O.P.Code: 23ME0337 | R23 | H.T.No. | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. III Year II Semester Regular Examinations April-2026

OPERATIONS RESEARCH

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions 10 x 2 = 20 Marks)

1	a	Define Operation Research and How it is useful for Decision makers?	CO1	L1	2M
	b	Discuss the characteristics of operation Research.	CO2	L2	2M
	c	Write the importance of Hungarian method.	CO2	L2	2M
	d	Discuss the unbalanced Transportation problems.	CO2	L2	2M
	e	What is Game theory? and its importance.	CO3	L1	2M
	f	Discuss the steps to Dominance principle problems.	CO3	L2	2M
	g	Discuss the importance of Queuing Theory.	CO4	L2	2M
	h	Explain the queue discipline and service pattern.	CO4	L1	2M
	i	Write the Dynamic programming applications in Operation Research.	CO5	L2	2M
	j	Explain the Failure mechanism of items.	CO5	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Explain the procedure involved in Two-phase simplex method	CO1	L1	5M
	b	What are the steps to provide structural Approach in operation Research	CO1	L1	5M

OR

3		Solve the following LPP Minimize $Z= X_1 - 3X_2+3X_3$ Subjected to $3X_1-X_2+2X_3 < 7$, $2X_1+4X_2 > -12$, $-4X_1+3X_2+8X_3= 0$	CO1	L4	10M

UNIT-II

4		Determine the basic Feasible solution to the following Transportation problem using NWC and LCM?	CO2	L5	10M

	A	B	C	D	E	SUPPLY
P	2	11	10	3	7	4
Q	1	4	7	2	1	8
R	3	9	4	8	12	9
DEMAND	3	3	4	5	6	

OR

5		The processing time in hours for the jobs when allocated to the different machinesis indicated below. Assign the machines for the jobs so that the total processing time in minimum.	CO2	L1	10M

MACHINES / JOBS	A	B	C	D	E
1	9	3	10	13	4
2	8	17	13	20	5
3	5	14	8	11	6
4	11	13	9	12	3
5	12	8	14	16	7

UNIT-III

6		Use the relation of Dominance to solve the game matrix.	CO1	L2	

FirmA \ FirmB	B1	B2	B3	B4	B5	B6
A1	4	2	0	2	1	1
A2	4	3	1	3	2	2
A3	4	3	7	-5	1	2
A4	4	3	4	-1	2	2
A5	4	3	3	-2	2	2

OR

7		Determine the sequence for the jobs and the total elapsed time?	CO3	L5	

	A	B	C	D	E	F	G	H	I
Machine1	4	7	6	11	8	10	9	7	6
Machine2	8	10	9	6	5	11	5	10	13

UNIT-IV

8	a	Discuss i) Server ii) Arrivalrate iii)Servicerate iv)queue discipline.	CO4	L2	
	b	What are the limitations for Applications of queuing Theory and applications of queuing models.	CO4	L1	

OR

9		For an item, the production is instantaneous. The storage cost of one item is Rs. 25 per run. Ifthe demand is 200 units per month. Find the optimum quantity to be produced per setup and determine the total cost of storage and setup per month.	CO4	L1	

UNIT-V

10	a	Describe the various types of replacement situations and Explain about Group replacement.	CO5	L5	
	b	Discuss briefly about Individual Replacement model in detail.	CO5	L2	

OR

11		ExplaintheTopdownApproachandBottomdown Approach indetail.	CO5	L1	1

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