II Semester B.C.A. Examination, June/July 2011
MATHEMATICS

Time : 3 Hours | Max. Marks : 75

Instructions : *1) Answer* ***all*** *questions in Part –* ***A****.*
2) Answer ***any five*** *questions in Part –* ***B****.*

PART – A

I. State whether **true** or **false** : **(1×5=5)**

1) If f(–x) = –f(x) is odd function.
2) The function $y = x^2$ is a parabola.
3) $\lim\limits_{x \to \infty} \frac{\cos x}{x} = 0$.
4) For $t \geq 0$, H(t) = 0.
5) $Sec^2 x = 1 + \tan^2 x$.

II. 1) State Squeeze theorem. **(2×10=20)**

2) Define right hand limit.
3) Use the Sandwich theorem to prove that $\lim\limits_{x \to 0} x \cos {}^1\!/\!_x = 0$.
4) Define continuity of increase function.
5) Define intermediate value theorem. Give an example.
6) Find the derivative of $f(x) = \sqrt{x}$.
7) Use the product rule to find the derivative of $f(x) = (x^2 + x)(2x + 1)$.
8) Define decreasing function.
9) Find the intervals on which f(x) = x + sin x is increasing or decreasing.
10) Define local maxima and local minima.

P.T.O.

PART – B

(5×10=50)

III. 1) Sketch the graph of $y = \frac{x^2}{(x+1)(x-2)}$ when x = –1 and x = 2.

2) Evaluate $\lim\limits_{x \to 1} \frac{x^2}{1+x^2}$.

3) Find an approximation to $\sqrt{5}$ to ten decimal places.

4) Differentiate $x^3 + \sin xy = xy^2$.

5) State and prove Rolle's theorem.

6) State and prove Leibnitz theorem.

7) Write the Taylor's series for $(1 + x)^r$.

8) If $f(x) = 12x^5 - 45x^4 + 40x^3 + 5$, classify the stationary points as maxima, minima and points of inflection.