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CS-60

03085

BACHELOR OF COMPUTER APPLICATIONS (PRE-REVISED)

Term-End Examination

December, 2013

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**.*

For Q.No. 1 (a), 1 (b) and 1 (c) :
For the set of real numbers R, and binary operation of addition, i.e, '+', the binary operation of multiplication, i.e, '.' and binary relation greater than, i.e, '>' state the following properties :

1. (a) (i) Addition is commutative in R **3**
(ii) Addition is associative in R

(b) (i) Multiplication is commutative in R **3**
(ii) Multiplication is associative in R

(c) (i) Law of Trichotomy **3**
(ii) '>' is transitive

(d) Give one example of each of the following : **3**
(i) An open interval
(ii) A closed interval
(iii) A half open interval

(e) Give one example of each of the following : **3**
(i) A constant function
(ii) The identity function
(iii) One-one function

(f) Find the radius of the circle with ends of its diameter$(-1, 2)$ and $(3, -4)$. 3

(g) Find the equation of a circle with centre the point (1,1) and radius 3 units. 3

(h) Prove that the lines whose equations are $3x - 7y + 9 = 0$ and $7x + 3y + 20 = 0$ are perpendicular to each other. 3

(i) Find the equation of the straight line that passes through the points (4,1) and (7,2). 3

(j) What is the co-ordinates of the vertex of the parabola whose equation is $y^2 + 6x - 2y + 13 = 0$. ? 3

(k) What is the eccentricity of the ellipse 3

$$\frac{x^2}{64} + \frac{y^2}{28} = 1 \ ?$$

(l) If $A = \begin{pmatrix} 2x & 0 \\ x & x \end{pmatrix}$ and $A^{-1} = \begin{pmatrix} 1 & 0 \\ -1 & 2 \end{pmatrix}$ then determine the value of x. 3

(m) Find the co-efficient of x^4 in $(2 + x)^5$. 3

(n) Evaluate $\frac{dy}{dx}$ where $y = 7x + 18$ 3

(o) Find $\int \sin 3x \, dx$ 3

2. (a) Find out the co-ordinates of the centre of the circle $x^2 + y^2 - 6x + 4y - 36 = 0$. Also compute the radius of the circle. 3

(b) Find out the value of $\begin{vmatrix} 1 & x & 2 \\ 1 & y & 2 \\ 1 & z & 2 \end{vmatrix}$ 3

(c) Calculate the area of the region bounded by the curve $y = x - x^2$ between $x = 0$ and $x = 1$. 4

3. (a) Find the roots of the equation $x^2-4x+3=0$. 3

(b) Simplify $(2+3i)(4-2i)$ where $i=\sqrt{-1}$. 3

(c) If $\sin y = x \sin(a+y)$, then prove that 4

$$\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}.$$

4. (a) Find out the equation of hyperbola such that the distance between the foci is 16 and eccentricity is $\sqrt{2}$. 3

(b) Compute the area bounded by the curves $x=1$, $x=3$, $xy=1$ and x-axis. 3

(c) If f(x) be a function of real variable x, $f(x)$ defined by 4

$$f(x) = -x \quad \text{when } x \leq 0$$
$$= x \quad \text{when } 0 < x < 1$$
$$= 2-x \quad \text{when } x \geq 1$$

Show that $f(x)$ is continuous at $x=0$ and also at $x=1$.

5. (a) Evaluate $\int_1^3 \left(1+x^2\right) dx$. 3

(b) Evaluate $\frac{dy}{dx}$ where $y = \left(x^2-3x+2\right)$. 3

(c) A contractor undertakes to build a wall 1000 m long in 50 days. He employs 56 men, but at the end of 27 days, finds that only 448m of the wall has been built. How many extra men must be employed in order that the wall be finished in time ? 4

6. (a) Each side of an equilateral triangle subtends an angle of 60° at the top of a tower h high, standing in the centre of the triangle. If a is the length of the side of the triangle then prove that $2a^2 = 3h^2$. 3

(b) The product of two number is $\frac{y}{x}$. If one of the number is $\frac{x}{y^2}$, then find out the other one. 3

(c) If the side of a square is increased by 25%, then calculate the percentage increase of its area. 4