Roll No. .....

Y–2072

B. C. A. (Part I) EXAMINATION, 2015

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) Using $\epsilon - \delta$ method, prove that :

$$\lim_{x \to 1} (2x + 7) = 9$$

(b) Show that the function :

$$f(x) = 3x^2 + 2x + 1$$

is continuous at $x = 2$.

(c) Test, at $x = 2$, differentiability of the function :

$$f(x) = \begin{cases} 1 + x & , \ x \leq 2 \\ 5 - x & , \ x \geq 2 \end{cases}$$

Unit—II

2. (a) If $y = \log(\cos x^2)$, then find $\frac{dy}{dx}$.

   (b) If $y^x = x^y$, then find $\frac{dy}{dx}$.

   (c) If :

$$\sqrt{1 - x^2} + \sqrt{1 - y^2} = a(x - y),$$

   then prove that :

$$\frac{dy}{dx} = \sqrt{\frac{1 - y^2}{1 - x^2}}.$$

Unit—III

3. (a) Find equation of tangent at $(3, -3)$ to the curve $y = 2x - x^2$.

   (b) Find equation of normal at point (3, 3) to the curve :

$$x^3 + y^3 = 6xy$$

   (c) For what value of x, the function $y = x(5 - x)$ is maximum or minimum ?

Unit—IV

4. (a) Find probability of getting sum 7 when two dice are thrown together.

   (b) A bag contains 4 white, 6 red and 15 black balls and another bag contains 11 white, 5 red and 9 black balls. A ball is drawn from each bag. Find probabilities of the following events :

   (i) both balls are white

(ii) both balls are red

(iii) both balls are black

(iv) both balls are of same colour

(c) For any *two* events prove that :

$$P(A \cup B) \leq P(A) + P(B)$$

Unit—V

5. (a) Draw frequency curve for the following frequency distribution :

Class	Frequency
0–10	2
10–20	4
20–30	10
30–40	4
40–50	3
50–60	8
60–70	1
70–80	5
80–90	11
90–100	2

(b) Fit normal curve at the following data :

Class	Frequency
15—20	8
20—25	13
25—30	19
30—35	10

(c) With the help of the following data, by the scatter diagram method find the nature of the correlation between x and y :

x	y
0	8
1	6
2	4
3	2
4	0