activity		Completion time (Weeks)		
Event	Event	Optimistic	Most likely	Pessimistic
1	2	1	1	7
1	3	1	4	7
1	4	2	2	8
2	5	1	1	1
3	5	2	5	14
4	6	2	5	8
5	6	3	6	15

- Draw up the project network and identify all the paths thereby.
- Determine the expected project length.
- Calculate the standard deviation and variance of the project length.
- What is the probability that the project will be completed?
 - Atleast 4 weeks earlier that the expected time?
 - Not more than 4 weeks later than the expected time?
- If the project due date is 19 weeks, what is the probability of not meeting the due date?
- What is the probability that the project will be completed within the schedule i.e. 20 weeks?
- Find the project duration at 90% probability.

CO4	L5
CO4	L4

Course Outcomes (COs)		PO1	PO2	PO3	PO4	PO5	PS01	PS02	PS03	PS04
CO1:	Get an insight into the fundamentals of Operations Research and its definition, characteristics and phases.									
CO2:	Use appropriate quantitative techniques to get feasible and optimal Solutions.									
CO3:	Understand the usage of game theory, Queuing Theory and Simulation for Solving Business				1a, 1b,		1a, 1b,		2b, 2c,	

	Problems.				1c, 2a, 2b, 2c, 3a, 3b		1c, 2a		3a, 3b	
CO4:	Understand and apply the network diagram for project completion.		3c		4c			3c		4

Cognitive level	KEYWORDS
L1 - Remember	list, define, tell, describe, recite, recall, identify, show, label, tabulate, quote, name, who, when, where, etc.
L2 - Understand	describe, explain, paraphrase, restate, associate, contrast, summarize, differentiate interpret, discuss
L3 - Apply	calculate, predict, apply, solve, illustrate, use, demonstrate, determine, model, experiment, show, examine, modify
L4 - Analyze	classify, outline, break down, categorize, analyze, diagram, illustrate, infer, select
L5 - Evaluate	asses, decide, choose, rank, grade, test, measure, defend, recommend, convince, select, judge, support, conclude, argue, justify, compare, summarize, evaluate
L6 - Create	design, formulate, build, invent, create, compose, generate, derive, modify, develop, integrate

PO1–Theoretical Knowledge; PO2–Effective Communication Skills; PO3–Leadership Qualities; PO4 –Sustained Research Orientation; PO5 –Self-Sustaining Entrepreneurship

CI

CCI

HOD

SCHEME OF EVALUATION

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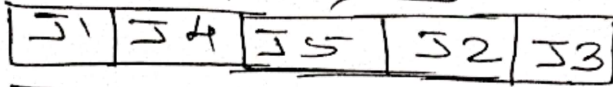
Note: Part A - Answer Any Two Full Questions (20*02=40 Marks)
 Part B - Compulsory (01*10= 10marks)

Part	Question #	Description	Marks Distribution		Max Marks
A	1	a) Decision of a Game Decision criterion of optimality is adopted, i.e. a player which wants to maximize his π , maximin is used & the one who wishes to minimize his π , minimax is used.	3M	3	20 M
		b) Importance of Game theory <ul style="list-style-type: none"> * Decision all times. * Need to perform below. * Formulate the acceptance points * Strategic decision making * Structured insight in to the value of info. 	3M 500 4M 500 Explained	7	

	c)	<p><u>Two person zero sum</u> <u>pure strategy Game</u></p> <ul style="list-style-type: none"> * Maximin * Minimax <p><u>Saddle point or Equilibrium</u> Smallest in its row & the largest in the column.</p> <p><u>Dominance method</u></p> <ul style="list-style-type: none"> * Dominance rule of column * Dominance rule of row. 	<p>(5 M) S S</p> <p>(5 M) S S</p>	10	
2	a)	<p>Minimax in decision theory minimizing player determines the maximum loss from each strategy and then selects the strategy with minimum loss out of the maximum loss list.</p>	(3 M)	3	20 M

b)

Job Sequencing



Total elapsed time = 72

D.T. for $m_1 = 25$

D.T. for $m_2 = 37$

D.T. for $m_3 = 15$

3m

1m

3m

1m

1m

7

c)

Showeroom

5,50,000 - 2,05,200

3,44,800

4m

wholesale

2,47,500

- 1,65,000

82,500

4m

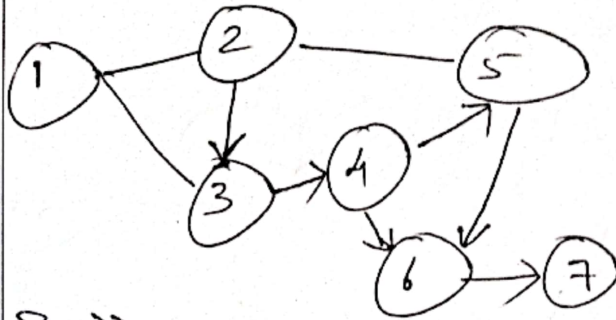
option 1 is better

2m

10

		<p>a) Payoff matrix</p> <p>potential outcomes of a strategic decision by organizing the available options and their consequences.</p>	<p>3m</p>	<p>3</p>	
	<p>3</p>	<p>b)</p> $\begin{bmatrix} 3 & -1 \\ -1 & 2 \end{bmatrix}$ <p>$v = 5/7$</p> <p>Player A = $\{3/7, 4/7\}$</p> <p>Player B = $\{3/7, 0, 0, 4/7, 0\}$</p>	<p>2m</p> <p>3m</p> <p>1m</p> <p>1m</p>	<p>7</p>	<p>20 M</p>

c)



Path

1-2-3-4-6-7 → 2m

15 + 3 + 8 + 14 + 14

54 = Duration → 2m

Activity

Activity	ES	EF	LS	LF
1-2	0	3	0	3
1-3	0	3	0	3
2-3	3	6	3	6
2-5	3	17	3	17
3-4	6	10	6	10
3-6	6	10	6	10
4-5	10	14	10	14
4-6	10	14	10	14
5-6	17	17	17	17
6-7	14	18	14	18

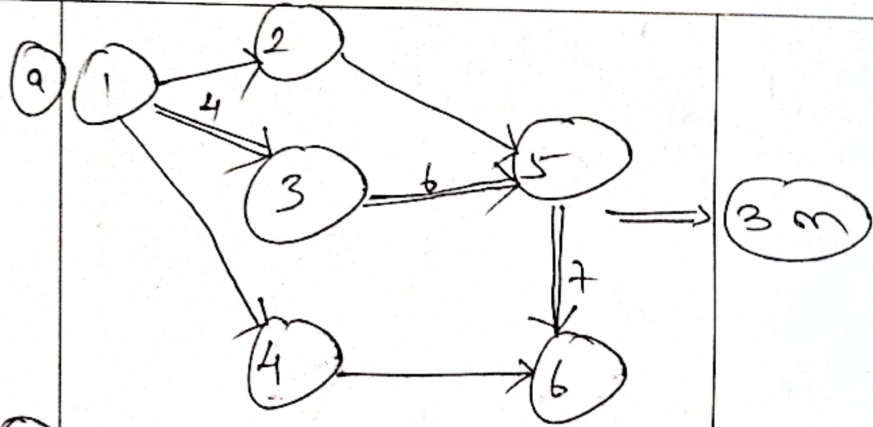
3m

2m

2m

3m

10



10 Critical Path =
 1-3-5-6
 $\rightarrow 4 + 6 + 7 = 17$ weeks

11 $\sigma = \sqrt{1+4+4} = \sqrt{9} = 3$
 $\sigma^2 = 9$

12 i) 9.18% }
 ii) 90.82% } $\rightarrow 2m$

13 74.86% $\rightarrow 1m$

14 20.87 = 21 weeks $\rightarrow 1m$

B 4

10 10M