

February 2014

Bachelor of Computer Applications (BCA) Examination

I Semester

Mathematics-I

Time 3 Hours]

[Max. Marks 40

Note : All questions are compulsory. Solve any two parts from each question. Each question carries equal marks.

1. Solve any two parts from each questions :

(a) Evaluate $\lim_{x \rightarrow \infty} \frac{x^2 - 2x + 1}{x^2 + 2x - 2}$

(b) Find $\frac{dy}{dx}$ if $y = \frac{1 - \cos x}{1 + \cos x}$

(c) Verify the continuity :

$$f(x) = \begin{cases} \frac{x^2 - 1}{x + 1} & ; x \neq 1 \\ 2 & ; x = 1 \end{cases}$$

2. (a) Expand $\sin x$ by Taylor's theorem in the person of $(x - \pi/2)$.

(b) Verify Rolle's theorem $f(x) = (x - a)^m (x - b)^n$ in $[a, b]$.

(c) Expand $\tan^{-1} x$ by Maclarin's theorem.

3. (a) Find the asymptotes of the curve :

$$y^3 - x^2y + 2y^2 + 4y + x = 0$$

(b) Show that the radius of curvature of catenary $y = c \cosh x/c$ at the point (x, y) is y^2/c .

(c) Evaluate $\int \sin^n x dx$.

4. (a) Evaluate : $\text{grad } r^n$.

(b) If $\vec{F} = x^2\vec{i} + xz\vec{j} + 2yz\vec{k}$ then find $\text{div}(\text{curl } \vec{F})$

(c) Find the directional derivations of functions $\phi = x^2 - y^2 + 2z^2$ at the point $P(1, 2, 3)$ in the direction of PQ , where Q the coordinate of Q is $(5, 0, 4)$.

5. (a) Find the inverse of the matrix :

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 3 & 1 & 2 \\ 2 & 4 & -1 \end{bmatrix}$$

(b) Find the rank if matrix :

$$A = \begin{bmatrix} 1 & 3 & 2 & 4 \\ 1 & -1 & 0 & 2 \\ 0 & 1 & 2 & 1 \end{bmatrix}$$

(c) Solve the system of equations :

$$x + y + z = 9$$

$$x + 2y + 3z = 6$$

$$x + y - 3z = 2.$$

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