Printed Page:-04 Subject Code:- AMIBA0507 Roll. No: NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA (An Autonomous Institute Affiliated to AKTU, Lucknow) MBA (Integrated) SEM: V - THEORY EXAMINATION (2024-2025) Subject: Operations Research Time: 2.5 Hours Max. Marks: 60 General Instructions: IMP: Verify that you have received the question paper with the correct course, code, branch etc. 1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice *Questions (MCQ's) & Subjective type questions.* 2. Maximum marks for each question are indicated on right -hand side of each question. 3. Illustrate your answers with neat sketches wherever necessary. 4. Assume suitable data if necessary. 5. Preferably, write the answers in sequential order. 6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked. 15 **SECTION-A** 1. Attempt all parts:-1-a. Operations Research approach is typically based on the use of (CO1, K2) 1 Physical model (a) Mathematical model (b) (c) Iconic model none of the above (d) In transportation problem, the preferred method of obtaining either optimal or very 1-b. 1 close to optimal solution is (CO2, K6) (a) **NWCR** LCM (b) VAM (c) Simplex (d) 1-c. The game without saddle point is (CO3, K2) 1 (a) Pure Strategy Game Mixed Strategy Game (b) (c) Fair Game (d) All the above 1-d. Which of the following rules is used to solve a two-machine sequencing 1

(a) VAM

problem?(CO4, K4)

	(b)	Johnson's Ru	le				
	(c)	NWCR					
	(d)	None of the a	bove				
1-e.	Pl	ERT stands for	(CO5, K4)				1
	(a)	Programme E	Evaluation and Re	eview Technique			
	(b)	Evaluation of	Programs and R	Robotic Techniqu	les		
	(c)	Assessment o	f Programs and I	Robotics			
	(d)	None of these	2				
2. Atte	empt a	all parts:-					
2.a.	N in	ame the two moves and two moves and the two moves and the two moves and two	ethods used to so al variables .(CC	olve an linear pro D1, K2)	gramming probl	em	2
2.b.	Ν	ame the variou	s types of transp	ortation problem	.(CO2, K6)		2
2.c.	W	ho developed	Game theory and	l when?(CO3, K2	2)		2
2.d.	Fi	nd the number	of theoretically	possible sequenc	e if:		2
2.e.	W	2. There are different m	5 tasks to perf achines.(CO4, K hree main phase	Form, each of v (4) s of project.(CO	vhich requires p 5, K4)	processing on 3	2
<u>SECT</u>	TON-	<u>B</u>					15
3. Ans	swer a	ny <u>three</u> of the	following:-				
3-a.	W	rite down the v	various objective	s of OR. (CO1, I	K2)		5
3-b.	Fi tra	nd initial basic ansportation pr	feasible solution oblem. (CO2, Ke	1 by using NWC 5)	R method of the	following	5
			D_{1}	D_{2}	D_3	Supply	
		F_{1}	2	7	4	5	
		F_2	3	3	1	8	
		F_3	5	4	7	7	
		F_4	1	6	2	14	
		Demand	7	9	18	34	
3.c.	So	olve the game v	whose payoff ma	trix is given belo	w. Also determine	ne the optimal	5

- Player B Player A $\begin{bmatrix} 4 & -4 \\ -4 & 4 \end{bmatrix}$
- 3.d. State the principal assumptions made while dealing with sequencing problems.(CO4, K2)

strategies and its value. (CO3, K4)

•

5

3.e. Construct a network for each of the projects whose activities and their precedence 5 relationships are given below: (CO5, K4)

Activity	Α	В	С	D	Ε	F	G	Η	Ι	J	K
Predecessor	-	-	-	А	В	В	С	D	Е	H, I	F, G

SECTION-C

4. Answer any one of the following:-

- 4-a. Write down any six characteristics of Operations Research.(CO1, K2)
- 4-b. A Goldsmith manufactures necklaces and bracelets. The no. of necklaces and bracelets that he can handle per day at most 24. It takes one hour to make a bracelet and half an hour to make a necklace. It is assumed that he can work for a maximum work of 16 hours a day. The profit on a bracelet is Rs. 300 and the profit on a necklace is Rs. 100. Formulate this problem as a LPP so as to maximize the profit. (CO1, K2)
- 5. Answer any one of the following:-

5-a.

Determine the initial basic feasible solution to the following Transportation Method by Least Cost method (CO2, K6)

Origin		Desti	Supply		
	А	В	С	D	
Р	5	4	2	6	20
Q	8	3	5	7	30
R	5	9	4	6	50
Demand	10	40	20	30	100

5-b. Determine the initial basic feasible solution to the following Transportation Problem by VAM Method. (CO2, K6)

Factory	Destination	Destination							
	W ₁	W ₂	W3	W_4					
F ₁	19	30	50	10	7				
F ₂	70	30	40	60	9				
F ₃	40	8	70	20	18				
Demand	• 5	8	7	14					

- 6. Answer any one of the following:-
- 6-a. Find the assignment of salesmen to various districts which will yield maximum profit.(CO3, K4)

		Dist	ricts		
		1	2	3	4
	Α	16	10	14	11
Salesman	В	14	11	15	15
	С	15	15	13	12
	D	13	12	14	15

6

30

6

6

6

6-b. Using dominance, solve the game whose payoff matrix is given below:(CO3, K4) 6

Player A\ ^{Player} B	B ₁	B ₂	B ₃	B ₄
A ₁	1	7	3	4
A ₂	5	6	4	5
A ₃	7	2	0	3

7. Answer any one of the following:-

Determine a sequence for the jobs, that will minimize the total elapsed time and 7-a. 6 also calculate idle time.(CO4, K4)

Job	1	2	3	4
Machine-1	5	8	7	3
Machine-2	6	7	2	5
Machine-3	7	8	10	9

A book binder company has one printing machine and one binding machine. There 7-b. 6 are manuscripts of a number of different books. Processing times for printing and binding are given in the following table:

Pool	Time(in hours)						
DOOK	Printing	Binding					
Α	5	2					
В	1	6					
С	9	7					
D	3	8					
Ε	10	4					

Determine the sequence in which books should be processed on the machines so that the total time required is minimized. Also, calculate the idle time for printing machine and binding machine (CO4, K4)

- 8. Answer any one of the following:-
- A project schedule has the following characteristics. 8-a.

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time	4	1	1	1	6	5	4	8	1	2	5	7
(days)												

From the above information, you are required to

1. Construct a network diagram.

- 2. Compute the earliest and latest event time
- 3. Determine the critical path and total project duration(CO5, K4)

The following table shows the jobs of a network along with their time estimates.

8-b.

Activity	1-2	1-6	2-3	2-4	3-5	4-5	6-7	5-8	7-8
A	1	2	2	2	7	5	5	3	8
M	7	5	14	5	10	5	8	3	17
B	13	14	26	8	19	17	29	9	32

Draw the project network and find the expected duration and variance of each activity.

Also find the variance and standard deviation of project length. (CO5, K4)

6

6

cop. July provad

•