



A Charutar Vidya Mandal's Institution
V.P. & R.P.T.P. SCIENCE COLLEGE
(AUTONOMOUS) (Grant-in-Aid)
Affiliated to Sardar Patel University
VALLABH VIDYANAGAR-388120



Bachelor of Science (Semester 1) Internal Examination - 2024
US01MIMTH01: Curve Sketching & Partial Derivatives

Date: 04th September 2024, Friday

Time: 11:00 AM to 12:00 PM

Total marks :20

Q.1 Select the correct option:

[06]

- 1) Asymptotes of $y = \frac{(x^2-1)}{(x^2-4)}$ are _____
a) $x = 2 ; y = 1$ b) $x = \pm 2 ; y = 1$ c) $x = \pm 2 ; y = -1$ d) not possible
- 2) The curve $r = 1 + \cos \theta$ is _____
a) Symmetry about polar axis b) Symmetry about normal axis
c) Symmetry about pole d) None of these
- 3) x and y- intercepts of the curves $x = \cos^2 \theta, y = 2 \sin \theta$ are _____.
a) $x = -1, y = \pm 2$ b) $x = 1, y = 2$
c) $x = 1, y = \pm 2$ d) $x = 0, y = 1$
- 4) $f(x, y) = x^2 \sin^{-1} \left(\frac{x^2+y^2}{xy} \right)$ is a homogeneous function of degree _____.
a) 0 b) 2 c) 4 d) None
- 5) If $u = \tan^{-1} \left(\frac{y}{x} \right)$, then $\frac{\partial^2 u}{\partial x^2} =$ _____.
a) $\frac{2xy}{(x^2+y^2)^2}$ b) $-\frac{2xy}{(x^2+y^2)^2}$ c) $-\frac{y}{(x^2+y^2)}$ d) $-\frac{y}{(x^2+y^2)^2}$
- 6) $\lim_{(x,y) \rightarrow (0,0)} \frac{(x^2-y^2)}{(x^2+y^2)} =$ _____.
a) 0 b) -1 c) 1 d) Limit does not exist

Q.2 Find asymptotes for the curve given by $x = t + \frac{1}{t^2}; y = t - \frac{1}{t^2}$. [07]

OR

- Q.2 a) State when a polar curve is symmetry with respect to polar axis? Also prove it. [05]
b) Find the arc length of the parabola $y = 4x^2$, joining from (0,0) to (3,36).. [02]

Q.3 Find the Extreme values of $x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$. [07]

OR

- Q.3 a) If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, then prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = \frac{3}{(x+y+z)}$. [05]
b) If $H = f(x - y, y - z, z - x)$, then prove that $\frac{\partial H}{\partial x} + \frac{\partial H}{\partial y} + \frac{\partial H}{\partial z} = 0$. [02]

Best of Luck

