



Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)

Re-accredited with 'A+' Grade by NAAC. Recognised by UGC Under Section 12B

Coimbatore - 641 043, Tamil Nadu, India

Master's Degree Examination – June / July 2021

II Semester

Class : I PG

Major : Textiles and Fashion Apparel/ MSW/
Physics/ Chemistry

Time : 3 hours

Max. Marks : 100

20MMAI01 IDC - Mathematical Techniques

Part-A

10 x 1 = 10

Choose the correct answer

- Identify the relation between \square and E from the following:
a. $\square = E - 1$ b. $\square = E + 1$ c. $\square = 1 - E^{-1}$ d. $\square = 1 + E^{-1}$ CO1K1
- Tell which case where Newton's forward interpolation formula is used to interpolate the values of y nearer to the _____ of the table.
a. beginning b. middle c. end d. last value CO1K1
- State which one of the following type of matrices that the coefficient matrix A of the system $AX = B$ is reduced to in Gauss elimination method.
a. Upper triangular b. Lower triangular c. Diagonal d. Unit CO2K1
- Name the method which is used to solve the system of linear equations.
a. Newton's forward interpolation method b. Newton's backward interpolation method
c. Gauss Jordan method d. Newton-Raphson method CO2K1
- Indicate the number of variables of an L.P.P. whose solution can be got by graphical method.
a. 2 b. 3 c. 4 d. any number CO3K2
- Identify which type of constraints occur only in the standard form of LPP.
a. \leq b. \geq c. $=$ d. $>$ CO3K2
- State: When maximin and minimax values of the game are same, then _____
a. there is a saddle point b. solution does not exist
c. strategies are mixed d. there is no saddle point CO4K1
- State which one of the following must be true for a two-person zero-sum game to be fair.
a. minimax value = maximin value b. minimax value = maximin value = 0
c. minimax value \neq maximin value d. minimax value $<$ maximin value CO4K1
- Name the time between the starting of the first job and the completion of the last job in a sequencing problem.
a. Total duration b. Total elapsed time c. Idle time d. Assigned time CO5K1
- Identify the time during which a machine remains waiting or vacant in a sequencing problem.
a. Idle time b. Slack time c. Critical time d. Processing time CO5K2

Answer ALL questions
Each answer should not exceed 400 words or two pages

11.a. Explain the following: (i) Forward differences (ii) Central differences CO1K2

(or)

11.b. Estimate the value y of at x = 21 from the following data using Newton's forward interpolation formula.

x	20	23	26	29
y	0.3420	0.3907	0.4384	0.4848

CO1K4

12. a. Determine the inverse of the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & 1 \\ 1 & 1 & 2 \end{bmatrix}$ by matrix inversion method.

CO2K3

(or)

12.b. Explain briefly the procedure of Gauss elimination method. CO2K3

13.a. Solve the following LPP using graphical method:

$$\begin{aligned} &\text{Maximize } z = 10x_1 + 4x_2 \text{ subject to the constraints} \\ &5x_1 + 2x_2 \leq 100 \\ &x_1 + 2x_2 \leq 50 \\ &x_1, x_2 \geq 0 \end{aligned}$$

CO3K3

(or)

13.b. Write the following L.P.P. in standard form:

$$\begin{aligned} &\text{Maximize } z = 2x_1 + 4x_2 + 7x_3 \text{ subject to the constraints} \\ &x_1 + 2x_2 - x_3 \leq 8 \\ &2x_1 + 8x_2 - 2x_3 \geq 12 \\ &-x_1 + x_2 + 2x_3 \geq 4 \\ &x_1, x_2, x_3 \geq 0 \end{aligned}$$

CO3K3

14.a. Explain the following: (i) Two-person zero-sum game
(ii) Saddle point
(iii) Value of the game. CO4K2

(or)

14.b. Establish that the following two-person zero sum game is strictly determinable and fair: Player A

$$\text{Player B } \begin{bmatrix} 0 & 2 \\ -1 & 4 \end{bmatrix}$$

Give optimum strategies of each player. CO4K3

15.a. Point out the basic assumptions made while dealing with the sequencing problem. CO5K4

(or)

15.b. There are five jobs, each of which must go through two machines A and B in the order AB. Processing times in hours are given in the table below:

Job (i)	1	2	3	4	5
Machine A (A_i)	5	1	9	3	10
Machine B (B_i)	2	6	7	8	4

Determine a sequence for the five jobs that will minimize the elapsed time T. CO5K3

Part C

5 x 12 = 60

Answer ALL questions

Each answer should not exceed 800 words or four pages

16.a. Estimate the value of θ at $x = 43$ from the following data:

x	40	50	60	70	80	90
θ	184	204	226	250	276	304

CO1K5

(or)

16.b. Measure the value of $y(63)$ from the data given below:

x	45	50	55	60	65
y	114.84	96.16	83.32	74.48	68.48

CO1K5

17.a. Evaluate the solution of the following system by Gauss Jordan method:

$$5x - 2y + 3z = 18$$

$$x + 7y - 3z = -22$$

$$2x - y + 6z = 22$$

CO2K5

(or)

17.b. Solve the following system by Gauss elimination method:

$$2x + 4y + 6z = 22$$

$$3x + 8y + 5z = 27$$

$$-x + y + 2z = 2$$

CO2K6

18.a. Solve the following LPP using graphical method:

Minimize $z = 2x_1 + x_2$ subject to the constraints

$$x_1 + x_2 \geq 1$$

$$5x_1 + 10x_2 \leq 50$$

$$x_1 \leq 4$$

$$x_1, x_2 \geq 0$$

CO3K6

(or)

18.b. Determine the solution of the following L.P.P.

graphically: Minimize $z = 20x_1 + 10x_2$

subject to the constraints

$$x_1 + 2x_2 \leq 40$$

$$3x_1 + x_2 \geq 30$$

$$4x_1 + 3x_2 \geq 60$$

$$x_1, x_2 \geq 0$$

CO3K3

19.a. For the game with the following pay-off matrix, plan the optimal strategies and the value of the game:

	B	
A	5	1
	[
	3	4

CO4K6

(or)

19.b. Solve the following game and determine the value of the game:

	B	
A	2	5
	[
	7	3

CO4K6

20.a. We have five jobs, each of which must go through the machines A, B and C in the order ABC. Devise the optimal sequence that will minimize the total elapsed time.

Job	1	2	3	4	5
Machine A	5	7	6	9	5
Machine B	2	1	4	5	3
Machine C	3	7	5	6	7

CO5K6

(or)

20.b. Estimate the minimum time, using graphical method, needed to process the following jobs on the machines shown, that is, for each machine find the job that should be done first. Also evaluate the total elapsed time to complete both the jobs.

		Machines				
		A	B	C	D	E
Job 1	Sequence					
	Time	3	4	2	6	2
Job 2	Sequence	B	C	A	D	E
	Time	5	4	3	2	6

CO5K5
