DECEMBER 2022 **U/ID 32515/UEM5A**

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer any TEN questions.

1. Write any three characteristics of mathematical models.

2. According to the nature how many types of classification in mathematical models. Write its names.

3. Which principle is used to find the status of light travels from one point to another point by mathematical model.

4. When will you use partial differential equation in mathematical modeling?

5. Express the model for the "effects of immigration and emigration on population size".

6. What is meant by decrease of temperature?

7. What is SIS model?

8. State prey predator model.

9. If $x(0)=100$, $a=0.1$, $b=0.001$, find $x(t)$ for $t=1$ in Logistic Growth model.

10. What is the solution of system of n linear homogeneous differential equation with constant coefficients?

11. Write any two assumption of cobweb model.

12. Express the Harrod model, for the situation savings made by the people in a county depend on the national income".

PART B — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

13. Write a short note on "populational Growth model".

14. Explain the classification of mathematical models.

15. Show that the model represented by $\frac{dx}{dt}=x(15-15x-3y)$, $\frac{dy}{dt}=y(4-x-y)$, $x>0$, $y\geq 0$ has a position.

16. Draw some trajectories for the competition model $\frac{dx}{dt}=x(1-0.1y)$, $\frac{dy}{dt}=y(1-0.1x)$.

17. Write a short note on simple epidemic model.

18. If $x(0)=100$, $y(0)=1$, $\beta=0.5$, plot $x(t)$, $y(t)$ in xy-plane for $t=1$ to 10 for the simple epidemic model.

19. Narrate the Harrod model.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

20. Explain the mathematical model for, "Diffusion of Glucose or a medicine in the blood stream".

21. Narrate prey predator model.

22. Show that the model represented by $\frac{dx}{dt}=x(12-4x-3y)$; $\frac{dy}{dt}=y(30+x-5y)$, $x \geq 0$, $y \geq 0$ has no position of equilibrium and that only the second species will service.

23. Discuss the stability theory for difference equations.

24. Explain cobweb model.

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