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A Charutar Vidya Mandal's Institution
V. P. & R. P. T. P. SCIENCE COLLEGE
(AUTONOMUS) (Grant-in-Aid)



Affiliated to Sardar Patel University, Vallabh Vidyanagar-388120

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

Date: 20-11-2024, (Wednesday)

Time: 11:00 am to 12:30 pm

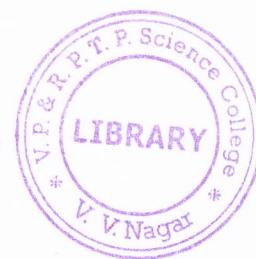
Total marks: 25

NOTE: The symbols used in this paper have usual meaning unless specified.

Q. 1 Write the most appropriate answer from the following multiple-choice questions.

[05]

- For which of the following curve, arc length between any two point of the curve is same?
(a) circle (b) square (c) ellipse (d) none of these
- Intrinsic equation is not depending on which of the following component of the curve?
(a) arc length (b) curvature (c) coordinate system (d) all of these.
- Which of the following curve has constant curvature?
(a) circle (b) ellipse (c) square (d) parabola
- Which of the following is not a homogeneous function?
(a) $x + y$ (b) $x^2 + y^2$ (c) $x^2 + y$ (d) xyz
- Which of the following is an implicit function?
(a) $x^2 + y^2 = 1$ (b) $y = 2x + 1$ (c) $y = e^x$ (d) $x = 3y$



- Q. 2** (i) Let $r = f(\theta)$ be a polar representation of the curve c . Prove that the length of arc c between two points A and B corresponding to angle $\theta = \theta_0$ and $\theta = \theta_1$ respectively is given by

$$\text{arc}AB = \int_{\theta_0}^{\theta_1} \sqrt{r^2 + \left(\frac{dr}{d\theta}\right)^2} d\theta.$$

- (ii) Using (i) find the length of the cardioid, $r = 2 + 2 \cos \theta$.

[05]

P. T. O.

OR

Q. 2 (i) Find equation of tangent and normal to the parabola $y^2 = 4ax$ at the point t . [05]

(ii) Sketch the curve $y = \frac{x^2+2x-3}{x^2+2x}$. [05]

Q. 3 Find the maxima and minima of the function $f(x, y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$. [10]

OR

Q. 3 If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, then prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 3(x + y + z)$. [10]

ALL THE BEST

