Roll No. .....

A–2722

B. C. A. (Part I) EXAMINATION, 2017

Paper Second

CALCULUS AND STATISTICAL METHODS

Time : Three Hours] [*Maximum Marks : 50*

Note : Attempt any *two* parts from each question. All questions carry equal marks.

Unit—I

1. (a) Find :

$$\lim_{x \to 0} \frac{\sqrt{1+x} - \sqrt{1-x}}{x}$$

(b) Test the continuity of the function at $x = 0$:

$$f(x) = \frac{1}{1 - e^{\frac{1}{x}}}$$

(c) Is the function $f(x) = |x|$ differentiable at $x = 0$?

Unit—II

2. (a) Find $\frac{dy}{dx}$ when $y = \sin^{-1}\left(\frac{x}{\sqrt{a^2 + x^2}}\right)$.

(b) Find the differential coefficient of $(\sin x)^{\cos x}$.

(c) If $e^y = y^x$, prove that :

$$\frac{dy}{dx} = \frac{(\log y)^2}{\log y - 1}$$

Unit—III

3. (a) Find the points on the curve $y = \sin x$ where the tangents are parallel to x-axis.

(b) Find the equation of normal at the point t on the curve $x = a\cos^3 t$, $y = a\sin^3 t$.

(c) Find the minimum value of $x + y$ where x and y are real variables such that $x > 0$ and $xy = 1$.

Unit—IV

4. (a) Two dice are thrown. Find the probability that the sum of faces is :

(i) 7 or 8

(ii) more than 8

(b) A speaks the truth in 75% cases and B speaks the truth in 80% of the cases: In what percentage of cases are they likely to contradict each other in stating the same fact ?

(c) If the chance of A, winning a certain race be $\frac{1}{6}$ and the chance of B winning it be $\frac{1}{8}$, what is the chance the neither should win ?

Unit—V

5. (a) Find the mean deviation from the following series :

Age (Less than)	No. of Persons
10	15
20	30
30	53
40	75
50	100
60	110
70	115
80	125

(b) Fit a straight line to the following data regarding x as the independent variable :

x	y
0	1
1	1.8
2	3.3
3	4.5
4	6.3

(c) Two lines of regression are given by $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$ and $\sigma_x^2 = 12$. Calculate the mean value of x and y, variance of y, and the coefficient of correlation between x and y.