

Program: Master of Computer Applications

Curriculum Scheme: MCA 2 YEAR COURSE

Examination: MCA SECOND YEAR SEMESTER-2 JANUARY-2022 (ATKT)

Course Code: MCA21 and Course Name: Mathematical Foundation for Computer Science 2

Time: 2:00 pm to 4:00 pm (2 Hrs)

Max. Marks: 80

Section I - MCQS (40 Marks) – 40 Minutes (2:00 pm to 2:40 am)

Section II – Subjective (40 Marks) – 80 Minutes (2:40 am to 4:00 pm)

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SECTION II

Q.2 Solve any **TWO** questions out of three questions.

[20 Marks]

1. Use simplex method to solve the following LPP

Maximize $Z = 30x_1 + 40x_2$

subject to $60x_1 + 120x_2 \leq 12000$

$8x_1 + 5x_2 \leq 600$

$3x_1 + 4x_2 \leq 500$

and $x_1, x_2 \geq 0$

2. Reduce the game by dominance property and solve using algebraic method

Player A	Player B			
	1	7	2	4
	0	3	7	8
	5	2	6	10

3. A company has factories F1, F2 and F3 which supply warehouses W1, W2, W3. Weekly factory capacities are 200, 160 and 90 units respectively. Weekly warehouse requirements are 180, 120 and 150 units respectively.

Find the initial basic feasible solution (IBFS) using Vogel's Approximation Method. Unit shipping costs are

	W1	W2	W3
F1	16	20	12
F2	14	8	18
F3	26	24	16

Q.3 Solve any **TWO** questions out of three questions.

[20 Marks]

1. Using two-phase method solve the following LPP

$$\text{Maximize } Z = 2x_1 + 3x_2 - 5x_3$$

$$\text{subject to } x_1 + x_2 + x_3 = 7$$

$$2x_1 - 5x_2 + x_3 \geq 10$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

2. An automobile dealer wishes to put four repairmen to four jobs. The repairmen have somewhat different kinds of skills and they exhibit different levels of efficiency from one job to another. The dealer has estimated the number of man hours that would be required for each man job combination. This is given in the matrix form in the following table.

		Jobs			
		A	B	C	D
Men	1	5	3	2	8
	2	7	9	2	6
	3	6	4	5	7
	4	5	7	7	8

Find the optimum assignment that will result in minimum man hours required.

3. At a railway reservation booking window, customers arrive randomly at the average rate of 16 per hour approximated to Poisson's distribution. If service time is exponentially distributed with a mean of 20 per hour, determine:
- Percentage utilization capacity
 - Probability that there are at least 3 customers in the queue
 - Average time spent in the system
 - Average number of customers waiting in the line
 - Probability that there are 5 customers in the system