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BCS-012

05354

BACHELOR OF COMPUTER APPLICATIONS (Revised)

Term-End Examination

June, 2013

BCS-012 : BASIC MATHEMATICS

Time : 3 hours *Maximum Marks : 100*

Note : *Question no.* **1** *is* ***compulsory.*** *Attempt* ***any three*** *questions from the rest.*

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1. (a) Evaluate $\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix}$: **5**

(b) Show that the points (a, b + c), (b, c + a) and (c, a + b) are collinear. **5**

(c) For every positive integer n, prove that $7^n - 3^n$ is divisible by 4. **5**

(d) The sum of first three terms of a G.P. is $\frac{13}{12}$ and their product is -1. Find the common ratio and the terms. **5**

(e) Find $\frac{dy}{dx}$ if $y = \frac{e^x + e^{-x}}{e^x - e^{-x}}$ **5**

(f) Evaluate $\int \frac{dx}{3x^2+13x-10}$ 5

(g) Write the direction ratio's of the vector $\bar{a} = i + j - 2k$ and hence calculate its direction cosines. 5

(h) Find a vector of magnitude 9, which is perpendicular to both the vectors $4i - j + 3k$ and $-2i + j - 2k$. 5

2. (a) Solve the following system of linear equations using Cramer's Rule $x + y = 0$, $y + z = 1$, $z + x = 3$. 5

(b) Find x, y and z so that $A = B$, where 5

$$A = \begin{bmatrix} x-2 & 3 & 2z \\ 18z & y+2 & 6z \end{bmatrix}, B = \begin{bmatrix} y & z & 6 \\ 6y & x & 2y \end{bmatrix}$$

(c) Reduce the matrix $A = \begin{bmatrix} 1 & 0 & 2 & 1 \\ 2 & 1 & 3 & 2 \\ 1 & 3 & 1 & 3 \end{bmatrix}$ to its normal form and hence determine its rank. 10

3. (a) Find the sum to n terms of the A.G.P. $1 + 3x + 5x^2 + 7x^3 + \ldots ; x \neq 1$. 5

(b) Use De Moivre's theorem to find $\left(\sqrt{3}+i\right)^3$ 5

(c) If α, β are the roots of $x^2 - 4x + 5 = 0$ form an equation whose roots are $\alpha^2 + 2$, $\beta^2 + 2$. 5

(d) Solve the inequality $-2 < \frac{1}{5}(4 - 3x) \leq 8$ and graph the solution set. 5

4. (a) Evaluate $\lim_{x \to 0} \frac{e^x - e^{-x}}{x}$. 5

(b) If a mothball evaporates at a rate proportional to its surface area $4\pi r^2$, show that its radius decreases at a constant rate. 5

(c) Evaluate : $\int \frac{dx}{4 + 5\sin^2 x}$ 5

(d) Find the area enclosed by the ellipse 5

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

5. (a) Find a unit vector perpendicular to each of the vectors $\bar{a} + \bar{b}$ and $\bar{a} - \bar{b}$ where $\bar{a} = i + j + k$, $\bar{b} = i + 2j + 3k$. 5

(b) Find the projection of the vector $7i + j - 4k$ on $2i + 6j + 3k$. 5

(c) Solve the following LPP by graphical method. **10**

Minimize : $z = 20x + 10y$

Subject to : $x + 2y \leq 40$

$3x + y \geqslant 30$

$4x + 3y \geqslant 60$

and x, y $\geqslant 0$
