

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2026
(First Semester)

Branch – ELECTRONICS

MATHEMATICS - I FOR ELECTRONICS

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	A Hermitian matrix A is defined as (i) $A^T = A$ (ii) $A^* = A$ (iii) $A^+ = A$ (iv) Both (ii) and (iii)	K1	CO1
	2	The sum of eigenvalues of a square matrix equal (i) The sum of diagonal entries (trace) (ii) The determinant of the matrix (iii) The product of diagonal entries (iv) Always zero	K2	CO1
2	3	Which formula expresses $\cos(nx)$ in terms of $\cos x$ and $\sin x$? (i) De Moivre's formula (ii) Pythagoras theorem (iii) Eulers formula (iv) Binomial formula	K1	CO2
	4	Which of the following is the correct expansion for $\cos(2x)$? (i) $2\cos^2 x - 1$ (ii) $1 - 2\sin^2 x$ (iii) $1 + 2\sin^2 x$ (iv) $2\sin^2 x - 1$	K2	CO2
3	5	What is the reduction formula for the integral $\int x^n dx$, when n is a positive integer? (i) $\int x^n dx = \frac{x^{n+1}}{n+1} + c$ (ii) $\int x^n dx = nx^{n-1} + c$ (iii) $\int x^n dx = x^n + c$ (iv) $\int x^n dx = \frac{x^n}{n} + c$	K1	CO3
	6	What is the main purpose of a reduction formula in integration? (i) To simplify differentiation problems (ii) To reduce a complex integral into a simpler or lower-order form (iii) To evaluate definite integrals using limits (iv) To convert an integral into a differential equation	K2	CO3
4	7	Find $\int_0^{\pi/2} \int_0^{\pi} \cos(x+y) dx dy$ (i) -2 (ii) 2 (iii) 1 (iv) -1	K1	CO4
	8	The value of triple integrals of $f(x,y,z) = xdx dy dz$ where x, y, z varies from 0 to 1 is _____ (i) 1/3 (ii) 1/5 (iii) 1/4 (iv) 1/2	K2	CO4
5	9	Find the value of x,y,z using Gauss elimination method $2x + y - 3z = -10$; $-2y + z = -2$; $z = 6$ (i) 2,4,6 (ii) 2,7,6 (iii) 3,4,6 (iv) 2,4,5	K1	CO5
	10	In Gaussian elimination method, original equations are transformed by using (i) Column operations (ii) Row Operations (iii) Mathematical Operations (iv) Subset Operation	K2	CO5

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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 the given matrix is Skew-Hermitian: $A = \begin{bmatrix} 1 & 1+i & 2 \\ -1-i & 3i & i \\ -2 & i & 0 \end{bmatrix}$	K3	CO1
		(OR)		
	11.b.	If $A = \begin{bmatrix} 3 & 1 & -1 \\ 0 & 1 & 2 \end{bmatrix}$, find AA' and $A'A$.		
2	12.a.	Show that $\frac{\sin 6\theta}{\sin \theta} = 32\cos^5\theta - 32\cos^3\theta + 6\cos\theta$.	K2	CO2
		(OR)		
	12.b.	Express $\sin 7\theta$ in terms of $\sin \theta$.		
3	13.a.	Evaluate $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx$.	K3	CO3
		(OR)		
	13.b.	Evaluate $\int_0^{\frac{\pi}{2}} \log(\sin x) dx$.		
4	14.a.	Evaluate $\int_0^a \int_0^b \int_0^c (x + 2y + z) dz dy dx$.	K3	CO4
		(OR)		
	14.b.	Evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} dy dx$.		
5	15.a.	Solve by Gauss Seidel method up to 3 decimal places $27x + 6y - z = 85, 6x + 15y + 2z = 72, x + y + 54z = 110$.	K3	CO5
		(OR)		
	15.b.	Solve the following system of equations using Gauss – Elimination Method $3x + 4y + 5z = 18; 2x - y + 8z = 13; 5x - 2y + 7z = 20$.		

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 the eigenvalues and eigenvectors of $\begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$.	K5	CO1
2	17	Show that $\sin^6 \theta = \frac{-1}{32} (\cos 6\theta - 6\cos 4\theta + 15\cos 2\theta - 10)$.	K3	CO2
3	18	Derive the reduction formula for $\int \sin^n x dx$ and evaluate $\int \sin^9 x dx$.	K5	CO3
4	19	Changing the order of integration and evaluate $\int_0^4 \int_{\frac{x^2}{4}}^{2\sqrt{x}} dy dx$.	K4	CO4
5	20	Solve by Gauss Jacobi method up to three decimal places $10x - 5y - 2z = 3; 4x - 10y + 3z = -3; x + 6y + 10z = -3$.	K3	CO5