

*A D Patel Institute of Technology*

INTERNAL EXAMINATION  
(GTU) MATHEMATICS – I  
October 3, 2008

TIME: 8.00 PM TO 9.00 AM

MAX. MARKS: 20

- |    |   |   |   |
|----|---|---|---|
| 1  | A | (i) Given that $1 - \frac{x^2}{2} \leq u(x) \leq 1 - \frac{x^2}{4}$ for all $x \neq 0$ , find $\lim_{x \rightarrow 0} u(x)$ . | 1 |
|    |   | (ii) At what points the function $y = \frac{1}{x-1}$ discontinuous?   | 1 |
|    |   | (iii) Choose the correct option:<br>For the continuous function $f(x)$ , if $f'(x) < 0$ then the function is                  | 1 |
|    |   | (a) increasing (b) decreasing<br>(c) both increasing and decreasing (d) none of these.  |   |
|    | B | Find the absolute extreme values of $f(x) = x^2 - 1$ on $-1 \leq x \leq 2$ .  | 2 |
|    | C | Graph the function $y = x^2 - 4x + 3$ . Include the coordinates of any local extreme points and inflection points.            | 3 |
|    | D | State and prove the Rolle's theorem   | 2 |
| OR | D | Define critical points and inflexion points of the function $f(x)$ .  | 2 |
| 2  | A | By applying the ratio test discuss the convergence of the series $\sum_{n=0}^{\infty} \frac{2^n + 5}{3^n}$ .                  | 3 |
|    | B | Test the convergence of the series $\sum_{n=0}^{\infty} \frac{2n}{n^2 - n + 1}$   | 3 |
|    | C | Does the series $1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \dots + \frac{1}{4^n} + \dots$ converge?                     | 2 |
|    | D | Expand $f(x) = x^3 - 2x + 1$ in powers of $(x - 2)$ .   | 2 |
| OR | D | Find Maclaurin series of $f(x) = \cos x$ .  | 2 |