R20 Regulation *Subject code:3P5CD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, May 2025

OPERATIONS RESEARCH

(ME)

Maximum Marks: 70 Date: 24.06.2025 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	What is Linear programming	2M	1	L1
2	Define assignment problem	2M	1	L1
3	Explain the characteristics of processing n jobs through two machines ?	2M	2	L1
4	Write short note on two Person zero sums game.	2M	2	L1
5	Give essential characteristics of queuing procedure.	2M	3	L1
6	What are the types of inventory?	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 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.	10M	2	L2

	The Salesman starts from A and comes back to A. What route should he follow so that the distance is minimum? **To City** **From City** **A B C D E** **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 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?	10M	3	L2
	OR			
16	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 B C D E F G H I P 2 5 4 9 6 8 7 5 4 Q 6 8 7 4 3 9 3 8 11 Find the sequence that minimizes the total elapsed time T. Also calculate the total idle time for the machines in this period.	10M	3	L2

17	A machine owner finds from his past records that the costs per year of maintaining a machine, whose purchase price is Rs.8000, are as given below. Yr. 1 2 3 4 5 6 7 8 Maintenance cost 1000 1300 1700 2200 2900 3800 4800 6000 Resale price 4000 2000 1200 600 500 400 400 400 Determine the time at which it is profitable to replace the truck.	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	Define Queuing theory and also discuss its assumptions and limitations.	10M	5	L2