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**CS-60**

12222

# BACHELOR IN COMPUTER APPLICATIONS

## Term-End Examination

## June, 2010

## 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) Show that the function $f(x) = 3x - 1$ ; $f : R \to R$ is one-one and onto. **15x3=45**

(b) Tell for each whether the statement is true or false :

(i) R, the set of Real Numbers, is closed under addition operation.

(ii) In R, the operation of multiplication is not commutative

(iii) The relation '>' of 'greater than' in R is transitive.

(c) The function :

$f : R \to R$, defined as

$f(x) = 3x + 7$ for all $x \in R$

is one - one

(d) Find $\frac{dy}{dx}$ where $y = 32 + 5x^3$

(e) Evaluate $\int_4^5 8\, x^3\, dx$.

(f) Prove that the points (4, 3), (7, −1) and (9, 3) are the vertices of an isosceles triangle.

(g) Find the equation of a straight line which passes through the points (3, −5) (−3, 5).

(h) Find the equation of a straight line which meets $x$-axis in (5, 0) and $y$-axis in (0, −3).

(i) Find the equation of the parabola whose focus is the point (3, 4) and directrix is the straight line $2x - 3y + 5 = 0$.

(j) Find the equation of a circle with radius 5 units and centre as (2, −3).

(k) Find the coordinates of the vertices and the foci and the length of the latus rectum of the hyperbola $16x^2 - 9y^2 = 144$.

(l) Solve the system of simultaneous equations :

$2x + 6y = 15$ ; $5x - 8y = 7$

(m) If V = [ 3, 5, 7, 8, 9, 11, 13, 15]

A = [3, 5, 9, 13], B = [5, 7, 9, 13, 15]

Find (i) $A \cup B$ (ii) $A \cap B$

(n) Evaluate $\int 5x^2\,dx$.

(o) Obtain $\frac{5+2i}{3-i}$ in the form of $a+ib$, a, b$\epsilon$R.

2. (a) Evaluate the integral **3+4+3**

$$\int\left(2x^2+3x^3\right)dx$$

(b) Evaluate the integral

$$\int\left(2\sin x+e^x+3\cos x\right)dx.$$

(c) Find the area of the region bounded by the curve $y=5x-x^2$, $x=0$, $x=5$ and lying above the $x$-axis.

3. (a) Find the equation of the circle circumscribing the triangle with vertices (1, 2), (−1, 4) and (3, 10). **4+3+3**

(b) Find the equation of parabola with focus (a, b) and directrix $\frac{x}{a}+\frac{y}{b}=1$. Find the equation of the axis.

(c) Find the standard equation of the hyperbola with eccentricity $\sqrt{2}$.

4. (a) Find the equation of the plane which is perpendicular to the plane $5x+3y+6z+8=0$ and which is contains the line of intersection of the planes $x+2y+3z=4,\ 2x+y-z+5=0$. **4+3+3**

(b) Find the equation to the sphere through the circle $x^2+y^2+z^2=9,\ 2x+3y+4z=5$ and the point (1, 2, 3).

(c) Find the equation to the cone whose vertex is origin and which passes through the curve given by $ax^2+by^2=2z,\ lx+my+nz=p$.

5. (a) Prove that $A-B=A\cap B'$. **3+3+4**

(b) Solve the equation $x^2-4x+1=0$.

(c) Expand $\cos^6\theta-\sin^6\theta$ in terms of the cosines of multiples of $\theta$.

6. (a) Find the maxima and minima of the following function **4+3+3**

$$f(x)=\sqrt{x}\ \ \forall\ x\in[4,16]$$

(b) Find the equations of the tangent and the normal to the following function.

$$y=x^2+2x+1 \text{ at } (1, 4)$$

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