S.No. 6845 P 16 MAE 1 B

(For candidates admitted from 2016–2021 batch)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Mathematics — Elective

MATHEMATICAL MODELING

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20)

Answer ALL questions.

1. Define the law of mass action.

2. Write down the differential equation of the continuity principle.

3. Write the three assumptions of Domar Macro model.

4. Define: Model with Removal and Immigration.

5. Write the equation of the Kepler's third law of planetary motion.

6. Write the formula for the transverse component of acceleration.

7. Define one-period fixed point.

8. Write the complementary function if the complex roots are repeated k-times.

9. Define planar graph.

10. Define weighted signeddigzoph.

PART B — (5 × 5 = 25)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain simple Harmonic motion.

Or

(b) Explain simple Geometrical problems.

12. (a) Explain Lanchester's combat model.

Or

(b) Explain Domar's First Debt model.

13. (a) Discuss about circular motion.

Or

(b) Discuss about the time period of circular motion of satellites.



14. (a) Discuss about application to Actuarial science.

Or

(b) Find the solution of linear difference equations by using Laplace Transform.

15. (a) Discuss about signal flow graphs.

Or

(b) Discuss about the balance of signed graphs.

PART C — (3 × 10 = 30)

Answer any THREE questions.

16. Explain orthogonal trajectories.

17. Explain the basic equations for the analysis of drug distribution in the $n$-compartment system.

18. Explain motion under the inverse square law.

19. Find the complementary function by use of matrices.

20. Discuss about electrical networks and kirchoff's laws.