BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: MBA/PRE-PHD **SEMESTER :**
BRANCH: MANAGEMENT **SESSION : SP/2024**

SUBJECT: MT412 OPERATIONS RESEARCH

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data handbook/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1	What is a sensitivity analysis? Discuss in brief.	[10]	2	4

Solve the following problem by Big M method.
Maximize Z = 4X1 +3X2
Subjected to,
$2X1 + X2 \geq 10$.
$-3X1 + 2X2 \leq 6$.
$X1 + X2 \geq 6$.
$X1, X2 \geq 0$.

Q.2 i) Solve the following Transportation problem of Minimization by using MODI's method, [10] 3 4

	D	E	F	G	H	Plant Capacity
A	5	8	6	6	3	800
B	4	7	7	6	5	500
C	8	4	6	6	4	900
Requirement	400	400	500	400	800	

ii) Solve the following Assignment problem by Hungarian method

	I	II	III	IV
A	42	35	28	21
B	30	25	20	15
C	30	25	20	15
D	24	20	16	12

Q.3 Answer the following with reference to the Theory of games, [10] 3 4

i) Explain your understanding about Zero Sum game.
ii) Minimax and Maximin principles used in Theory of games.
iii) Pure and Mixed strategies
iv) Saddle point.
v) Solve the following game,

	B1	B2	B3	B4	B5
A1	3	-1	4	6	7
A2	-1	8	2	4	12
A3	16	8	6	14	12
A4	1	11	-4	2	1

i) Solve the following game,

	B1	B2	B3	B4	B5
A1	-2	0	0	5	3
A2	3	2	1	2	2
A3	-4	-3	0	-2	6
A4	5	3	-4	2	6

PTO

Q.4 i) Explain your understanding about Replacement? What are the various replacement models? [10] 4 4

ii) A machine costs Rs. 15000. The running cost for the different years is given below,

Year	1	2	3	4	5	6	7
Running Cost	2500	3000	4000	5000	6500	8000	10000

Find the optimal replacement period if the capital is worth 10% per annum and the machine has no salvage value.

Q.5 i)Explain the significance of OR in decision-making. What are the various application areas of OR in management? Give examples. [10] 4 3

ii)Explain your understanding of Reliability and Failure.

A component failure data shows that the hazard rate function is given by,

$\lambda(t) = 5x10^{-6}t$, where t is in hours.

What is its B_{02} life?

:::::30/04/2024 E:::::