

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034
B.Com, DEGREE EXAMINATION – MATHEMATICS
THIRD SEMESTER – NOVEMBER 2019
MT 3209- BASIC MATHEMATICS

Date: 04-11-2019
Time: 01.00 – 04.00

Dept. No.

Max. : 100 marks

PART-A

ANSWER ALL QUESTIONS:

(10×2 =20)

1. Define Demand function.
2. Find the slope of the line joining $(-3,7)$ and $(7,-3)$.
3. If $A = \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 3 \\ 3 & 3 \end{bmatrix}$, find AB and BA .
4. State Cayley-Hamilton theorem
5. Define optimum solution
6. Define non-degenerate basic feasible solution.
7. Rohit scored 120 runs which includes 3 sixes and 8 boundaries. What percentage of his total score was made by running between the wickets.
8. Find the value of 55% of 900 – 45% of 800.
9. What percentage of 4800 gram is 24 gram ?
10. Write the formula for Spearman's rank correlation

PART -B

ANSWER ANY FIVE QUESTIONS:

(5×8=40)

11. a) Find the equation of a straight line which makes a negative intercept of 4 units on the X-axis and passes through the point $(2,4)$.
 b). Find the intercepts of the equation $x - y + 1 = 0$

12. Prove that
$$\begin{vmatrix} a & b & c \\ a-b & b-c & c-a \\ b+c & c+a & a+b \end{vmatrix} = a^3 + b^3 + c^3 - 3abc .$$

13. Verify Cayley-Hamilton theorem for the matrix $A = \begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$ and hence find A^{-1} .

14. Find the matrix B such that $A^2 + 3A + B = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, where $A = \begin{bmatrix} 3 & -2 \\ -1 & 4 \end{bmatrix}$

15. Ramu was 4 times as old as his son 8 years ago. After 8 years Ramu will be twice as old as his son. What are their present age.
16. A book was sold for Rs. 27.50 with a profit of 10%. If it were sold for Rs.25.70 then what would have been the percentage of profit or loss ?
17. Find the initial basic feasible solution to the following transportation problem by North-West corner rule.

	M1	M2	M3	M4	M5	M6	Available
W1	9	12	9	6	10	5	5
W2	7	3	7	7	5	5	6
W3	6	5	9	11	3	11	2
W4	6	5	9	11	3	11	2
W5	6	5	9	11	3	11	2
W6	6	8	11	2	2	10	9
Demand	6	4	6	2	4	2	

18. Calculate the mean and standard deviation for the following table giving the age distribution of 542 members.

Age in Years	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Number of members	3	61	132	153	140	51	2

PART - C

ANSWER ANY TWO QUESTIONS:

(2×20= 40)

19. a) Find the equation of the straight line passing through the point (2,3) and perpendicular to the line $x - 2y = 8$. (7 marks)
- b) Define Equilibrium price. Find the Equilibrium price given $Q_d = \frac{8p}{p-2}$ and $Q_s = p^2$. (5 marks)
- c) If $f(x) = x^2 - 2x + 5$, find $f(x+2) - f(x-1) + f(x+1)$. (8 marks)

20. (a) Find the inverse of the matrix $A = \begin{bmatrix} 5 & -6 & 4 \\ 7 & 4 & -3 \\ 2 & 1 & 6 \end{bmatrix}$ (12 marks)

- (b) Solve by using Cramer's rule $2x - 3y = 3$, $4x - y = 11$. (8 marks)

21. (a) The assignment cost of assigning any one operator to any one machine is given in the following table.

		Operators			
		I	II	III	IV
Machines	A	10	5	13	15
	B	3	9	18	3
	C	10	7	3	2
	D	5	11	9	7

Find the optimum assignment schedule. (10 marks)

- b) Find the solution to the following transportation problem by Least Cost Method. (10 marks)

	D1	D2	D3	D4	D5
S1	1	2	1	4	30
S2	3	3	2	1	50
S3	4	2	55	9	20
	20	40	30	10	

22. (a) Solve the following LPP by graphical method.

Maximize $z = 5x_1 + 4x_2$

Subject to the constraints

$1.5x_1 + 2.5x_2 \leq 80$

$2x_1 + 1.5x_2 \leq 70$

$x_1, x_2 \geq 0$.

(10 marks)

- (b) Two ladies were asked to rank 7 different types of lipsticks. The ranks given by them are as follows.

Lipstick	A	B	C	D	E	F	G
Neelu	2	1	4	3	5	7	6
Neena	1	3	2	4	5	6	7

Calculate the Spearman's rank correlation.

(10 marks)