

1703

B.C.A. FIRST YEAR EXAMINATION, 2019

BASIC MATHEMATICS

Time: Three Hours

Maximum Marks: 100

Answer of all the questions (short answer as well as descriptive) are to be given in the main answer-book only. Answers of short answer type questions must be given in sequential order. Similarly, all the parts of one question of descriptive part should be answered at one place in the answer-book. One complete question should not be answered at different places in the answer-book. Write your roll numbers on question paper before start writing answers of questions.

Question paper consists of three parts.

All THREE parts are compulsory.

PART – A

[Marks: 20]

(Very Short Answer)

Consists 10 question of two marks each.

Maximum limit for each question is up to 40 words.

PART – B

[Marks: 20]

(Short Answer)

Consists 5 question of four marks each.

Maximum limit for each question is up to 80 words.

PART – C

[Marks: 60]

(Long Answer)

Consists 5 question of twelve marks each with internal choice.

PART – A

- Q.1 (a) Define Signum function.
(b) Define domain and range of a function.
(c) Define Transpose of a matrix.
(d) Evaluate $\begin{vmatrix} 0 & 1 & 2 \\ -1 & 0 & -3 \\ -2 & 3 & 0 \end{vmatrix}$
(e) Write formula for area of a triangle.
(f) Write Sridhar Aycharya's formula.
(g) Define Mode.
(h) Define Regression.
(i) Define Permutation.
(j) Define Exhaustive Events.

PART – B

- Q.2 (a) Consider the infimum binary operation * on the set {1, 2, 3, 4, 5} defined by $a*b = \text{minimum of } a \text{ and } b$. Write the multiplication table of the operation*.
(b) Find the value of x, if $\begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} x & 3 \\ 2x & 5 \end{vmatrix}$
(c) In what ratio does the points (- 4, 6) divide the line segment joining the points A (- 6, 10) and B (3, - 8)?
(d) Find the variance of the following data:
6, 8, 10, 12, 14, 16, 18, 20, 22, 24
(e) Find the value of n such that ${}^n P_5 = 42 {}^n P_3, n > 4$

PART – C

- Q.3 (a) Consider $f: \mathbb{R} \rightarrow \mathbb{R}$ given by $f(x) = 4x + 3$. Show that f is invertible also find the inverse of f .
- (b) Define Identity function and draw the graph of Identity function.

OR

- (a) Show that the Modulus function $f: \mathbb{R} \rightarrow \mathbb{R}$, given by $f(x) = |x|$, is neither one – one nor onto.
- (b) Find the domain of the function

$$f(x) = \frac{x^2 + 3x + 5}{x^2 - 5x + 4}$$

- Q.4 (a) If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$; then verify that $AA' = A'A = I$,

Where I is the unit matrix.

- (b) Find x, y satisfying the matrix equation.

$$\begin{bmatrix} x - y & 2 & -2 \\ 4 & x & 6 \end{bmatrix} + \begin{bmatrix} 3 & -2 & 2 \\ 1 & 0 & -1 \end{bmatrix} = \begin{bmatrix} 6 & 0 & 0 \\ 5 & 2x + y & 5 \end{bmatrix}$$

OR

- (a) Prove that:

$$\begin{vmatrix} -a^2 & ab & ac \\ ba & -b^2 & bc \\ ac & cb & -c^2 \end{vmatrix} = 4a^2b^2c^2$$

- (b) Solve the following system of equations by Cramer's rule.

$$x - y + z = 4$$

$$2x + y - 3z = 0$$

$$x + y + z = 2$$

- Q.5 (a) Find the equation of a line perpendicular to the line $x - 2y + 3 = 0$ and passing through the point $(1, -2)$.
- (b) Find the roots of the quadratic equation $6x^2 - x - 2 = 0$, by factorization method.

OR

- (a) Find the angle between the lines

$$y - \sqrt{3}x - 5 = 0 \text{ and } \sqrt{3}y - x + 6 = 0.$$

- (b) Find the quadratic equation whose roots are 4 and -2 .

Q.6 (a) Draw a histogram of the following frequency distribution:

Age in years:	0 – 2	2 – 4	4 – 6	6 – 8	8 – 10	10 – 12
No. of Students:	5	12	20	30	16	8

(b) Find the mode for the following distribution:

Class-Interval :	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency :	5	8	7	12	28	20	10

OR

Find the mean and standard deviation of the following distribution.

Age group:	15 – 17	17 – 19	19 – 21	21 – 23	23 – 25	25 – 27	27 – 29
Frequency:	14	11	8	6	5	4	2

- Q.7 (a) A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these committees would consist of 1 man and 2 women?
- (b) In an experiment of tossing two dice, find the probability that the sum of the numbers is 7.

OR

A Problem in Mathematics is given to three students A, B and C whose chances of solving it are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$ respectively. What is the chance that the problem will be solved if they all try jointly?
