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**CS-60**

# BACHELOR OF COMPUTER APPLICATIONS (BCA) (Pre-Revised)

## Term-End Examination

02496

## June, 2016

## 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 questions no. 2 to 6. Use of calculator is permitted.*

**1.** (a) Obtain the centre and radius of the circle :

$$x^2 + y^2 = 9$$

(b) Evaluate :

$$\int \text{cosec } (3x + 4)\, dx$$

(c) If $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}$, then compute $2A + B$.

(d) What is the mean of the first five prime numbers ?

(e) Fill in the blanks in the following :

By associative property of '+' in $\mathbf{R}$ we get

$$(x + y) + z = \ldots$$

for $x, y, z \in \mathbf{R}$.

(f) $f : \mathbf{R} \sim \{0\} \to \mathbf{R}$ is a function and is defined as

$f(x) = x^2$. Then find whether f is 1 – 1 or not.

(g) Find $\frac{dy}{dx}$ for each of the following :

(i) $y = 2 \cos x$

(ii) $y = 3x + 7$

(iii) $y = x^5$

(h) Evaluate the following :

$$\int (1 + x^2)\, dx$$

(i) Find the value of the determinant given as follows :

$$\begin{vmatrix} 1 & 2 & 2 \\ 2 & 3 & 4 \\ 3 & 5 & 6 \end{vmatrix}$$

(j) Draw a graph for the function :

$f : \mathbf{R} \to \mathbf{R}$ such that $f(x) = |x|$

for all $x \in \mathbf{R}$.

(k) Do the following as directed :

(i) Describe the following set by listing method :

$\{x \mid x \text{ is a divisor of } 24\}$

(ii) Describe the following by the Set-Builder/Rule method :

$\{1, 4, 9, 16, ...\}$

(iii) Show the following set equality :

$A \cup A = A$ for any set A.

(l) Find the midpoint of the straight line joining the line segment

P (– 3, 5) and Q (4, 7).

(m) Solve the equation :

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

(n) Find the equation of the straight line that is perpendicular to the line $7x + 2y = 9$ and passes through the point (– 1, – 3).

(o) Find the area of the region bounded by the curve

$y = 5x - x^2$, $x = 0$, and $x = 5$

and lying above the x-axis. *15×3=45*

**2.** (a) For what value of k is the function

$$f(x) = \begin{cases} 2x + 1, & x \leq 2 \\ x + k, & x > 2 \end{cases}$$

is continuous at $x = 2$ ?

(b) Find the equation of the straight line parallel to the line $4y + 3x + 7 = 0$, and passing through the point (0, 0).

(c) Evaluate the following :

(i) $\int_0^{\pi} (2\cos x - x)\, dx$

(ii) $\int_0^{1} \frac{4}{5}(x + x^2)\, dx$ *3+3+4*

**3.** (a) Evaluate :

$$\lim_{x \to \infty} \frac{11x^2 - 6x + 8}{9x^2 - 5x + 5}$$

(b) Can Rolle's Theorem be applied to the following function ?

$y = \sin^2 x$ on the interval $[0, \pi]$

Find 'c', such that $f'(c) = 0$, in case Rolle's theorem can be applied.

(c) Using Cramer's rule or otherwise solve the following system of equations :

$$x + 2y - z = 2$$
$$2x + 3y + 2z = 7$$
$$-x + 2y + 3z = 4$$ *3+3+4*

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

(b) Show that the function $f(x) = x^2$ is a decreasing function in $]-\infty, 0]$.

(c) Find the principal argument of the complex number $-\sqrt{3} - i$. *3+3+4*

5. (a) Show that

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a).$$

(b) Evaluate :

$$\lim_{x \to 3} \frac{x^2 - 4x + 3}{2x^2 - 11x + 15}$$

(c) Find two positive numbers such that their sum is 10 and their product is maximum. *3+3+4*

6. (a) Find the point on the curve $y^3 = x^2(2 - x)$, where the tangent is parallel to the x-axis.

(b) Find the centre, eccentricity and foci of the ellipse

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

(c) Find the equation of a circle passing through the origin and making intercepts 4 and 5 on the co-ordinate axes. *3+3+4*

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