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CS-60

02389

BACHELOR OF COMPUTER APPLICATIONS (PRE-REVISED)

Term-End Examination

June, 2014

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) If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$. $A = \{2, 4, 6, 8\}$ and $B = \{2, 3, 5, 7\}$. Prove that $(A \cap B)' = A' \cup B'$. **15x3=45**

(b) Show that the function $f : R \to R$ defined by $f(x) = 3x^3 + 5$ for all $x \in R$ is a bijection.

(c) Determine whether the following relation R on the set Z of all the integer defined as $R = \{(x, y) : x - y \text{ is an integer}\}$.

(d) Find $\frac{dy}{dx}$ if $y = \log\left(x + \sqrt{a^2 + x^2}\right)$.

(e) Evaluate $\int_0^{\pi/4} \sqrt{1 + \sin 2x}\, dx$.

(f) Show that the points (3, 0), (6, 4) and (−1, 3) are the vertices of a right angled isosceles triangle.

(g) Find the equation of the straight line which makes equal intercepts on the axes and passes through the line $(3, -5)$.

(h) Find the coordinates of the centre and radius of the circle $2(x^2 + y^2) = 4x + 6y + 43$.

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

(j) Find the equation of the ellipse whose focus is $(2, -1)$, directrix is $x - y + 4 = 0$ and eccentricity is $\frac{3}{4}$.

(k) In any hyperbola if the conjugate axis equals the latus rectum, find the eccentricity.

(l) Evaluate : $\int \frac{1+\sin 2x}{x+\sin^2 x}\,dx$.

(m) Express $\left(-\sqrt{3}+\sqrt{-2}\right)\left(2\sqrt{3}-i\right)$ in the form of $a + ib$.

(n) Solve the simultaneous equations $4x - 7y = 8$, $x + 2y = 5$.

(o) If $y = (x^2+1)\ (x^2+2x+1)\ (x+4)$. Find $\frac{dy}{dx}$.

2. (a) Find the point (or points) of intersection of $\frac{x+2}{2} = \frac{y+3}{3} = \frac{z-4}{-2}$ and $3x+2y+6z=12$. **3+4+3**

(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 $\frac{x-1}{2} = \frac{y}{3} = \frac{z-3}{1}$ and radius is 2.

3. (a) State and prove the distribution law for finite sets. **3+3+4**

(b) Represent the complex number $z=1 + i\sqrt{3}$ in the polar form.

(c) Solve using Cardon's method

$x^3 + 21x + 342 = 0$.

4. (a) Evaluate : $\int \frac{x^2-1}{x^4+1} dx$. **3+3+4**

(b) Prove that $\int_0^{\pi/2} \log\cos\theta \, d\theta = -\frac{\pi}{2}\log 2$.

(c) Find $\frac{dy}{dx}$ if $y = \sin^{-1}\sqrt{1-x^2}$.

5. (a) Find the lengths of the intercepts of the circle $x^2+y^2-8x-17y+12=0$ on the axes of the coordinates. **4+3+3**

(b) Find the coordinates of the vertex and the focus of the parabola $2y^2+3y+4x=2$.

(c) Show that the line $x-3y=13$ touches the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$. What are the coordinates of the point of contact.

6. (a) Find the equations of the tangents drawn to the curve $y^2 - 2x^3 - 4y + 8 = 0$ from the point (1, 2). **3+3+4**

(b) Find the equation of the normal to the curve $y = x \log_e x$, which is parallel to the line $2x - 2y + 3 = 0$.

(c) Find the intervals in which $f(x) = (x+1)^3 (x-3)^2$ is increasing or decreasing.
