This question paper contains 4 printed pages] **Roll No.** 27472

Sl.No. 1337

132

B.C.A. (Part - I)

B.C.A. (Part - I) EXAMINATION, 2017
(Faculty of Science)
(Three - Year Scheme of 10 +2 + 3 Pattern)
Paper - 132
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.

PART - I :	***(Very Short Answer) consists of 10 questions of 2 marks each. Maximum limit for each question is up to 40 words.***
PART - II:	***(Short answer) consists of 5 questions of 4 marks each. Maximum limit for each question is up to 80 words.***
PART - III:	***(Long answer) consists of 5 questions of 12 marks each with internal choice.***

PART - I

1. Very Short Answer Type

a) Define Invertible functions.

b) Define range of a function.

c) Define transpose of a matrix..

d) What Difference between eigen values and eigen vectors.

e) Write standard equation of a circle.

f) Write Shridharacharya's formula.

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

g) Define Dispersion.

P.T.O.

h) Write Relation between Mean, Mode, Median.

i) Define Permutations.

j) Write Multiplication Law of probability.

PART - II

2. a) Prove that if $f : X \to Y$ and $g : Y \to Z$ are one-one function, then gof is also a one-one functions.

b) If $A = \begin{bmatrix} 1 & 3 & 2 \\ 4 & 2 & 5 \end{bmatrix}_{2\times3}$, $B = \begin{bmatrix} -1 & 0 & 3 \\ -2 & 5 & 1 \end{bmatrix}_{2\times3}$, find the Matrix D such that $A + 2B - D = 0$.

c) Show that the point A(0, 1), B (1, 4), C(4, 3) and D(3, 0) are the vertices of a square.

d) Calculate the median for the following frequency distribution.

xi	1	2	3	4	5	6	7	8	9
fi	8	10	11	16	20	25	15	9	6

e) Prove that

$$^nP_{n-1} = {^nP_n}.$$

PART - III

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

b) Define equal functions give an example of two functions that are equal.

OR

a) Show that the function $f : R \to R$, where $f(x) = x^3 + x$, for all $x \in R$ is a bijection.

b) If $f : R \to R$ where $f(x) = 2x - 3$ for all $x \in R$ then prove that f is bijective. Also find f^{-1}.

4. a) If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & ces\alpha \end{bmatrix}$, then verify that $A^T A = I_2$.

b) If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, find $(A - 2I)(A - 3I)$.

OR

c) Prove that $\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix} = xyz\,(x-y)\,(y-z)\,(z-x)$.

d) Solve the following system of equations by Cramer's rule

$$x + y + z = 11$$
$$2x - 6y - z = 0$$
$$3x + 4y + 2z = 0.$$

5. a) Find the Locus of a point such that the sum of its distances from the points (2, 0) and (–2, 0) is always 6.

b) Derive the slope - Intercept form of the equation of straight line.

OR

a) Derive the normal form of the equation of straight line.

b) Prove that the following straight lines are concurrent.

$3x - 5y - 11 = 0$, $5x + 3y - 7 = 0$, $x + 2y = 0$.

6. a) Calculate the mean and the standard deviation of first n natural numbers.

b) Calculate the mean, variance and standard deviation for the following frequency distribution:

Marks	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No.of students (fi)	3	6	13	15	14	5	4

OR

The following marks were obtained by a class of students in Mathematics (out of 100).

Paper - I	45	55	56	58	60	65	68	70	75	80	85
Paper - II	56	50	48	60	62	64	65	70	74	82	90

Compute the correlation coefficient for the above data. Find also the equations of the lines of regression.

7. a) Find the value of n if ${}^7P_n = 2.\ {}^7P_{n-2}$.

b) Let A and B be two events such that $P(\bar{A}) = 2/3$ and $P(A \cup B) = \frac{1}{2}$. Find $P(\bar{A} \cap B)$.

OR

a) To prove that $C(n, r) = C(n-1, r-1) + C(n-1, r)$, where $0 < r < n$.

b) Find the probability of getting a total of at least 6 in a simultaneous throw of three dice.

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