R18 Regulation *Subject code: 2P7CB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VII Semester Supplementary Examinations, July 2022

OPERATIONS RESEARCH

(Mechanical Engineering)

Maximum Marks: 70 Date:04.07.2022 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)

1 What is a redundant constraint in LPP?
2 Give the assumptions in linear programming models.
3 How do you solve an unbalanced transportation problem?
4 What is degeneracy in a transportation problem?
5 Mention the need for sequencing in a flow shop.
6 How will you decide between replacement and repair?
7 State the limitations of game theory.
8 Mention the cost components involved in an inventory problem.
9 What is recursive function in dynamic programming?
10 Define the term jockeying used in queuing theory.

Part-B

Answer All the following questions. (10M X 5=50Marks)

11 What do you mean by LPP? What are its limitations? Use penalty (or Big-M) method to maximize $z = 3x_1 - x_2$, subject to the constraints: $2x_1 + x_2 \geq 2$; $x_1 + 3x_2 \leq 3$; $x_2 \leq 4$; $x_1, x_2 \geq 0$. [10]

OR

12 Discuss the following (a) phases of operations research. [6]
(b) Limitations of operations research. [4]

13 Find the optimum solution to the Transportation problem given in the Table. [10]

	D1	D2	D3	D4	Supply
O1	5	3	6	2	19
O2	4	7	9	1	37
O3	3	4	7	5	34
Demand	16	18	31	25	90

OR

14 An equipment costs Rs 500/-. Operation and maintenance costs are nil for the first year and increases by Rs 100/- per year thereafter. If the money worth is 5% every year, determine the best age for replacement of the equipment. Assume negligible resale value. [10]

15 Solve the following Assignment problem. [10]

	I	II	III	IV	V
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	13

OR

16 A machinist has to do turning and threading on a number of different jobs. The Processing time in minutes are given below.

Job	1	2	3	4	5	6
Time for turning	3	12	5	2	9	11
Time for threading	8	10	9	6	3	1

Determine a sequence of these jobs that will minimize the total elapsed time. Also find the elapsed time and idle time for two operations. [10]

17 Solve the following game graphically. [10]

	Player B	
Player A	1	2
	5	4
	-7	9
	-4	-3
	2	1

OR

18 A manufacturer purchases items in lots of 800 units which is a four months requirement. The cost per unit is Rs. 100 and the ordering cost is Rs. 120 per batch order. The inventory carrying cost is estimated as 20% of the average inventory investment. [10]
(a) Determine the annual variable cost for managing the inventory.
(b) How much saving can be obtained from the EOQ purchases?

19 Apply Dynamic programming to Max $Z = 2x_1+3x_2$
Subjected to $x_1+2x_2 \leq 4$; $2x_1+x_2 \leq 3$ and $x_1, x_2 \geq 0$. [10]

OR

20 Trucks arrive at a depot every 18 minutes for service. The service time is 34 minutes. Find
(a) The probability that the depot is empty.
(b) Average queue length, assuming that the capacity of depot is limited to 3 trucks only. [10]