27-Dec-2023 10:30 am - 01:30 pm   1T00192 - M.C.A. (Sem-II) (Choice Based)
Two Year Programme (IDOL) / 55921 - Mathematical Foundation for Computer
science II   QP CODE: 10043838

Time: 3 Hours   **Total Marks: 80**

NB;   (1)   Question no 1 is compulsory

      (2)   Attempt any Three Questions between Questions no 2 to Questions no 6

Q1   Attempt any 4 questions out of 5 questions.   [20]

    A.   Explain the advantages and disadvantages of LPP.

    B.   Explain the Hungarian Method to solve an assignment problem.

    C.   Solve the following transportation problem using North West Corner Rule

Plants / Warehouse	P	Q	R	S	Demand
	6	7	9	3	70
	11	5	2	8	55
	10	12	4	7	90
Supply	85	35	50	45	

    D.   A company manufactures two products A and B, each using Machine I and Machine II. Processing time per unit of A are 5 and 6 hours respectively and that of B are 4 and 5 respectively. Maximum number of hours available are 20 for machine I and 22 for machine II. Per unit, the profit of A and B are Rs. 6 and Rs. 5 respectively. Formulate LPP to determine production of A and B for maximum profit.

    E.   Explain the algorithm of MODI method.

Q2   Answer the following:

    A.   Find the optimal solution of the following assignment problem: [10]

Cost (In Rs)

	A	B	C	D
1	20	56	38	26
2	30	60	12	56
3	80	42	40	34
4	42	56	52	24

    B.   Solve the following transportation problem using VAM method.   [10]

Sources	Distribution Centre				
	D1	D2	D3	D4	Supply
S1	12	6	20	25	400
S2	6	11	15	12	300
S3	9	15	17	7	500
Demand	200	250	350	400	

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Q3   Answer the following:

A.   Find the optimal strategies for the player A and B of the following game.
     Also find the value of the game.

Player B

Player A	B1	B2	B3	B4	B5
A1	12	6	4	11	3
A2	9	8	7	9	10
A3	5	7	6	6	11
A4	8	9	5	5	4

B.   Consider the following payoff table. Find which strategy is optimal   [10]
     Using:
     i.   Maximin Criterion
     ii.   Maximax Criterion
     iii. Minimax Regret Criterion
     iv.   Laplace Criterion

State of Nature	Payoff in Rs (Course of Action)			
	A1	A2	A3	A4
S1	40	20	20	18
S2	50	-5	15	17
S3	60	30	4	10

Q4   Answer the following:

A.   A self-serviced cafeteria manned by single cashier. During peak hours, customers
     arrive at a rate of 24 customers per hour. The average number of customers that
     can be serviced by cashier is 28 per hour. Calculate: [10]
     i.   The probability that cashier is idle.
     ii.   The average number of customers in the queuing system.
     iii. The average time a customer spends in the system.
     iv.   The average number of customers in the queue.
     v.   The average time a customer spends in the queue waiting for service.

B.   Explain Simulation in detail, State its advantages.   [10]

Q5   Answer the following:

A.   Solve the following by using the simplex method: [10]
     Max Z: $50X1 + 20X2$
     Subject to: $20X1 + 10X2 \leq 500$
                       $50X1 + 50X2 \leq 300$
                       $X1, X2 \geq 0$

B.   Jhon is a dentist who schedules all her patients for 30 minutes appointments. Some of the patients take more or less than 30 minutes depending on the type of dental work to be done. The following summary shows the various categories of work their probabilities and the time needed to complete the work: [10]

Category	Time Required	No. of Patients
Filling	45 min	40
Crown	60 min	15
Cleaning	15 min	15
Extracting	45 min	10
Checkup	15 min	20

Simulation the dentist clinic for four hours and find out the average waiting time the patients as well as the idleness of the doctors. Assume that all the patients show up at the clinic at exactly their schedule arrival.
Use the following random number for handling the above problem:
40, 82,11,34,25,66,17,79.

Q6   Answer the following:
A.   Solve the following LPP by graphical method.   [10]
Maximize $z = 4 x_1 + 7 x_2$
Subject to $6x_1 + 12x_2 \leq 60$
$5x_1 + 5x_2 \leq 30$
And $x_1, x_2 \geq 0$

B.   Explain game theory.   [10]

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