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CS-60

BACHELOR IN COMPUTER APPLICATIONS

04646

Term-End Examination

December, 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 question **no. 2 to 6**. Use of calculator is permitted.*

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1. (a) If x and y be any real numbers, then **15x3=45**

$$|x|^2 = x^2 = |-x|^2$$

(b) Tell for each of the following statements, whether it is true or false.

(i) R, the set of real numbers, is closed under multiplication operation.

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

(iii) Addition is Montone is R, i.e if a > b then a + c > b + c for all a, b, c in R.

(c) Show that the function

$f : R \to R$ defined as $f(x) = 4x + 11$ for all x in R is onto R.

(d) If $y = 81 + 17x^2$ then find dy/dx.

(e) Evaluate : $\int_2^3 3x^2 \, dx$

(f) Find the equation of a straight line that passes through the points (1,2) and $(-3, 4)$.

(g) Find the equation of a circle with centre as (3, 5) and radius as 8 units.

(h) If $A = \{2, 3, 4, 5, 6,\}$ and

$B = \{4, 6, 7, 8,\}$ then

Find out the sets $A \cup B$ and $A \cap B$.

(i) obtain $\frac{3 + 7i}{1 - i}$ in the form $a + ib$, $ab \in R$

(j) Solve the system of simultaneous equations : $2x + y = 7$ and $5x + 3y = 18$

(k) Evaluate $\begin{vmatrix} a & 2a & d \\ b & 2b & e \\ c & 2c & f \end{vmatrix}$ where a, b, c, d, e, $f \in R$.

(l) Find the locus of a point which moves so that its distance from the point (1,0) is equal to its distance from the axis of y.

(m) Show that the points (2, 8), (5, 7), $(-1, -1)$, (7, 3) and (6, 0) are concyclic.

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

(o) Find the equation of the hyperbola whose foci are $(0, \pm 6)$ and conjugate axis is $2\sqrt{11}$.

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

$$\int \left(4x+8x^4\right) dx$$

(b) Evaluate the integral

$$\int \left(2\cos x + 2e^x + 5\sin x\right) dx$$

(c) Find the area of the smaller region lying above the x-axis and included between the circle $x^2+y^2=2x$ and the parabola $y^2=x$.

3. (a) Find the equation of the circle passing through the point $(-6, 5)$, $(-3, -4)$ and $(2, 1)$. What are the co-ordinates of the centre of the circle. 3+3+4

(b) Show that the line $y=2x+3$ touches the parabola $y^2=24x$ and find the coordinates of the point of contact.

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

4. (a) A man wants a name plate with display area equal to 48 cm^2 bordered by a white strip 2 cm along top and bottom and 1 cm along each of the two remaining sides. What dimensions should the plate have so that the total area of the plate is a minimum ? 4+3+3

(b) Find the oblique asymptotes to the curve given by : $x^3+y^3 = 3ax^2$

(c) Find the value of the determinant

$$\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix}$$

5. (a) Prove that for sets A and B 4+3+3

$A \cap B = B \cap A$

(b) Find the formula for cos 4θ in terms of cosθ and sinθ.

(c) Solve the equation $x^2-10x+40 = 0$

6. (a) Show that in three - dimensional space the 3+4+3

line $x-1 = \frac{1}{2}(y-3) = \frac{1}{3}(z-5)$ meets the

line $\frac{1}{3}(x+1) = \frac{1}{5}(y-4) = \frac{1}{7}(z-9)$

(b) Find the equation for the sphere through the points (0, 0, 0), (0, 1, −1), (−1, 2, 0) and (1, 2, 3)

(c) Find the equation of the cone passing through $2x^2+3y^2+4z^2 = 1$ and $x+y+z = 1$