MAY 2025 **U/ID 32515/UEM5A**

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer any TEN questions.

1. Define Mathematical Modelling with an example.

2. If the age of mother is four times the age of her daughter after five years the age of mother will be only three times the age of the daughter. Find their ages.

3. State Fick's law of diffusion.

4. Write the general form of rate of dissolution.

5. Write the formula for model with removal and immigration.

6. Define SIS model.

7. What is the consideration of changes of population in dynamics?

8. Define competition model using difference equation.

9. Explain $s(t), y(t), I(t)$ in Harrod Model.

10. Write the solution of COBWEB model.

11. Express the techniques of mathematical modelling in figure.

12. Define ordinary differential equation of first order relate with mathematical model.

PART B — (5 × 5 = 25 marks)

Answer any FIVE questions.

13. Write about the classification of Mathematical Models in nature.

14. Explain population growth models.

15. Derive a simple Epidemic model through systems of first order ordinary differential equation.

16. Describe the solution of linear difference equation by using Laplace Transform.

17. Discuss Harrod Model through difference equation.

18. Explain partial modelling for subsystems and transferability of mathematical model.

19. Discuss logistic law of population growth.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

20. Explain in detail the characteristics of realism, hierarchy, relative precision, robustness and self consistency models.

21. Describe about diffusion of glucose in the blood stream with mathematical model.

22. Discuss prey predator models through systems of ODE of the first order.

23. Derive (a) Population and growth (b) Logistic growth (c) Competition and (d) Simple Epidemic model through difference equation.

24. Find the solution for R at the end of n-years with the sinking fund factor.

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