Q.P. Code: 19ME0325 **R19**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech IV Year I Semester Regular Examinations November/December-2022

OPERATIONS RESEARCH

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 Solve the following Degeneracy in simplex method Maximize $3X_1 + 9X_2$, Subjected to $X_1 + 4X_2 \leq 8$, $X_1 + 2X_2 \leq 4$, $X_1, X_2 \geq 0$ **L3 12M**

OR

2 **a** Discuss the applications of Operations Research. **L6 6M**

b What are the characteristics of operation Research? **L1 6M**

UNIT-II

3 Solve the following transportation problem Determine the Shipping scheme by the Northwest corner Rule **L3 12M**

	A	B	C	D	AVAILABLE
P	4	6	8	13	50
Q	13	11	10	8	70
R	14	4	10	13	30
S	9	11	13	8	50
REQUIRED	**25**	**35**	**105**	**20**	

OR

4 **L1 12M**

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

A Department has 5 employees and five jobs are to be performed. The time each man will take to perform each job is given in the following table below. How the job should be Allocated one per employee, so as to minimize the total man-hours.

UNIT-III

5 **a** Find the saddle point following GAME **L1 6M**

		Player B		
		B1	B2	B3
Player A	A1	-3	-1	6
	A2	2	0	2
	A3	5	-2	-4

b Define i) queue ii) infinite queue **L1 6M**

OR

6 Consider a self-service store with one cashier. Assume Poisson arrivals and exponential service times. Suppose that 9 customers arrive on the average every 5 minutes and the cashier can serve 10 in 5 minutes. Find **L3 12M**

i) Average number of customers queuing for service

ii) Probability of having more than 10 customers in the system.

iii) Probability that a customer has to queue for more than 2 minutes

UNIT-IV

7 A project has the following schedule. Construct PERT network and compute the total float for each activity Find critical path and its duration **L6 12M**

Activity	Time in month	Activity	Time in month	Activity	Time in month
1-2	2	3-6	1	6-9	3
1-4	2	4-5	5	7-8	3
1-7	1	4-8	8	8-9	3
2-3	4	5-6	4		

OR

8 **a** Discuss the Backward pass computations for Latest Allowable Time in detail **L6 6M**

b Explain the following **L1 6M**

i) critical event ii) critical activity iii) Total float iv) Free float

UNIT-V

9 Assume that present value of one rupee to be spent in a years' time is Re.0.90 and C=Rs 6000,Capital cost of equipment. Running costs are given in the table below. When should the machinebe replaced? **L5 12M**

Year (n)	1	2	3	4	5	6	7
Running cost (MC)in Rs.	1000	1200	1600	2000	2600	3200	4000

OR

10 **a** Determine the sequence for the jobs and the total elapsed time. **L1 6M**

b Explain the Bellman's principle of optimality. **L2 6M**

***** END *****