R20 Regulation *Subject code: 3P5CD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, April 2026

OPERATIONS RESEARCH

(ME)

Maximum Marks: 70 Date: 22.04.2026 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.
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)		Marks	CO	BTL
1	What is Linear programming?	2M	1	L1
2	Define assignment problem.	2M	1	L1
3	Write the characteristics of processing n jobs through two machines.	2M	2	L1
4	What are the consequences of over-inventory and under-inventory situations?	2M	2	L1
5	Which competitive situation is called a game?	2M	3	L1
6	What is Sequencing problems?	2M	3	L1
7	Define saddle point.	2M	4	L1
8	Define Bellman's principle of optimality with examples.	2M	4	L1
9	What is the importance of queuing line theory in O.R?	2M	5	L1
10	What is dynamic programming?	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Solve the dual simplex method by Consider the following problem. max 3x1 + 2x2 s.t. 3x1 + x2 ≤ 12 x1 + x2 ≤ 6 5x1 + 3x2 ≤ 27 x1, x2 ≥ 0.	10M	1	L2
	OR			
12	What are the main phases of operation research and characteristics of Operation Research?	10M	1	L2
13	Determine an initial feasible solution to the following transportation problem by using NWCM	10M	2	L2

	D1	D2	D3	D4	Supply
S1	1	2	1	4	30
S2	3	3	2	1	50
S3	4	2	5	9	20
Demand	20	40	30	10	

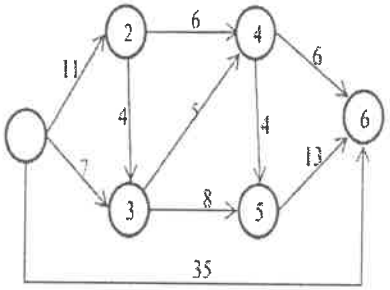
	OR			
14	A travelling salesman has to visit five cities. He wishes to start from a particular city, visit each city once and then return to his starting point. The travelling distance of each city from a particular city is given below. The Salesman starts from A and comes back to A. What route should he follow so that the distance is minimum?	10M	2	L2
15	Three jobs are to be done by 4 machines .Each job can be assigned to one machine only. The cost of each job on each machine is given in the following table	10M	3	L2
	OR			
16	Find an optimal sequence for the following sequencing problem of four jobs and five machines when passing is not allowed, of which processing time (in hours) is given below:	10M	3	L2

		To City				
		A	B	C	D	E
From City	A	-	1	6	8	4
	B	7	-	8	5	6
	C	6	8	-	9	7
	D	8	5	9	-	8
	E	4	6	7	8	-

Machine/ Job	M1	M2	M3	M4
J1	18	24	28	32
J2	8	13	17	19
J3	10	15	19	22

What are the job assignments which will minimize the total cost?

Job	Machine				
	A	B	C	D	E
I	7	5	2	3	9
II	6	6	4	5	10
III	5	4	5	6	8
IV	8	3	3	2	6

17	A truck owner finds from his past records that the maintenance cost per year of a truckwhose purchase price is Rs.8000, are given below: Year: 1 2 3 4 5 6 7 8 Maintenance cost (Rs): 1000 1300 1700 2200 2900 3800 4800 6000 Resale Price : 4000 2000 1200 600 500 400 400 400 Determine at what time it is profitable to replace the truck?	10M	4	L2
	OR			
18	Machine A cost Rs.45000 and the operating costs are estimated of Rs.1000 for the first 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.	10M	4	L2
19	Consider the shortest path problem from node 1 to node 6 defined in the following network. Solve the problem using Dijkstra Algorithm (show your calculations in details for each iteration).  	10M	5	L2
	OR			
20	(a) What is the significance of inventory? (b)Write limitations of E.O.Q.	5M 5M	5	L2