

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BSc DEGREE EXAMINATION MAY 2026
(Second Semester)**

Branch- **BIOCHEMISTRY**

MATHEMATICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The sum and product of eigen values of $\begin{pmatrix} 2 & -3 \\ 4 & -2 \end{pmatrix}$ A) 0,0 B) 4,8 C) 0,8 D) 2, -2	K1	CO1
	2	For a square matrix A, what is the characteristic equation defined as? A) $\det(A) = 0$ B) $A_n = 0$ C) $\det(\lambda I - A) = 0$ D) $\text{tr}(A) = 0$	K2	
2	3	If the product of roots of $x^3 - 5x^2 - kx + 24 = 0$ is 12, then k is A) 4 B) -4 C) 2 D) -2	K1	CO2
	4	The roots of the equation $x^3 + px + q = 0$ are in Arithmetic Progression. Then which of the following is always true? A) $p = 0$ B) $q = 0$ C) $p^3 = 27q^2$ D) $4p^3 + 27q^2 = 0$	K2	
3	5	In Gauss Elimination, the coefficient matrix is transformed into which form? A) Identity matrix B) Diagonal matrix C) Upper triangular matrix D) Lower triangular matrix	K1	CO3
	6	Which of the following methods uses the latest updated values during iteration? A) Gauss-Seidel method B) Jacobi method C) Both A and B D) Neither A nor B	K2	
4	7	The variable p in Newton's forward interpolation formula is defined as: A) $p = \frac{x-x_n}{h}$ B) $p = \frac{x-x_0}{h}$ C) $p = \frac{x_n-x}{h}$ D) $p = \frac{x_0-x}{h}$	K1	CO4
	8	Which of the following methods requires the computation of backward differences? A) Newton's forward interpolation B) Newton's backward interpolation C) Lagrange interpolation D) Divided difference interpolation	K2	
5	9	In numerical differentiation, the step size h is: A) The interval between data points B) The point where derivative is calculated C) The order of derivative D) None of the above	K1	CO5
	10	Simpson's 1/3 rule requires _____ A) An even number of intervals B) An odd number of intervals C) Equally spaced data points D) Both A and C	K2	

Cont...

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Show that that a Eigen vector X of a matrix A cannot correspond to more than one eigen root of A.	K3	CO1
		(OR)		
	11.b.	Compute A^3 if $A = \begin{pmatrix} 1 & 2 \\ 4 & 3 \end{pmatrix}$.		
2	12.a.	Diminish the roots of the following equations and find the transformed equation for $x^4 - 6x^3 - x^2 + 30x - 20 = 0$ by 3	K3	CO2
		(OR)		
	12.b.	Find the value of k for which the roots of the equation $2x^3 + 6x^2 + 5x + k = 0$ are in AP		
3	13.a.	Explain the steps of Gauss elimination method for solving the equations $x - y + z = 1, -3x + 2y - 3z = -6, 2x - 5y + 4z = 5$	K2	CO3
		(OR)		
	13.b.	Compare the Gauss elimination method and Gauss Seidel method.		
4	14.a.	Using Newton's formula, estimate the value of $f(1.5)$ from the following table $\begin{array}{c} x: \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \\ f(1.5) \quad 858.3 \quad 869.6 \quad 880.9 \quad 892.3 \quad 903.6 \end{array}$	K2	CO4
		(OR)		
	14.b.	Give the table of divided difference formula for $\begin{array}{c} x : 0 \quad 2 \quad 3 \quad 5 \quad 6 \\ y : 1 \quad 19 \quad 55 \quad 241 \quad 415 \end{array}$		
5	15.a.	Find the rate of change of pressure with respect to volume when $V=2$ for the given table $\begin{array}{c} V: 2 \quad 4 \quad 6 \quad 8 \quad 10 \\ P: 105 \quad 42.7 \quad 25.3 \quad 16.7 \quad 13 \end{array}$	K3	CO5
		(OR)		
	15.b.	Find $\int_0^6 \frac{1}{1+x} dx$ using Simpson's rule by dividing the range into 6 equal parts.		

SECTION - C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Find eigen value and eigen vector of the matrix $A = \begin{pmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{pmatrix}$	K3	CO1
2	17	Solve the equation $32x^3 - 48x^2 + 22x - 3 = 0$ whose roots are in A.P.	K2	CO2
3	18	Solve the equations by Gauss Jacobi method $27x + 6y - z = 85, 6x + 15y + 2z = 72, x + y + 54z = 110$	K3	CO3
4	19	Apply Lagrange's formula to find $f(27)$ given that $f(14) = 68.7, f(17) = 64, f(31) = 44, f(35) = 39.1$	K3	CO4
5	20	By dividing the range into ten equal parts, estimate the value of $\int_0^\pi \sin x dx$ by Simpson's rule.	K2	CO5

Z-Z-Z END