S.S. Jain Subodh College of Global Excellence
Pre University Examination 2021

BCA FIRST YEAR
(Basic Mathematics)
(PAPER-2)

Time: 3 hr. **Marks: 100**

PART - I: (Short Answer) consists of 10 questions of 2 marks each. Maximum limit for each question is upto 40 words.
PART- II: (Short answer) consists of 5 questions of 4 marks each. Maximum limit for each question is up to80 words.

PART- III :(Long answer) consists of 5 questions of 12 marks each with internal choice.

PART-I

Q.1 Very short answers type questions.

(a) Define the sin(x) function.
(b) Let A= {-2,-1, 0, 1, 2} and the function f:A→R is defined by f(x)= x^2 + 1.Find the range of f.
(c) If $A=\begin{bmatrix}1 & 3\\ 3 & 4\end{bmatrix}$ and A^2- kA –5I_2 =0, then find value of k.
(d) Solve by Cramer's rule 2x – y = 17, 3x+5y =6.
(e) One year ago, a man was 8 times as old as his son. Now his age is equal to the square of his son's age. Find their present ages.
(f) If a is one of the root of the equation 4x^2 + 2x -1=0 then prove that other root is 4a^3 -3a.
(g) The points scored by a basket ball teams in a series of matches are as follows :
16, 1, 6,16, 14,4, 13,8,9,23,47,9,7,8,17,28
(h) Write formula of mode of grouped date.
(i) Find the number of different words which can be formed using the letters of the word MATHEMATICS.
(j) Find the probability of throwing an even number with a die.

PART-II

Q.2 Attempt all the parts....

(a) If f : R→R and g : R→R are two functions defined as follows then find (fog)(x) and (gof)(x) :
f(x)= 2x+ 3 , g(x)= x^2 + 1.
(b) Find the inverse of matrix by adjoint method $A=\begin{bmatrix}1 & 2 & 5\\ 3 & 1 & 4\\ 1 & 1 & 2\end{bmatrix}$
(c) Write relation between the root and coefficient of Quadratic equation.
(d) Find the median of the following data.

Class:	40	41	42	43	44	45	46	48
Frequency:	2	5	7	8	13	26	6	3

(e) Find the mean of the following data:
2, 4, 6, 10, 3, 4, 5, 7, 4, 3

PART-III

Attempt all the following questions by taking any two parts from each question.

Q.3

a. If $f: R \to R$ and $g: R \to R$ are the functions, where $f(x) = 2x + 3$ and $g(x) = x^2 + 1$ for all x belongs R, then find $(f+g)(3)$, $(fg)(5)$.

b. Let $A = R - \{2\}$ and $B = R - \{1\}$ if $f: A \to B$ is a mapping defined by $f(x) = \frac{x-1}{x-2}$ show that f is bijective.

c. Define Composite of function.

Q.4

a. Solve the given system of equation by cramer's rule.
$3x + y + z = 2$, $2x - 4y + 3z = -1$, $4x + y - 3y = -11$

b. Find eigen values and eigen vectors for the following matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

c. If $A = \begin{bmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{bmatrix}$ verify that $A(\text{adj } A) = (\text{adj } A)A = (\det A)I_3$.

Q.5

a. The hypotenuse of a right angled triangle is 6 meters more than twice the shortest side. If the third side is 2 metres less than the hypotenuse find the sides of the triangle.

b. Arithmetic mean and geometric mean of two numbers are 5 and 3. Find these two numbers.

c. If p and q are roots of a quadratic equation $2x^2 - 3x - 5 = 0$ then form a quadratic equation whose roots are p^2 and q^2.

Q.6

a. Find mean of following data:

Class	:	20-40	40-60	60-80	80-100	100-120	120-140	140-160
Frequency	:	9	11	14	6	8	15	12

b. Find the median weight of the students.

Weight	:	20-40	40-60	60-80	80-100	100-120	120-140	140-160
No. of Students	:	9	11	14	6	8	15	12

c. Find the S.D., C.S.D. and C.V. for the following distribution:

x	:	9	12	15	18	21	24	27	30
y	:	20	60	150	250	200	120	50	40

Find the median weight of the students.

Q.7

a. In a single throw of two dice, determine probability of getting a total of 7.

b. Three coins are tossed together then find the probability that (1) only two tai occur (2) at Least two tails occur.

c. Four persons are chosen at random from a group of 4 men, 3 women, and 5 ildren. Find the probability that in selected persons exactly two will be children.

This question paper contains 3 printed pages.

Roll No. 32417

102/132

Bas. Maths.

B.C.A. (Part-I) EXAMINATION - 2022

101830

(Faculty of Science)

(Three-Year Scheme of 10+2+3 Pattern)

BASIC MATHEMATICS

Time Allowed : 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 number on question paper before start writing answers of questions.

PART-I : *(Very short answer) consists of 10 questions of 2 marks each. Maximum limit for each question is upto40 words.*

PART-II : *(Short answer) consists of 5 questions of 4 marks each. Maximum limit for each question is upto 80 words.*

PART-III : *(Long answer) consists of 5 questions of 12 marks each with internal choice.*

PART - I

1. (i) Let $A = \{-2, -1, 0, 1, 2\}$ and the function $f : A \to R$ is defined by $f(x) = x^2 + 1$. Find the range of f.

(ii) Define Bijective function.

(iii) Find whether the following matrix is singular or not.

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 4 \\ 2 & 2 & 2 \end{bmatrix}$$

(iv) If $A = \begin{bmatrix} 2 & 4 \\ 4 & 3 \end{bmatrix}$, $X = \begin{bmatrix} x \\ 1 \end{bmatrix}$, $B = \begin{bmatrix} 8 \\ 11 \end{bmatrix}$ and $AX = B$

then find x.

(v) Prove that $\mu^2 = 1 + \frac{\delta^2}{4}$, Where notations have their usual meaning.

(vi) Solve the quadratic equation $25x(x+1) = -4$.

(vii) Find the mean of first ten natural numbers.

(viii) Define Correlation.

(ix) Find the probability of throwing a prime number with a dice.

(x) In how many ways can 8 persons be arranged around a table ?

PART - II

Attempt **all** the parts.

2. If $f: R \to R$ and $g: R \to R$ are two functions defined by $f(x)=\frac{1}{2-x}$ and $g(x)=\frac{1}{1+x}$

Find $fog(x)$ and $gof(x)$

3. Find the inverse of matrix by adjoint method.

$$A=\begin{bmatrix}1 & 2 & 5\\ 3 & 1 & 4\\ 1 & 1 & 2\end{bmatrix}$$

4. Express x^3-2x^2+x-1 into a factorial polynomial.

5. If the mean of the following data is 20.2, find the value of k.

x:	10	15	20	25	30
f:	6	8	20	k	6

6. How many different words can be formed by the word "COMMERCE" when all vowels are not together.

PART - III

Attempt all the questions by taking **any two** parts from each question.

7. (a) Let $A=R-\{3\}$, $B=R-\{1\}$ and $f: A \to B$ s.t. $f(x)=\frac{x-2}{x-3}$. Prove that f is bijection. Also find f^{-1}.

(b) If $f(x)=\frac{x-1}{x+1}$, $x \neq -1, 1$ then prove that fof^{-1} is an identity function.

(c) If $A=\{1, 2, 3, 4\}$, $B=\{3, 5, 7, 9\}$, $C=\{7, 23, 47, 79\}$ and $f: A \to B$ s.t. $f(x)=2x+1$; $g: B \to C$ s.t. $g(x)=x^2-2$ then write $(gof)^{-1}$ and $f^{-1}og^{-1}$ as set of ordered pairs.

8. (a) Find the solution of the following system of equations.

$5x+3y+7z=4$

$3x+26y+2z=9$

$7x+2y+10z=5$

(b) Find the eigen values and corresponding eigen vectors of the matrix.

$$A=\begin{bmatrix}8 & -6 & 2\\ -6 & 7 & -4\\ 2 & -4 & 3\end{bmatrix}$$

(c) Find the value of x such that

$$[1 \times 1]\begin{bmatrix}1 & 3 & 2\\ 2 & 5 & 1\\ 15 & 3 & 2\end{bmatrix}\begin{bmatrix}1\\ 2\\ x\end{bmatrix}=0$$

9. (a) Evaluate $\Delta^3[(1-x)(1-2x)(1-3x)]$

(b) The sum of two numbers is 15. If the sum of their reciprocals is $\frac{3}{10}$ then find the numbers.

(c) The product of Kamal's age five year ago with his age 9 years later is 15. Find Kamal's present age.

10. (a) Calculate the standard deviation and coefficient of standard deviation from the following data.

Class	:	0−2	2−4	4−6	6−8	8−10
Frequency	:	2	5	15	7	1

(b) Find the coefficient of correlation from the following data.

X :	46	54	56	56	58	60	62	66
Y :	36	40	49	54	42	58	54	58

(c) Consider the two regression lines $3x+2y=26$ and $6x+y=31$. Find the mean values and coefficient of correlation between x and y.

11. (a) Prove that ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$

(b) How many 6 digit numbers may be formed using the digits 0, 1, 2, 3, 4, 5 if repetition is not allowed.

(c) A bag contains 2 white, 4 black and 5 red balls. Three balls are drawn at random. Find the probability that all three balls are of same colour.

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CbH