R18 Regulation *Subject code:2P7CB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VII Semester Supplementary Examinations, November 2023

OPERATIONS RESEARCH

(ME)

Maximum Marks: 70 Date:12.12.2023 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

	Part-A	
All the following questions carry equal marks (10x2M=20 Marks)		
1	What is operation research	L1
2	What are the shadow prices?	L1
3	Define LPP.	L1
4	Distinguish between assignment and allocation problem.	L2
5	Write Johnsons' No passing rule?	L1
6	What are the situations which make the replacement of items necessary?	L1
7	Which competitive situation is called a game?	L1
8	What is inventory management?	L1
9	What is the main limitation of graphical method of linear programming?	L1
10	What is the importance of queuing line theory in O.R?	L1
	Part-B	
Answer All the following questions. (10MX 5=50Marks)		
11	What are the characteristics and application of operation research. [10]	L2
	OR	
12	Minimize $Z=5x_1+4x_2+3x_3$ subject to the constraints $x_1+x_2+x_3 = 100$; $x_1 \leq 20$; $x_2 \geq 30$; $x_3 \leq 40$ and $x_1,x_2,x_3 \geq 0$ Use big M method. [10]	L3
13	Minimize $Z = x_1 - x_3 - 2x_3$, Subject to constraints $3x_1+x_2+3x_3 \leq 7$; $x_1 +2x_2 \geq -6$; $4x_1+3x_2+5x_3 \leq 10$ and $x_1,x_2,x_3 \geq 0$ [10]	L3
	OR	
14	There are three sources or origins which store a given product. These sources supply these products to four dealers. The capacities of the sources (S_i) and the demands at dealers (D_J) are as given below. $S_1 = 150$, $S_2 = 40$, $S_3 = 80$ $D_1 = 90$, $D_2 = 70$, $D_3 = 50$, $D_4 = 60$. The cost of transporting the product from various sources to various dealers is shown in the table below.	L3

	D_1	D_2	D_3	D_4
S_1	27	23	31	69
S_2	10	45	40	32
S_3	30	54	35	57

Find out the optimum solution for transporting the products at a minimum cost. [10]

15 Find the sequence that minimizes the total elapsed time required to complete the following jobs. [10] — L3

Processing times in hours

No. of jobs	: 1	2	3	4	5	6
Machine A	: 4	8	3	6	7	5
Machine B	: 6	3	7	2	8	4

OR

16 Determine the optimal sequence of jobs for the given processing times jobs on three machines. [10] — L3

Job	M1	M2	M3
1	3	8	13
2	12	6	14
3	5	4	9
4	2	6	12
5	9	3	8
6	11	1	13

17 (a) Write down limitations of game theory. [5] — L2
(b) Distinguish between deterministic and probabilistic games. [5] — L2

OR

18 Machine A cost Rs.45000 and the operating costs are estimated of Rs.1000 for the first year increasing by Rs.10000 per year in the second and subsequent years. Machine B costs Rs.50000 and operation costs are Rs.2000 for the first year, increasing by Rs.4000 in the second and subsequent years. If we have machine of type A, should we replace it with B? If so when?. Assume that both machines have no resale and future costs are not discounted. [10] — L3

19 A company has 6 jobs which go through 3 machines X,Y and Zin the order XYZ.The processing time in minutes for each job on each machine is as follows. [10] — L3

	Job 1	2	3	4	5	6
X	18	12	29	36	43	37
Y	7	12	11	2	6	12
Z	19	12	23	47	28	36

Find the optimal sequence, total elapsed time and idle times for each machine

OR

20 Define dynamic programming. Write advantages, limitations and applications of dynamic programming. [10] — L2