22MAU626A

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(Sixth Semester)

Branch – **MATHEMATICS**

MAJOR ELECTIVE COURSE – II : MATHEMATICAL MODELLING

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 The Square of the period of revolution of any planet around the sun is directly proportional to the _____ of the semi-major axis of the orbit.
(i) cube (ii) Square
(iii) fourth power (iv) square-root

2 Movement of particles from high to low concentration is directly proportional to the particle's concentration gradient is known as __ law
(i) Faraday's (ii) Fisher's
(iii) Fick's (iv) Ohm's

3 Insulin secretion increases in ___ proportion to the concentration of glucose in the blood.
(i) direct or indirect (ii) indirect
(iii) neither direct nor indirect (iv) direct

4 The ____ transform formula is used to convert a function from the time domain to the frequency domain.
(i) sine (ii) Laplace
(iii) Fourier (iv) integral

5 A ___ fund is a financial strategy that involves regularly saving money to meet future expenses.
(i) sinking (ii) surplus
(iii) future (iv) slack

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a) Write some characteristics of mathematical models.
OR
b) Find the maximum area Triangle for the given perimeter.

7 a) Give the mathematical model of populational growth.
OR
b) Explain the Mathematical model for Logistic law of population growth.

8 a) Discuss about the Competition models.
OR
b) Explain a model for Diabetes mellitus.

9 a) Write the various cases arises in finding the complementary function for difference equations.
OR
b) Write about the Stability theory for difference equations.

Cont...

10 a) Explain the Harrod model.

OR

b) Discuss about the Samuelson's interaction models.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a) Explain the mathematical models based on Motion of Planets and Motions of Satellites.

OR

b) Derive the mathematical model using law of reflection and law of refraction of light.

12 a) Explain the simple compartment model.

OR

b) Derive the mathematical model for Diffusion of glucose or a Medicine in the blood stream.

13 a) Explain Prey-predator models.

OR

b) What is known as simple epidemic model? Discuss about a susceptible-infected-susceptible model and SIS model with constant number of carriers.

14 a) Give the simple difference equations for Logistic growth model, prey-predator model and competition model.

OR

b) How do you find the Solution of linear difference equations by using Laplace transform and also using z-transform.

15 a) Derive the Cobweb model.

OR

b) Write the Mathematical models related to actuarial science.

Z-Z-Z END