(i) Printed Pages : 2 Roll No. .....

(ii) Questions : 8 Sub. Code : 1 7 0 4 4

Exam. Code : 0 0 0 1

B.A./B.Sc. (General) 1st Semester

(2125)

MATHEMATICS

Paper–II Calculus–I

Time Allowed : Three Hours] **[Maximum Marks : 30**

Note :— Attempt **FIVE** questions in all by selecting at least **TWO** from each unit.

UNIT–I

1. (a) Show that $\sqrt{13}$ is irrational number. 3

   (b) Find g.l.b., l.u.b. of $S = \{3 \cos x - 2 \sin x \mid x \in \Re\}$. 3

2. (a) Show that $\lim_{x \to a} \sin \frac{1}{x-a}$ does not exist. 3

   (b) Find value of k so that :

$$f(x) = \begin{cases} \dfrac{x^2 - 3x + 2}{x - 1} & \text{if } x \neq 1 \\ k & \text{if } x = 1 \end{cases}$$

   is continuous at x = 1. 3

3. (a) Evaluate $\lim_{x\to 0}\left(\frac{1}{x^2}\right)^{\tan x}$. 3

(b) Evaluate $\lim_{x\to 0}\frac{\cosh x-\cos x}{x\sin x}$. 3

4. (a) Find solution set of $2|x| + |x-1| = 4$. 3

(b) Use definition to show that $\lim_{x\to 4} x+4=8$. 3

UNIT–II

5. (a) State and prove Rolle's Theorem. 3

(b) Find approximate value of $\sqrt{26}$. 3

6. (a) If $y = x^{\sinh x} + x^{\cosh x}$, find $\frac{dy}{dx}$. 3

(b) If $y=\left[\log\left(x+\sqrt{x^2+1}\right)\right]^2$, find $y_n(0)$. 3

7. (a) State and prove Cauchy's Theorem of mean value. 3

(b) Find first three non-zero terms in Maclaurin's expansion of $\tan^{-1}x$, $|x| < 1$. 3

8. (a) If $y=\begin{cases} x^2\sin\frac{1}{x} & \text{if } x\neq 0 \\ 0 & \text{if } x=0 \end{cases}$ show that $\frac{d^2y}{dx^2}$ does not exists at $x = 0$. 3

(b) Discuss applicability of L.M.V. theorem for :

$f(x) = |x|$ in $[-1, 1]$. 3