Code No: 842AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA II Semester Examinations, July/August - 2021
OPERATIONS RESEARCH

Time: 3 Hours   **Max.Marks:75**

Answer any five questions
All questions carry equal marks
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1. Use duality to solve the following LP problem   [15]

    Maximize $Z = 2x_1 + x_2$
    Subject to $x_1 + x_2 \leq 6$
                      $x_1 + 2x_2 \leq 10$
                      $x_1 - x_2 \leq 2$
                      $x_1 - 2x_2 \leq 1$
                      x_1 and $x_2 \geq 0$.

2. Solve the following transportation problem to find its optimal solution by (MODI) method.   [15]

	W1	W2	W3	W4	Supply
P1	190	300	500	100	70
P2	700	300	400	600	90
P3	400	100	400	200	180
Demand	50	80	70	140	340

3. Six jobs have to be processed on three machines A, B and C in the order ACB. The time taken by each job on each machine is indicated below. Each machine can process only one job at a time. Find the total elapsed time and the idle time on each machine.   [15]

Job		J_1	J_2	J_3	J_4	J_5	J_6
Processing time	A	12	8	7	11	10	5
In hrs. on	B	7	10	9	6	10	4
Machine	C	3	4	2	5	15	4

4. The cost of a machine is Rs. 6,100 and its scrap value is Rs.100. The maintenance costs found from experience are as follows:

Year	1	2	3	4	5	6	7	8
Maintenance cost (Rs.)	100	250	400	600	900	1200	1600	2000

    When should the machine be replaced?   [15]

5. Arrivals at a telephone booth are considered to be Poisson with an average time of 10 minutes between one arrival and the next. The length of a phone call is assumed to be distributed exponentially with mean 3 minutes.
    a) What is the probability that an arrival will have to wait more than 10 minutes before the phone is free?
    b) What is the probability that it will take him more than 10 minutes altogether to wait for phone and complete his call?
    c) Estimate the fraction a day that the phone will be in use.
    d) Find the average number of units in the system.   [15]

6. A tax consulting form has a single counter in its office to receive people who have problems concerning their income, wealth and sales taxes. On the average 48 persons arrive in an 8-hour day. Each tax adviser spends 5 minutes on an average on an arrival. If the arrivals are Poissionly
    a) The average number of customers in the system
    b) Average time a customers waiting to be served.
    c) Average waiting time for a customer.
    d) Average waiting time for a customer.   [15]

7. Ram industry needs 5400 units year of a bought-out component which will be used in its main product. The ordering cost is Rs.250 per order and the carrying cost per unit per year is Rs. 30. Find the economic order quantity, the number of orders per year and the time between successive orders.   [15]

8. Solve the following game graphically where pay off matrix for player A is given below.
                                                                                         [15]

8	-6
7	-4
-7	6
-4	-2

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