R20 Regulation *Subject code: 3P5CD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, November 2025

OPERATIONS RESEARCH

(ME)

Maximum Marks: 70 Date: 10.11.2025 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	List any three applications of LPP.	2M	1	L1
2	Compare simplex method and dual simplex method.	2M	1	L1
3	What are the basic characteristics of a queuing system?	2M	2	L1
4	Write on two Person zero sums game.	2M	2	L1
5	Write the difference between the Transportation Problem and Assignment Problem.	2M	3	L1
6	Define Artificial Variable.	2M	3	L1
7	Define Replacement.	2M	4	L1
8	What is Economic order quantity?	2M	4	L1
9	What are controlled variables in inventory problem?	2M	5	L1
10	Define Lead time and reorder point.	2M	5	L1

Part-B

	Answer All the following questions. (5X10M=50Marks)	Marks	CO	BTL
11	Solve the following LP problems graphically Minimize $Z = 3x1 + 2x2$ Subject to $5x1 + x2 \geq 10$, $x1 + x2 \geq 6$, $x1 + 4x2 \geq 12$, $x1, x2 \geq 0$.	10M	1	L2
	OR			
12	Write the steps involved in solving LPP Using Graphical method? And also write the applications of Operations Research.	10M	1	L2
13	Determine optimal feasible solution to the following transportation problem.	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

		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	-

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

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?

	OR					
16	Solve using Dominance principle.	10M	3	L2

		Player B		
Player A		1	7	2
		6	2	7
		5	2	6

17	There are nine jobs, each of which must go through two machines P and Q in the order PQ, the processing times (in hours) are given below: Machine / Job(s): A: P 2, Q 6; B: P 5, Q 8; C: P 4, Q 7; D: P 9, Q 4; E: P 6, Q 3; F: P 8, Q 9; G: P 7, Q 3; H: P 5, Q 8; I: P 4, Q 11	10M	4	L2
	OR			
18	The demand for an item is 18000 units per year. The holding cost is Rs1.20 per unit time and the cost of shortage is Rs.5.00. The production cost is Rs.400.00. Assuming that replacement rate is instantaneous determine the optimum order quantity.	10M	4	L2
19	The annual consumption of an item is 2000 units. The ordering cost is Rs.100 per order. The carrying cost is Rs.0.80 per unit, per year. Assuming working days as 200, lead time as 20 days, and safety stock as 100 units, calculate i) EOQ, ii) The number of orders per year.	10M	5	L2
	OR			
20	Write Queuing theory and also discuss its assumptions and limitations.	10M	5	L2