



THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

Re-accredited (2nd Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

Backlog Arrear Examination, March 2021

MAT 237

Max. Marks: 75

Geometry

Duration: 3hrs

Answer any FIVE Questions:

5×15=75

- (a) Prove that any affine transformation is a resultant of at most six parallel projections.

(b) Prove that cross ratio is preserved in central projection on intersecting lines.
- (a) Prove that the Projective transformation forms a group.

(b) Find the cross ratio of lines through the origin in terms of its slopes. Hence find the harmonic conjugate of x -axis with respect to $y = 3x$ and $y = -3x$.
- State and Prove Desargue's Theorem.
- Prove that every fractional transformation is a projective transformation.
- Prove that a projectivity with a fixed point is a perspectivity. Hence prove Pappus Theorem.
- (a) Derive Serret-Frenet formula.

(b) Find curvature and torsion of spherical indicatrix of binormal.
- (a) Derive the equation of an Involute and find its curvature and torsion.

(b) State and Prove the necessary and sufficient condition for a curve to be a Helix.