Code No.: ME506PC | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
III–B.TECH–I–Semester End Examinations (Supply) - May- 2023
OPERATIONS RESEARCH
(MECH)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks.

PART-A **(20 Marks)**

1. a) Explain the nature of the operations research. [2M]
   b) Discuss the Basic Solution and Unbounded Solution. [2M]
   c) Define assignment problems. [2M]
   d) Explain the steps in transportation algorithm. [2M]
   e) What are the situations which make the replacement of items necessary? [2M]
   f) What is Group replacement problem? [2M]
   g) Write the mathematical equation for EOQ. [2M]
   h) What are the different inventory models? [2M]
   i) Give some important applications of queuing theory? [2M]
   j) State applications of dynamic programming. [2M]

PART-B **(50 Marks)**

2. Solve the Linear Programing Problem. [10M]
   Maximize $Z= 3x_1+2x_2$
   Subjected to
   $4x_1+ 3x_2 \leq 12$
   $4x_1 - x_2 \leq 8$
   $x_1, x_2 \geq 0$.

OR

3. State different types of models used in operation research. Explain any two any methods. [10M]

4. Explain the steps involved in the formulation and optimal solution of an assignment problem. [10M]

OR

5. Find the Total cost using North-west corner method. Also find the optimal solution [10M]

	W1	W2	W3	W4	Capacity
F1	95	105	80	15	12
F2	115	180	40	30	7
F3	195	180	95	70	5
Requirement	5	4	4	11	24

6. There are seven jobs, each of which has to go through the machines A and B in the order AB. Processing times in hours are given below. [10M]

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine a sequence of these jobs that will minimize the total elapsed time.

OR

7. The maintenance cost and resale value per year of a machine whose purchase price is Rs. 7000 is given below: [10M]

Year:	1	2	3	4	5	6	7	8
Maintenance cost (Rs):	900	1200	1600	2100	2800	3700	4700	5900
Resale Price :	4000	200	1200	600	500	400	400	400

When should the machine be replaced.

8. Obtain the optimal strategies for both persons and the value of the game for zero-sum two-person game whose payoff matrix is given below: [10M]

	Player B			
Player A	B1	B2	B3	B4
A1	3	2	4	0
A2	2	4	4	2
A3	4	2	4	0
A4	0	4	0	8

OR

9. The annual demand per item is 6400 units. The unit cost is ₹12 and the inventory carrying charges 25% per annum. If the cost of procurement is ₹ 300 determine: [10M]
   i. EOQ
   ii. No. of orders per year

10. What is a Waiting line? Give some important applications of queuing theory. [10M]

OR

11. Jobs arrival at a workstation in a manufacturing plant is in a Poisson fashion at an average rate of five per hour. The time to machine one job is an exponential distribution with a mean time of 20 minutes. [10M]
    i. What is the expected time a job has to wait at the workstation?
    ii. What will be the average number of jobs waiting at the workstation at any time?
    iii. What is the probability that there will be more than four jobs?

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