

Roll No.

11182

**B. Sc. (Pass Course) 1st Semester
(Regular/Re-appear/Improvement)
(Mercy Chance)
Examination – December, 2023**

MATHEMATICS-II (Calculus)

Paper : 12BSM112

Time : Three Hours] [Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 9 (Unit-V) is **compulsory**. Marks are indicated against each question.

UNIT – I

1. (a) Evaluate : 4

$$\lim_{x \rightarrow 0} \frac{x}{|x|}$$

(b) If $y = ae^{mx} + be^{-mx}$, then show that : 3

$$y_2 - m^2 y = 0$$

P. T. O.

11182

2. (a) Find the n th derivative of $\cos^3 x$. 3
(b) Expand $\log(1 + x)$ in powers of x by Maclaurin's theorem. 4

UNIT – II

3. (a) Find the asymptotes parallel to coordinate axes for the curve $y = x(x - 2)(x - 3)$. 3
(b) Prove that the asymptotes of the curve :
$$x^2 y^2 - a^2(x^2 + y^2) - a^3(x + y) + a^4 = 0$$
forms a square, through two of whose vertices the curve passes. 4

4. (a) Find the radius of curvature for the curve : 3

$$r^n = a^n \cos n\theta.$$

- (b) Show that the curve $y^2 = bx \sin \frac{x}{a}$ has a node or a conjugate point at the origin according as a and b have like or unlike signs. 4

UNIT – III

5. (a) Evaluate : 3

$$\int_0^{\infty} \frac{dx}{(1+x^2)^{n+\frac{1}{2}}}$$

- (b) Evaluate : 4

$$\int_0^{2a} x^{9/2} (2a-x)^{-1/2} dx$$

(2)

6. (a) Trace the curve : $x^3 + y^3 = 3ax^2$ 3
 (b) Find the entire length of the cardioid : 4

$$r = a(1 + \cos \theta)$$

UNIT – IV

7. (a) Find the area of one loop of the curve $r = a \sin 3\theta$.
 Hence find the total area of the curve. 4
 (b) Find the area common to the parabola $y^2 = ax$ and
 the circle $x^2 + y^2 = 4ax$. 3
8. (a) The loop of the curve $2ay^2 = x(x-a)^2$ revolves
 about x -axis. Find the volume of the solid so
 generated. <https://www.iguonline.com> 4
 (b) Find the centroid of the semi-circular region of
 radius r by Pappus theorem. 3

UNIT – V

9. (a) Find the n th derivative of $\log(ax + b)$. 2
 (b) State Taylor's theorem with Cauchy's form of
 remainder. 2
 (c) Evaluate : 2

$$\int_0^{\pi/2} \sin^6 \theta \cos^5 \theta d\theta$$

(3)

P. T. O.

- (d) Define Singular Point. 2
 (e) What is intrinsic equation of a curve ? 2
 (f) Write down the formula for surface area of
 revolution about x -axis of the curve $y = f(x)$. 2

(4)