June - July 2009
Bachelor of Computer Application (BCA) Examination
II Semester

Mathematics - II

Time : 3 Hours] [Max. Marks : 40

Note : *All questions are compulsory and carry equal marks. Solve any two parts from each questions.*

1. (a) Trace the curve

$$y^2 (a + x) = x^2 (a - x)$$

(b) Discuss the convergence of Beta function.

(c) Trace the curve

$$r = a (1 + \cos \theta)$$

2. (a) State and prove Duplication formula.

(b) Find the length of the parabola y2 = 4ax from the vertex to an extremity of the latus rectum.

(c) Prove that

$$B (m, n) = 2 \int_0^{\pi/2} \sin^{2m-1}\theta \cos^{2n-1}\theta \, d\theta$$

3. (a) Evaluate $\int_R XY \, dx \, dy$ over the region in the positive quadrant for which x + ≤ 1.

(b) State Divergence theorem and apply it to show that

$$\iint_S \Delta \, (x^2 + y^2 + z^2) \, ds = 6V$$

(c) If r × dr = 0, then show that $\hat{r}$ = constant.

4. (a) If

$$F(x, y) = \begin{cases} (x^3 - y^3)/x^2 + y^2, & (x, y) \neq (0, 0) \\ 0 & (x, y) = (0, 0) \end{cases}$$

Then show that (x, y) is continuous but not differentiable at (0, 0)

(b) If $u = \sin^{-1} \frac{(x^2 + y^2)}{(x + y)}$ then show that

$$x \partial u \partial x + y \partial u / \partial y = \tan u$$

(c) State and prove Mean value Theorem for function of two variables.

5. (a) Discuss the Maxima and Minima of the Function

$$ax^3y^2 - x4y^2 - x^3y^3$$

(b) Test the convergence of the series

$$1 + 1/3 + \_ 1/5 + 1/7 + \ldots\ldots\ldots 1/2n - 1 + \ldots\ldots\ldots\ldots$$

(c) Find the Maxima and Minima of $u = x^2 + y^2 + z^2$ where

$$ax^2 + by^2 + cz^2 = 1$$

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