LR-2137

M. A./M. Sc. (Second Semester) Examination, May-June 2023

MATHEMATICS

[Differential Geometry of Manifolds-II-V(iii)]

Time Allowed : Three hours

Maximum Marks : 40

Note : Attempt questions of all **two** sections as directed. Distribution of marks is given with sections.

Section-'A'

(Short Answer Type Questions)   5×3=15

Note : Attempt all **five** questions. Each question carries 3 marks.

Unit-I

1. What is a vector bundle over a manifold, explain.

Or

Define a vector bundle and give examples.

Unit-II

2. What is a Riemannian manifold, explain.

Or

Explain Riemannian connection.

Unit-III

3. Define a Geodesic.

Or

What is conformed curvature tensor.

Unit-IV

4. Define a submanifold and give example.

Or

Explain Hypersurfaces.

Unit-V

5. What is an almost complex manifold, explain.

Or

Define Nijenhuis tensor.

Section-B

(Long Answer Type Questions)   5×5=25

Note : *Attempt all five questions. **One** question from each unit is compulsory. Each question carries 05 marks. Word limit to each question is 800.*

Unit-I

6. Describe in details induced bundle with examples.

Or

What is a bundle homomorphism, explain with examples.

Or

What is an induced bundle, explain with detailed examples.

Unit-II

7. State and prove Schur's theorem.

Or

What is a Riemannian connection, explain giving examples.

Unit-III

8. Prove that for a Riemannian symmetric space any C' curve is invariant under each of its points is a representation of a geodesic.

Or

Describe the projective curvature tensor and discuss its properties.

Unit-IV

9. State and prove the Gauss's formulae.

Or

State and prove the generalized Gauss and Mainardi Codazzi equation.

Unit-V

10. Explain contravariant almost analytic vector fields giving examples.

Or

What is F-connection, explain.