

**BACHELOR OF COMPUTER
APPLICATIONS (B. C. A.)
(PRE-REVISED)
Term-End Examination
December, 2020**

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

Time : 3 Hours

Maximum Marks : 75

Note : (i) *Question number 1 is compulsory.*

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

(iii) *Use of calculator is permitted.*

1. Solve the following : 15×3=45

(a) Find the centre and radius of sphere :

$$x^2 + y^2 + z^2 - 2x - 4y - 6z + 5 = 0.$$

(b) Find $\frac{dy}{dx}$, when $x = at^2$ and $y = 2at$.

- (c) Solve the following system using Cramer's rule :

$$x - 2y = 4$$

$$2x + 3y = -13.$$

- (d) Solve the following equations graphically :

$$x^2 + y^2 = 4,$$

$$x + y = 2.$$

- (e) Determine the equation of a line passing through the points (3, 4) and (2, -1).
- (f) Find the equation of a line passing through the point (2, 2) and sum of the intercepts on the axis is 9.
- (g) Evaluate :

$$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}.$$

- (h) For any real x , find the minimum value of

$$\frac{x^3}{3} - x^2 + x + 2.$$

- (i) Which of the following collections are sets :
- (i) All the days of a week
 - (ii) All the factors of 30
 - (iii) Only the good students of a class

- (j) Show that the function ' f ' defined by $f(x) = \sin 2x$ is periodic. Also, find its period.
- (k) Check the continuity of the function f defined by $f(x) = |x-1|$ at $x = 1$.
- (l) Write the condition, when the matrix $\begin{bmatrix} a & c \\ b & d \end{bmatrix}$ is singular.

- (m) Transform the quadratic equation :

$$3x^2 + y^2 + 15x - 10y + 5 = 0$$

to parallel axes through the point (1, 1).

- (n) Determine the equation of the sphere on the join of (2, 3, 5) and (4, 9, -3) as diameter.
- (o) If $x^y = e^{x-y}$; prove that :

$$\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}.$$

2. (a) If the roots of $px^2 + 5x + r = 0$ are 2 and $\frac{1}{2}$, then show that $p = r$. 4

(b) Find $\frac{dy}{dx}$, if $y = e^{\cos x}$. 3

(c) Obtain the equation of a circle which passes through the intersection of the lines $3x - 2y - 1 = 0$ and $4x + y - 27 = 0$ and whose centre is the point $(2, -3)$. 3

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

$$y^2 = -4x$$

(b) Find the equation of the ellipse whose foci are $(\pm 2, 0)$ and eccentricity is $= \frac{1}{2}$. 3

(c) Express : 3

$$\frac{(6+i)(2-i)}{(4+3i)(1-2i)}$$

in the form $a + ib$.

4. (a) Evaluate : 4

$$\int_0^1 \frac{\tan^{-1} x}{1+x^2} dx.$$

- (b) For any two sets A and B, prove that : 3

$$(A \cup B)^c = A^c \cap B^c.$$

- (c) Find the length of the perpendicular on the line $x + \sqrt{3}y + 7 = 0$, from the point (0, 0). 3

5. (a) Find the points of intersection of the parabola $y^2 = 4x + 8$ and the circle $x^2 + y^2 = 4$. 4

- (b) Evaluate : 3

$$\int_0^{\pi/2} \cos^2 x \, dx.$$

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

$$y = x^4, x = 1, x = 5 \text{ and } x\text{-axis}.$$

6. (a) The vertex and the focus of a parabola are respectively (0, 4) and (0, 2). Find out the equation of the parabola. 3

- (b) The equation of the ellipse is : 4

$$\frac{x^2}{5} + \frac{y^2}{4} = 1$$

Determine the distance between the foci of the ellipse.

- (c) Find out the coordinates of the point P which divides the line joining of A (5, -2) and B (9, 6) in the ratio of 3 : 1. 3