

**BACHELOR OF COMPUTER
APPLICATIONS (BCA)
(PRE-REVISED)**

Term-End Examination

June, 2020

**CS-60 : FOUNDATION COURSE IN MATHEMATICS
IN COMPUTING**

Time : 3 Hours

Maximum Marks : 75

Note : (i) Question No. 1 is compulsory.

*(ii) Answer any three questions from
Question No. 2 to 6.*

(iii) Use of calculator is permitted.

1. (a) If the lines :

3

$$x - 2y = 6$$

$$3x + 4y = -2$$

and $\lambda x + 4y + \lambda^2 = 0$

are concurrent, then find the values of λ .

- (b) Find the domain and range of the function

f defined by $f(x) = |x - 1|$.

3

- (c) Check whether the function f defined by :

$$f(x) = \frac{1}{x^2}$$

on the interval $] 0, 1]$ is increasing or not.

- (d) Find $\frac{dy}{dx}$, where :

3

$$\frac{x^2}{4} + \frac{y^2}{9} = 1$$

(e) Find the equation of a line passing through

the point $(-1, -2)$ and with slope $\frac{4}{7}$. 3

(f) Write down a regular partition for the interval $[2, 4]$ with 7 partitioning points. 3

(g) Evaluate : 3

$$\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4}$$

(h) Which of the following sets are finite and which are infinite ? 3

(i) the solution set of $3x + 8 = 11$.

(ii) the set of points on the diameter of a circle.

(iii) \mathbb{N} .

(i) Write the polar form of the complex number $-i$. 3

- (j) Sketch the ellipse : 3

$$\frac{x^2}{25} + \frac{y^2}{9} = 1$$

- (k) Write the Cartesian form of the equation : 3

$$r^2 = 2r \cos \theta$$

- (l) Identify the conic : 3

$$x^2 - 2xy + y^2 + \sqrt{2}y = 2$$

- (m) Evaluate : 3

$$\begin{vmatrix} 3 & -2 & 4 \\ 6 & 8 & 1 \\ -9 & 6 & 12 \end{vmatrix}$$

- (n) If : 3

$$\sin y = x \sin (a + y)$$

prove that :

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

- (o) Find the equation of the tangent and normal to the curve : 3

$$y^2 = 3x^2 + 1$$

at the point (1, 2).

2. (a) If $1, \omega, \omega^2$ are the cube roots of unity, then find the value of : 3

$$(1 - \omega) (1 - \omega^2) (1 - \omega^3) (1 - \omega^4) (1 - \omega^5)$$

- (b) If the sum of two natural numbers is 10, then find the numbers, when their product is maximum. 4

- (c) Determine the equation of a circle if its centre is (8, - 6) and passes through the point (5, - 2). 3

3. (a) Find the vertex, focus and directrix of the parabola : 4

$$4y^2 + 12x - 12y + 39 = 0$$

- (b) Find the centre, the length of the axes, eccentricity and foci of the ellipse : 3

$$x^2 + 2y^2 - 2x + 12y + 10 = 0$$

- (c) Express : 3

$$\frac{(1+i)(2+i)}{3+i}$$

in the form $a + ib$.

4. (a) Evaluate : 4

$$\int_{-1}^1 5x^4 \sqrt{x^5 + 1} dx$$

- (b) Find the equation of the sphere whose centre is $(-6, 1, 3)$ and radius 4. 3

- (c) Find the equation of the sphere on the join of (1, 2, 3) and (0, 4, -1) as diameter. 3

5. (a) If: 4

$$\frac{\sqrt{5}-1}{\sqrt{5}+1} + \frac{\sqrt{5}+1}{\sqrt{5}-1} = a + b\sqrt{5}$$

find a and b .

- (b) Prove that: 3

$$\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx = \frac{\pi}{4}$$

- (c) Find the area under the given curves and given lines: 3

$$y = x^2,$$

$x = 1$, $x = 2$ and x -axis.

6. (a) A circle passes through (0, 0); (α , 0) and (0, b). What is the co-ordinates of the centre of the circle? 4

- (b) At which point the line, $x - y = 1$ touches the hyperbola $3x^2 - 4y^2 = 12$? 3
- (c) Solve the following systems of equations using Cramer's rule : 3

$$x + 2y = 7$$

$$3x + 2y = 9$$