PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(Sixth Semester)

Branch – **MATHEMATICS WITH COMPUTER APPLICATIONS**

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 radius of the earth a =
(i) $\frac{180d}{2\pi\theta}$ (ii) $\frac{360d}{\pi\theta}$
(iii) $\frac{360d}{2\pi\theta}$ (iv) $\frac{270d}{2\pi\theta}$

2 The formula of Rate of dissolution $\frac{dx}{dt}$ = _____.
(i) $\frac{Kx(t)}{V}((X(t))$ (ii) $\frac{Kx(t)}{2V}((x_0 - C_0V))$
(iii) $\frac{x(t)}{V}((x_0 - C_0V) - X(t))$ (iv) $\frac{Kx(t)}{V}((x_0 - C_0V) - X(t))$

3 $\frac{dI}{dt}$ = _____.
(i) $\beta c_0 Nexp(-\alpha t) - [\beta c_0 \exp(-\alpha t) + \gamma]I$ (ii) $\beta c_0 Nexp(-\alpha t) - [\beta c_0]$
(ii) $\beta exp(-\alpha t) - [\exp(-\alpha t) + \gamma]I$ (iv) $\beta c_0 Nexp(-\alpha t)I$

4 The value of $Z(a^n)$ is _____.
(i) $\frac{1}{z-a}$ (ii) $\frac{z}{z-a}$
(iii) $\frac{2z}{z+a}$ (iv) $\frac{z}{z-2a}$

5 The solution of $y(t) = \frac{\beta}{\beta-\alpha}y(t-1)$ is _____.
(i) $y(t) = (\frac{\beta}{\beta-\alpha})^t$ (ii) $y(t) = y(0)(\frac{\beta}{\beta+\alpha})^{t-1}$
(iii) $y(t) = y(0)(\frac{\beta}{\beta-\alpha})^t$ (iv) $y(t) = y(1)(\frac{\beta}{\beta-\alpha})^{t-2}$

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

6 a Explain a classification of Mathematical model.
OR
b Calculate the distance of a Moon.

7 a Explain a Radio Active Decay.
OR
b Describe a Logistic Law of population.

8 a Explain a Simple Epidemic model.
OR
b Summarise a model of removal and immigration.

9 a For model, Let x(0)=100, a=0.5 or 1 or 2 . Calculate x(t) for t=1 to 50 and plot x(t) as a function of t in each case.
OR
b Explain a Stability theory for difference equations.

10 a Describe a Harrod model.
OR
b Explain the Samuelson's interaction.

Cont...

SECTION -C (30 Marks)

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

11 a. Discuss about a mathematical modeling through Geometry.

OR

b Explain the Modeling through Calculus.

12 a Discuss about a change of price of a commodity.

OR

b Discuss about a Diffusion of Glucose or a Medicine.

13 a Summarise a Competition Model.

OR

b Discuss about a Model for Diabetes Melitus.

14 a Summarise : Population Growth model and Logistic Growth model.

OR

b Discuss about a solution of linear difference equation by using laplace transform.

15 a Discuss about a Cobureb model.

OR

b Explain a application to Actuarial science.

Z-Z-Z END