

MMA-E414

DIFFERENTIAL GEOMETRY

MM : 100
Time : 3 hrs
L T P
5 2 0

Sessional : 30
ESE : 70
Pass Marks : 40

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer type questions of six marks each and student shall be required to attempt any five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper

Curves With Torsion: Tangent, Principal normal-Curvature, Binormal -Torsion ,Serret-Frenet formulae, Locus of centre of curvature and examples. Spherical curvature, Locus of centre of spherical curvature, Theorem: Curve determined by its intrinsic equation, Helices, Spherical indicatrix of tangent, Involutives, Evolutes. Bertrand curves.

Envelopes, Developable Surfaces: Surfaces, Tangent plane –Normal, One –Parameter Family of Surfaces: Envelope, Characteristics, Edge of regression, Developable surfaces, Developables associated with a curve : Osculating development , Polar development, Rectifying development. Two –parameter Family of Surface: Envelope, Characteristics points, and its examples.

Curvilinear Coordinates on a Surface Fundamental Magnitudes: Curvilinear Coordinates, First order magnitude , Directions on a surface , The normal , Second order Magnitude ,Derivatives of n ,Curvature of normal section ,Meunier’s theorem and examples.

Curves on a Surface: Lines of Curvature: Principal direction and curvatures, First and second curvature, Euler’s theorem, Dupin’s indicatrix, The Surface $z = f(x,y)$, Surface of revolution and examples. Conjugate directions, Conjugate systems. Asymptotic lines, Curvature and torsion, Isometric Parameters, Null Lines or Minimal curves and examples.

The Equations of Gauss and of Codazzi: Gauss’s formula for r_{11} , r_{12} , r_{22} ,Gauss’s characteristic equations ,Mainardi–Codazzi relations, Alternative expressions ,Bonnet’s theorem, Derivation of an angle ω and examples.

Geodesic: Geodesic property, Equations of geodesics, Surface of revolution, Torsion of a geodesic ,Curves in relation to Geodesics : Bonnet’s theorem ,Joachimsthal’s theorems ,Vector curvature , Geodesic curvature and its other formulae ,Examples.

BOOKS SUGGESTED:

- | | |
|-------------------|---|
| 1.C.E.Weatherburn | Differential Geometry |
| 2.Bansi Lal | Differential Geometry, Atma Ram & Sons, Delhi |
| 3.Andrew Presely | Elementary Differential Geometry, Springer |