JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2024

Ph.D.-II Semester (Mathematics)

COURSE CODE (CREDITS): 17P1WMA111 (3) MAX. MARKS: 15

COURSE NAME: DIFFERENTIAL GEOMETRY

COURSE INSTRUCTOR: Pradeep Kumar Pandey MAX. TIME: 1 Hour

Note: *(a) All questions are compulsory.*

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems.

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1. Compute the 2-form $dx \wedge dy$ in polar coordinates. [2M] [CO1]

2. Find the curvature of the curve $\alpha(t) = \left(t^2, \frac{2}{3}t^3, \frac{1}{4}t^4\right)$ defined for $t \geq 0$. [2M] [CO1]

3. State and prove Frenet-Serret formulae for space curves in $\mathbb{R}^3$. [3M] [CO1]

4. Define a regular surface, and prove or disprove that the ellipsoid is a regular surface. [3M] [CO2]

5. Compute the Frenet frame for the curve $\alpha(t) = (a\cos t, a\, sint\, t,\ b\sin t)$, $t \in \mathbb{R}$. [5M] [CO2]

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