

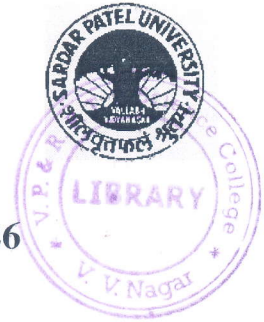


A Charutar Vidya Mandal's Institution

V. P. & R. P. T. P. SCIENCE COLLEGE

(AUTONOMUS) (Grant-in-Aid)

Affiliated to Sardar Patel University, Vallabh Vidyanagar -388120

Bachelor of Science (Semester 6) Internal Examination-2026**US06MIMTH07: Partial differential equations-I**

Date: 09-03-2026 (Monday)

Time: 10:45 pm to 11:45 pm

Total marks: 20

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. [06]**

- (1) Which of the following is not a solution of $\frac{dx}{yz} = \frac{dy}{xz} = \frac{dz}{xy}$ _____.
- (a) $x^2 - y^2 = c$ (b) $z^2 - y^2 = c$ (c) $2z^2 + y^2 = c$ (d) $x^2 + y^2 - 2z^2 = c$
- (2) A necessary and sufficient condition that there exists between two functions $u(x, y)$ & $v(x, y)$ a relation $f(u, v) = 0$ not involving x or y explicitly is that _____.
- (a) $\frac{\partial(u, v)}{\partial(x, y)} = 0$ (b) $\frac{\partial(x, y)}{\partial(u, v)} = 0$ (c) $\frac{\partial(u, x)}{\partial(v, y)} = 0$ (d) none of these
- (3) Orthogonal trajectories of given curves intersects them at _____.
- (a) acute angle (b) right angle (c) obtuse angle (d) origin.
- (4) Degree of the partial differential equation $\frac{\partial^2 z}{\partial x^2} = \left(1 + \frac{\partial z}{\partial y}\right)^{\frac{1}{2}}$ is _____.
- (a) 0 (b) 1 (c) 2 (d) 3
- (5) The auxiliary equations of Lagrange equation are used to solve _____.
- (a) Pfaffian DE (b) second order PDE (c) first order linear PDE (d) none of these
- (6) If $z = ax + by$, then $p^2 + q^2 = 5$ implies _____.
- (a) $a^2 + b^2 = 5$ (b) $a - b = 5$ (c) $a + b = 5$ (d) $ab = 5$

Q. 2 Find the orthogonal trajectories on the cone $x^2 + y^2 = z^2 \tan^2 \alpha$ at its intersection with the family of planes $z = k$. [07]

OR

Q. 2 (P) Solve the simultaneous differential equation: $\frac{dx}{z-y} = \frac{dy}{x-z} = \frac{dz}{y-x}$ [03]

(Q) Show that if X is a vector such that $X \cdot \text{curl} X = 0$ and μ is an arbitrary function of x, y, z then $(\mu X) \cdot \text{curl}(\mu X) = 0$ [04]

Q. 3 Find the surface which intersects the surface of system $z(x+y) = c(3z+1)$ orthogonally to and which passes through the circle $x^2 + y^2 = 1, z = 1$. [07]

OR

Q. 3 (P) Obtain the partial differential equation of $z = ax^3 - by^3$. [02]

(Q) Find the integral surface of the equation $(x-y)y^2p + (y-x)x^2q = (x^2 + y^2)z$ through the curve $xz = 8, y = 0$. [05]

All the Best



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Bachelor of Science (Semester 6) Quiz Test-2026**US06MIMTH07: Partial differential equations-I**

Date: 09-03-2026 (Monday)

Time: 10 minutes

Total marks: 05

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

Q. 1 Whether the following statement is TRUE or FALSE. Write your answer in the box. [05]

1. The geometrical interpretation of $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ represents a family of curves. []
2. The equation $p^2 + 2xypq = 1$ is the non linear partial differential equation. []
3. $2x dx + y^2 dy = 0$ is the Pfaffian differential equation. []
4. Every Linear PDE is Quasi- linear PDE. []
5. Integral surface of $x^2 + y^2 = c_1$, $yz + x^2 = c_2$ passes through the line $x = 1$, $y = 0$ is $y(y - z) = 0$. []

All the Best