



Shree H.N.Shukla College of Science Rajkot
MATHEMATICS

S.Y.B.Sc. (Sem. IV) (CBCS)

UNIT TEST

PAPER- 401

Curvature,Asymptotes,Multiple Points

Time: 1 hour]

[Total Marks: 30

Instruction: (i) All questions are compulsory.

(ii) Figures to the right indicate full marks of the question.

1. (A) Answer the following:

[10]

- 1) Define: Double point
- 2) Define: Node
- 3) Radius of curvature of $y^2=12x$ at the point $(0,0)$ is _____.
- 4) The curve $y=x^4$ is concave upwards at the point _____.
- 5) A point on the curve through which pass two real branches of the curve is called _____.
- 6) What is the curvature at any point of the circle of radius r ?
- 7) The curve $y=x^3$ has a point of inflexion at _____.
- 8) A possible double point on the curve $(y-x)^2+x^6=0$ is/are _____.
- 9) Define: Curvature and radius of curvature
- 10) The asymptote parallel to y -axis for the curve $x^2+y^2=1$ is _____.

(B) Attempt any two:

[04]

- 1) Find the radius of curvature of the curve $y = c \cosh \frac{x}{c}$.
- 2) Prove that $y = \log x$ is convex upward everywhere.
- 3) Find asymptotes of the curve $(x^2 + y^2)x - ay^2 = 0$ parallel to co-ordinate axes.
- 4) Find points of inflexion of the curve $x^2y - 4x + 3y = 0$.

(C) Attempt any two:

[06]

- 1) Find all asymptotes of the curve $4x^3 - 3xy^2 - y^3 + 2x^2 - xy - y^2 = 1$.
- 2) Find double point of the curve $x^3 + y^3 - 3x^2 - 3xy + 3x + 3y - 1 = 0$.
- 3) Show that the parabola $y^2 = 4ax$ has no asymptotes.
- 4) Find oblique asymptote of the curve

$$y = \frac{x^2 + 2x - 1}{x}$$

(D) Attempt any two:

[10]

- 1) Show that the radius of curvature of any point on the cardioid $r = a(1 + \cos \theta)$ is $\frac{2}{3}\sqrt{2ar}$. Hence prove that $\frac{\rho^2}{r}$ is constant.
- 2) Find the position and nature of double points of the curve $x^4 - 2ay^3 - 3a^2y^2 - 2a^2x^2 + a^4 = 0$.
- 3) Find all asymptotes to the curve $2x^3 - x^2y - 2xy^2 + y^3 - 4x^2 + 8xy + 4x + 1 = 0$.
- 4) Find asymptotes parallel to co-ordinate axis for the following curves:
 - (i) $y(x^2 - 1) = x$
 - (ii) $x^2y - 3x^2 - 5xy + 6y + 2 = 0$

******BEST OF LUCK******