17PAMCT4A11

M.Sc. Degree Examinations - Even Semester 2021

II Year IV Semester

Differential Geometry and Tensor Calculus

Max Marks: 25

Answer any Five questions (5 * 5 = 25)

1. Show that $[\dot{r}, \ddot{r}, \dddot{r}] = 0$ is a necessary and sufficient condition that the curve be plane.

2. Obtain the curvature and torsion of the curve of intersection of the two quadratic surfaces $ax^2 + by^2 + cz^2 = 1,\ a'x^2 + b'y^2 + c'z^2 = 1.$

3. On the Paraboloid $x^2 - y^2 = z$, find the orthogonal trajectories of the sections by the planes z =constant.

4. Prove that the curves of the family $\frac{v^3}{u^2}$ =constant are geodesics on a surface with metric $v^2du^2 - 2uv\ du\ dv + 2u^2\ dv^2\ \ (u > 0, v > 0).$

5. If $g(t)$ is continuous for $0 < t < 1$ and if $\int_0^1 v(t)g(t)dt = 0$ for all admissible function $v(t)$ as defined above, then $g(t) = 0.$

6. Explain about symmetric, antisymmetric and quotient law with suitable example.

7. Explain the fundamental and associated tensor.