PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2023
(Second Semester)

Branch – **BIOCHEMISTRY**

MATHEMATICS

Time: Three Hours Maximum: 50 Marks

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

1 A eigen vector of a matrix cannot correspond to more than ----- eigen root of a matrix.
(i) two (ii) one (iii) four (iv) three

2. An equation of the n^{th} degree has ___ roots only.
(i) n-1 (ii) n-2 (iii) n (iv) n+1

3. In which method the solution is got by successive approximation?
(i) Direct method (ii) Indirect method
(iii) Crout's method (iv) Jordan's method

4. The n^{th} divided differences of a polynomial of ___ degree are constant.
(i) $(n-1)^{th}$ (ii) n^{th} (iii) $(n+1)^{th}$ (iv) $(n+2)^{th}$

5. ___ rule approximation the area of two adjacent strips by the area under a quadratic parabola.
(i) Simpson's one third (ii) Trapezoidal
(iii) Romberg's (iv) Bessel's

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

6) a) Find the eigen values and eigen vectors of the matrix $\begin{pmatrix} 4 & 1 \\ 3 & 2 \end{pmatrix}$.

OR

b) State any three properties of Eigen vector.

7) a) Solve the equation $x^2 + 6x + 20 = 0$, one of the root being 1+3i.

OR

b) Remove the fractional coefficients from the equation.

$x^3 - \frac{1}{4}x^2 + \frac{1}{3}x - 1 = 0$

8) a) Bring out the steps for complete pivoting method.

OR

b) Narrate the condition for the convergence of iterative methods.

9) a) Describe about the Gregory Newton forward interpolution formula.

OR

b) Find out the divided differences of y_x, given that.

x:	1	2	4	7	12
y_x:	22	30	82	106	206

Cont...

10) a) Develop the newton's forward difference formula.

OR

b) Explain about Simpson's one third rule.

SECTION -C (30 Marks)

Answer **ALL** questions

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

11) a) Find the eigen values and eigen vectors of the matrix.

$$\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$

OR

b) Verify Cayley- Hamilton theorem for $\begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$ .Hence find its inverse.

12 a) Solve $2x^3 - x^2 - 22x - 24 = 0$, two of the roots being in the ratio 3:4.

OR

b) If α, β, γ are the roots of the equation $x^3 + px^2 + qx + r = 0$, form the equation whose roots are

(i) $\alpha^2 + 1, \beta^2 + 1, \gamma^2 + 1$. (ii)$\alpha\beta, \beta\gamma, \gamma\alpha$.

13 a) Solve the given equations by Gauss elimination method.

$$2x + y + 4z = 12$$
$$8x - 3y + 2z = 20$$
$$4x + 11y - z = 33$$

OR

b) Solve, by Gauss-Jacobi method of iteration the equations.

$$27x + 6y - z = 85$$
$$6x + 15y + 2z = 72$$
$$x + y + 54z = 110.$$

14 a) Using Newton's interpolation formula, find the melting point of alloy containing 84 percent of lead.

p:	40	50	60	70	80	90
t:	184	204	226	250	276	304.

OR

b) Given the values

x:	14	17	31	35
f(x):	68.7	64.0	44.0	39.1

Find the value of f(x) corresponding to x=27.

15 a) From the following table of values of x and y,

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for x = 1.05.

x:	1.00	1.05	1.10	1.15	1.20	1.25	1.30
y:	1.00000	1.02470	1.04881	1.07238	1.09544	1.11803	1.14017.

OR

b) Dividing the range into 10 equal parts, find the approximate value of $\int_0^{\pi} \sin x \, dx$ by

(i) Trapezoidal rule (ii) Simpson's rule.

Z-Z-Z END