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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech IV Year I Semester Supplementary Examinations November-2020

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 LPP by Dual Simplex method **12M**

Minimize $Z = X_1 + 2X_2 + 3X_3$,

Subjected to $2X_1 - X_2 + X_3 \geq 4$,

$X_1 + X_2 + 2X_3 \leq 8$,

$X_2 - X_3 \geq 2$ and

$X_1, X_2, X_3 \geq 0$

OR

2 Solve the following LPP by Big-M penalty method **12M**

Minimize $Z = 5X_1 + 3X_2$

Subjected to $2X_1 + 4X_2 \leq 12$,

$2X_1 + 2X_2 = 10$,

$5X_1 + 2X_2 \geq 10$ and

$X1, X2 \geq 0$

UNIT-II

3 The processing time in hours for the jobs when allocated to the different machines is indicated below. Assign the machines for the jobs so that the total processing time in min. **12M**

MACHINES

JOBS	**1**	**2**	**3**	**4**	**5**
1	9	22	58	11	19
2	43	78	72	50	63
3	41	28	91	37	45
4	74	42	29	49	39
5	36	11	57	22	25

OR

4 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. **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

UNIT-III

5 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 a) Average number of customers queuing for service b) Probability of having more than 10 customers in the system. c) Probability that a customer has to queue for more than 2 minutes **12M**

OR

6 Solve the following GAME Theory ,using the Dominance Principle **12M**

FirmA	**Firm B**				
	4	6	5	10	6
	7	8	5	9	10
	8	9	11	10	9
	6	4	10	6	4

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 .Also calculate Total Float, Free Float, Construct PERT network and compute the total float for each activity. Find critical path with its duration. **12M**

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

OR

8 Find the sequence that minimizes the total elapsed time required to complete the following tasks on the machines in the order 1 – 2 – 3. Find also the minimum total elapsed time and the ideal times on the machines. **12M**

Tasks time on Machines		**A**	**B**	**C**	**D**	**E**	**F**	**G**
	1	3	8	7	4	9	8	7
	2	4	3	2	5	1	4	3
	3	6	7	5	11	5	6	12

UNIT-V

9 The yearly cost of 2 machines A and B when money value is neglected is as follows. **12M**

Year (n)	1	2	3	4	5
Machine A	1800	1200	1400	1600	1000
Machine B	2800	200	1400	1100	600

Find their cost patterns if money values is 10% per year and hence find which machine is most Economical

OR

10 **a** Explain the Bellman's principle of optimality **6M**

b Describe the various types of replacement situations and Explain about group replacement **6M**

*** END ***