Question Bank for PG Course
অঙ্ক (Mathematics)
নবম (খ ২) পত্র (Paper - IXB(ii))
Mathematical Models in Ecology : PGMT-IXB(ii)

1. What are the different parts of ecology?

2. What are the Biotic components of Ecosystem?

3. Which of the following statements is/are false?

   i)   Dynamical model may be deterministic or stochastic.
   ii) State variables are chosen to determine the current state of a system
   iii) Dynamical modelling is not possible in continuous time.

4. What is a conservation equation?

5. Why stochastic models are needed for modelling of any ecological system ?

6. What are the basic postulates for developing continuous time models of single-species population ?

7. Define the asymptotic stability of a fixed point x^* of the equation $\frac{dx}{dt} = f(x)$.

8. Write down the Gompertz equation for time dependent growth rate in Malthus population model.

9. What condition, called Allee effect, represents a population having a maximum intrinsic growth rate at intermediate density?

10. What is the critical value H_c of H , the constant rate per unit time of removal of members, in a constant rate Harvesting model ?

11. When the system $\frac{dx_1}{dt} = f(x_1, x_2)$, $\frac{dx_2}{dt} = g(x_1, x_2)$ defined on $D \subset R^2$ is cooperative?

12. Cattle, deer and sheep rely on bacteria to breakdown plant cellulose into digestive sub-units. What type of interaction is this?

13. What is Fibonacci sequence?

14. Define Bifurcation values.

15. Investigate the qualitative behaviour of the solution of the system using Poincare' – Bendixson theorem

$$\frac{dx}{dt} = x\left(1 - \frac{x}{30}\right) - \frac{xy}{x + 10}$$

$$\frac{dx}{dt} = y\left(\frac{x}{x + 10} - \frac{1}{y}\right)$$