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

(ii) Questions : 8 Sub. Code : 0 1 4 6

Exam. Code : 0 0 0 2

B.A./B.Sc. (General) 2nd Semester

(2054)

MATHEMATICS

Paper—II (Calculus–II)

Time Allowed : Three Hours] [Maximum Marks : 30

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

UNIT—I

1. (a) Find a and b so that the curve $y = ax^3 + 3bx^2$ has a point of inflexion at (–1, 2). 3

   (b) Show that origin is node, a cusp or a conjugate point on the curve $y^2 = ax^2 + bx^3$, according as a is positive, zero or negative. 3

2. (a) Find horizontal and vertical asymptotes of the curve :

   $$x^2y^3 + x^2 + 3y^2 - 9xy + 8x - 25 = 0$$ 3

   (b) Find asymptotes of the curve :

   $$x^3 + y^3 - 3axy = 0$$ 3

3. Trace the curve $y = x^3 + 5x^2 + 3x - 4$. 6

4. (a) Find radius of curvature of the parabola $y^2 = 4ax$ at the point (x, y). 3

(b) Find centre of curvature of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. 3

UNIT—II

5. (a) Find reduction formula for $\int_0^{\pi/2} \cos^n x \, dx$. 3

(b) Obtain reduction formula for $I_n = \int x^n e^{ax} \, dx$. 3

6. (a) Find the value of $\int \cosh (\log x) \, dx, x > 0$. 3

(b) Evaluate $\lim_{n \to \infty} \frac{(\lfloor x)^{\frac{1}{n}}}{n}$. 3

7. (a) Evaluate $\int_0^1 \frac{1}{1+x} dx$, using trapezoidal rule taking $n = 5$. 3

(b) Find the length of the curve $y = x^{2/3}$ from $x = -1$ to $x = 8$. 3

8. (a) Find area enclosed by the curve :

$x = a \cos^3 t, y = a \sin^3 t, 0 \leq t \leq 2\pi$. 3

(b) Find the volume of the solid generated by revolving the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ about x-axis. 3