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)	If $\lim_{x\to -2} p(x)=4$, $\lim_{x\to -2} q(x)=0$ and $\lim_{x\to -2} s(x)=-3$ then find $\lim_{x\to -2}(p(x)+q(x)+s(x))$.	1
		(ii)	For what value of b is $g(x)=\begin{cases} x, x \prec -2 \\ bx^2, x \geq -2 \end{cases}$ continuous at every x ?	1
		(iii)	Find the interval on which the function $h(x)=\frac{1}{x}$ decreases.	1
	B		Find the absolute maximum and minimum values of $f(x)=x^2$ on [-2,1]	2
	C		Graph the function $y=x^4-4x^3+10$ .Include the coordinates of any local extreme points and inflection points.	3
	D	(i)	State Lagrange Mean Value Theorem.	1
		(ii)	Verify validity of Rolle's theorem for the function f(x) = sinx , $[0,\pi]$.	1
OR	D		The geometric mean of two positive numbers a and b is the number $\sqrt{ab}$ .Show that the value of c in the conclusion of Mean Value Theorem for $f(x)=1/x$ on an interval [a,b] of positive number is $c=\sqrt{ab}$.	2
2	A	(i)	Show that the sequence $a_n=\frac{2n}{n+1}$ is non decreasing and find its upper bound.	2
		(ii)	Discuss the convergence of the series $1+2+4+8+16+.........\infty$	1
	B		Investigate the convergence of the series $\sum_{n=0}^{\infty}\frac{1}{(n+1)(n+2)}$	2
	C		Find the Taylor's formula for sin x about origin and show that $R_n(x)\to 0$ as $n\to\infty$.	3
	D		Expand $f(x)=x^3-4x^2+2x+1$ in powers of $(\mathrm{x}-1)$.	2
OR	D		Find Maclaurin series of $f(x)=xe^x$.	2