

**BACHELOR OF COMPUTER****APPLICATIONS (BCA)****Term-End Examination****December, 2019****CS-60 : FOUNDATION COURSE IN MATHEMATICS  
IN COMPUTING***Time : 3 Hours**Maximum Marks : 75*

*Note : Question No. 1 is compulsory. Attempt any  
three questions from Question Nos. 2 to 6.*

*Use of Scientific calculator is permitted.*

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1. (a) If  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ ;  $A = \{2, 4, 6, 8\}$   
and  $B = \{2, 3, 5, 7\}$ ; prove that : 3

$$(A \cap B)' = A' \cup B'$$

- (b) Prove that : 3

$$(1 - \sin^2 \theta) \tan^2 \theta = \sin^2 \theta$$

- (c) The average score of boys in an examination of a school is 71 and that of girls is 73. The average of the school in that examination is 71.8. Find the ratio of the number of boys to the number of girls appeared in the examination. 3
- (d) Determine the equation of a line passing through the points (3, 4) and (2, -1). 3
- (e) Show that the points (3, 0), (6, 4) and (-1, 3) are the vertices of a right angled isosceles triangle. 3
- (f) Find the equation of a circle passing through origin and making intercepts 4 and 5 on the co-ordinates axis. 3

(g) If  $\cos^{-1} x + \cos^{-1} y = \pi$ , then what is the value of  $\sin^{-1} x + \sin^{-1} y$  ? 3

(h) How many terms are there in the expansion of  $(4x + 7y)^{10} + (4x - 7y)^{10}$  ? 3

(i) Prove that : 3

$$\sqrt{\sec^2 \theta + \operatorname{cosec}^2 \theta} = \tan \theta + \cot \theta$$

(j) Verify that function  $f(x) = \frac{x^2 - 1}{x - 1}$  is continuous at  $x = 0$  or not. 3

(k) Find the 12th term of the sequence 2, -6, 18, -54, ..... 3

(l) Obtain the equation of the straight line passing through the origin and perpendicular to  $3x + 4y = 5$ . 3

(m) Solve the equation  $2x^2 - 3x + 1 = 0$ . 3

- (n) Verify Lagrange's mean value theorem for the function  $f(x) = x^2 - 2x$  on the interval  $[1, 2]$ . 3

- (o) Evaluate : 3

$$\lim_{x \rightarrow 3} \frac{2x^2 - 7x + 3}{5x^2 - 12x - 9}$$

2. (a) In a group of 52 persons, 16 drink tea but not coffee and 33 drink tea. How many drink coffee but not tea? 3

- (b) Determine the area bounded by the curves  $x = 1$ ,  $x = 3$ ,  $xy = 1$  and  $x$ -axis. 3

- (c) Find  $\frac{dy}{dx}$  if  $y = (ax + b)^m$ . 4

3. (a) If the roots of  $x^2 + bx + c = 0$  are two consecutive integers, what is the value of

$$b^2 - 4c - 1 ? \quad 3$$

- (b) If  $f(x) = \sqrt{9 - x^2}$ ; then evaluate : 3

$$\lim_{x \rightarrow 2} \frac{f(2) - f(x)}{x - 2}$$

- (c) Evaluate : 4

$$\lim_{x \rightarrow 0} \frac{\sin 2x}{x}$$

4. (a) Evaluate : 3

$$\int \sqrt{1 - \sin 2x} \, dx$$

- (b) The plane  $z = 1$  intersects the sphere

$$x^2 + y^2 + z^2 = 9 \text{ in a circle. What is the}$$

radius of the circle ? 3

(c) If  $\sin y = x \sin (a + y)$ , then prove that : 4

$$\frac{dy}{dx} = \frac{\sin^2 (a + y)}{\sin a}$$

5. (a) If  $x = at^2, y = 2at$ , then find  $\frac{dy}{dx}$ . 3

(b) From the top of a house 32 m high, the angle of elevation of the top of the tower is  $45^\circ$  and the angle of depression of the foot of the tower is  $30^\circ$ . Determine the height of the tower. 3

(c) Find the equation of tangent and normal to the circle :

$$x^2 + y^2 - 2x - 10y + 1 = 0$$

at the point  $(-3, 2)$ . 4

6. (a) Taking four subdivisions of the interval [1, 3], find the approximate value of

$$\int_1^3 x^2 dx \text{ by the Trapezoidal rule.} \quad 3$$

- (b) Find the equation of a parabola with focus at (1, 1) and the directrix is  $x + y + 1 = 0$ .

3

- (c) Find the eccentricity, foci, length of the latus rectum of the ellipse :

4

$$25x^2 + 16y^2 = 400$$