Class: I M.Sc (Maths)

Sub: Mathematical Modeling

Time: 3hrs
Max: 75

PART - A (10 x 2 = 20)

Answer ALL questions.

1. Write a short notes on rate of dissolution
2. Find curves for which the Projection of the normal on the x-axis of Constant length.
3. State the assumptions of prey-Predator models.
4. Define Domar's Second depr model.
5. write the equations of Radial Component of accelⁿ
6. When will you say that the motion is overdamped.
7. write the difference equation of Competition model.
8. Define the followed terms. Give an example for each (a) Antibalance (b) Duobalance of a graph.
9. what is meant by one-Period fixed Points.
10. Define a incidence matrix. Give an example.

PART - B (5 x 5 = 25)

11 a) what is meant by Radio active decay.

(Or)

b) Explain the motion under gravity in Resisting Medium.

12. a) Narrate the age - Structured Population Models.

(or)

b) Discuss the model for Diabetes Melitus.

13. a) Explain the motion under the inverse Square Law. Also Prove $v^2 = \mu\left(\frac{2}{r} - \frac{1}{a}\right)$

(or)

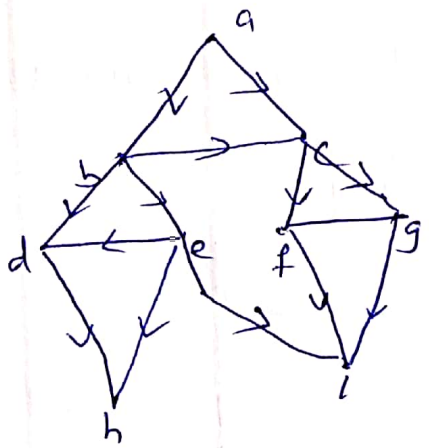
b) Derive the equation of the Common Catenary.

14 a) Derive Z - transform. Also find the Solution of Linear difference equation by using Z transform method.

(or)

b) Enumerate the Harrod model.

15 a) Define Herary measure. Find the Herary measure for each individual in the following graph.



(or)

b) Derive Euler formula for Polygonal Graph.

Section-C (3×10=30)

Answer any three questions.

16. Derive the equation of motion of SHM. Also Prove that a SHM with time Period $2\pi\sqrt{a/g}$

17. Define Projectile. with usual notations Prove that $y = x\tan\alpha - \frac{1}{2}\frac{gx^2}{v^2\cos^2\alpha}$ Also Prove that the Projectile attains the max. height $v^2\sin^2\alpha/2g$.

18. Discuss the Elliptic motions of Satellites

19. Elaborate on the age-Structured Population models.

20. Explain weighted digraphs and Markov Chains with an examples.