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**CS-60**

# BACHELOR OF COMPUTER APPLICATIONS (PRE REVISED)

02825

## Term-End Examination

## December, 2012

## 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 **No. 2 to 6**. Use of calculator is **permitted**.*

**1.** (a) Find the modulus and argument of the following complex number $z=\frac{1+2i}{1-3i}$ **15x3=45**

(b) Evaluate $\int \frac{\cos x}{x}\, dx$

(c) Let $A=\{1, 2, 4, 5\}$, $B=\{2, 3, 5, 6\}$, $C=\{4, 5, 6, 7\}$ verify that

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

(d) Solve the given simultaneous equations

$3x+5y=6,\ x+4y=2$

(e) Find $\frac{dy}{dx}$ if $y^3-3xy^2=x^3+3x^2y$

(f) Find the angle between the lines joining the points (0, 0), (2, 3) and the points (2, $-2$) (3, 5).

(g) Find the centre and radius of the given circle $x^2 + y^2 - x + 2y - 3 = 0$.

(h) Find the equation of the parabola whose focus is $(-3, 0)$ and the directrix is $x + 5 = 0$.

(i) Find the lengths of major and minor axes, coordinates of foci and vertices and the eccentricity of $16x^2 + 25y^2 = 400$.

(j) Find the equation of the hyperbola whose conjugate axis is 5 and the distance between the foci is 13.

(k) Find the domain for which the functions $f(x) = 2x^2 - 1$ and $g(x) = 1 - 3x$ are equal.

(l) Evaluate $\int_{-2}^{3} \frac{1}{x+7}\, dx$.

(m) If R is the relation "less than" from $A = \{1, 2, 3, 4, 5\}$ to $B = \{1, 4, 5\}$ write down the set of ordered pairs corresponding to R.

(n) Show that the function $f : R \to R$ defined by $f(x) = 6x - 7 \ \forall \ x \in R$ is one-one.

(o) Prove that the points $(a, b + c)$, $(b, c + a)$ and $(c, a + b)$ are collinear.

2. (a) Solve by Cramer's Rule 3+4+3

$2x - y = 17,\ 3x + 5y = 6.$

(b) Solve the equation $9x^2 - 12x + 20 = 0.$

(c) Apply De Moivre's formula to prove that $\cos 2\theta = \cos^2\theta - \sin^2\theta$ and $\sin 2\theta = 2\sin\theta\cos\theta.$

3. (a) Find the equation of the circle that passes through the points (1, 0), (−1, 0) and (0, 1). 3+3+4

(b) Find the equation of the parabola whose latus rectum is 4 units, axis is the line $3x + 4y = 4$ and the tangent at the vertex is the line $4x - 3y + 7 = 0.$

(c) Find the equation of the ellipse with focus at (1, 1) and eccentricity $\frac{1}{2}$ and directrix $x - y + 3 = 0.$

4. (a) If $y = \sqrt{x^2 + a^2}$. Prove that $y\frac{dy}{dx} - x = 0.$ 3+4+3

(b) Find the slopes of the tangent and the normal to the curve $x^2 + 3y + y^2 = 5$ at (1, 1).

(c) Evaluate $\int \cos^3 x \, dx$.

5. (a) Find the points of local maxima or local minima if **4+3+3**

$f(x) = \sin x + \cos x$ where $0 < x < \pi/2$.

(b) Prove that $A-(B \cup C)=(A-B) \cap (A-C)$.

(c) Trace the curve $(x^2-1)(y^2-4)=4$

6. (a) Find the point of intersection of **3+4+3**

$$\frac{x+2}{2} = \frac{y+3}{3} = \frac{2-4}{-2} \text{ and } 3x+2y+6z=12.$$

(b) Find the equation of the sphere described on the join of (3, 4, 5) and (1, 2, 3).

(c) Find the equation of the cylinder whose axis is $x = 2y = -z$ and radius is 4.