

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	The product of Eigen values of a matrix A is a) $ A $ b) $\text{Tra } A$ c) 1 d) -1	K1	CO1
	2	If A is a 3x3 matrix such that the sum of its eigen values is 5 and the product of its eigen values is 8, what is the value of $ A $? a) 5 b) 8 c) 40 d) 13	K2	CO1
2	3	The expansion of $\cos^3 \theta$ in terms of cosines of multiples of θ is: a) $\frac{1}{4}(3 \cos \theta + \cos 3\theta)$ b) $\frac{1}{4}(3 \cos \theta + 3 \cos \theta)$ c) $\frac{1}{4}(3 \sin \theta + \sin 3\theta)$ d) $\frac{1}{4}(\cos 3\theta - 3 \cos \theta)$	K1	CO2
	4	$(\cos 15^\circ + i \sin 15^\circ)^6 =$ a) i b) -i c) 1 d) -1	K2	CO2
3	5	The sum of the infinite exponential series is a) 0 b) 1 c) e d) e^{-1}	K1	CO3
	6	The approximate value of $e^{0.5}$ is a) 1.625 b) 1.646 c) 1.500 d) 1.750	K2	CO3
4	7	The nth derivative of $\sin(ax + b)\sin(ax + b)$ is a) $a \sin(ax + b + \frac{\pi}{2})$ b) $\sin(ax + b + n\pi)$ c) $a^n \cos(ax + b)$ d) $a^n \sin(ax + b + \frac{n\pi}{2})$	K1	CO4
	8	The nth derivative of $\frac{1}{x}$ is a) $-\frac{1}{x^2}$ b) $\frac{(-1)^n n!}{x^{n+1}}$ c) $\frac{n!}{x^{n+1}}$ d) $\frac{(-1)^n}{x^{n+1}}$	K2	CO4
5	9	The reduction formula for $I_n = \int \sin^n x \, dx$ is a) $I_n = \frac{1}{n} \sin^{n-1} x \cos x + \frac{n-1}{n} I_{n-2}$ b) $I_n = -\frac{1}{n} \sin^{n-1} x \cos x + \frac{n-1}{n} I_{n-2}$ c) $I_n = -\frac{1}{n} \cos^{n-1} x \sin x + \frac{n-1}{n} I_{n-2}$ d) $I_n = \frac{1}{n} \cos^{n-1} x \sin x + \frac{n-1}{n} I_{n-2}$	K1	CO5
	10	If $I_n = \int_0^{\frac{\pi}{2}} \cos^n x \, dx$ and $I_5 = \frac{8}{15}$ then $I_7 =$ a) $\frac{32}{105}$ b) $\frac{8}{21}$ c) $\frac{16}{35}$ d) $\frac{48}{315}$	K2	CO5

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.	State the Cayley Hamilton Theorem for the matrix $A = \begin{bmatrix} 2 & 0 & -1 \\ 0 & 2 & 0 \\ -1 & 0 & 2 \end{bmatrix}$	K1	CO1
		(OR)		
	11.b.	Find the eigen values and eigen vectors of $\begin{bmatrix} 11 & -4 & -7 \\ 7 & -2 & -5 \\ 10 & -4 & -6 \end{bmatrix}$		
2	12.a.	Prove that $\frac{\sin 7\theta}{\sin \theta} = 64 \cos^6 \theta - 80 \cos^4 \theta + 24 \cos^2 \theta - 1$	K3	CO2
		(OR)		
	12.b.	Prove that $(\sqrt{3} + i)^n + (\sqrt{3} - i)^n = 2^{n+1} \cos \frac{n\pi}{6}$		
3	13.a.	Find the sum to infinity of the series $\frac{4}{18} + \frac{4 \cdot 12}{18 \cdot 27} + \frac{4 \cdot 12 \cdot 20}{18 \cdot 27 \cdot 36} + \dots$	K1	CO3
		(OR)		
	13.b.	Find the co-efficient of x^n in e^{e^x}		
4	14.a.	Prove that $D^n(\sin x) = \sin(\frac{n\pi}{2} + x)$	K3	CO4
		(OR)		
	14.b.	Prove that $D^n(\cos x) = \cos(\frac{n\pi}{2} + x)$		
5	15.a.	Solve $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx$	K3	CO5
		(OR)		
	15.b.	Solve $\int x^3 \cos 2x dx$		

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 matrix which breaks down $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ into a diagonal matrix and perform diagonalization.	K1	CO1
2	17	Expand $\sin^3 \theta \cos^4 \theta$ in terms of sines of multiples of θ .	K3	CO2
3	18	Find the sum to infinity of $\frac{1^2}{3!} + \frac{2^2}{5!} + \frac{3^2}{7!} + \dots$	K1	CO3
4	19	Compute y_n when $y = \frac{x^2}{(x-1)^2(x+2)}$	K3	CO4
5	20	Evaluate the reduction formula for $\int \sin^m x \cos^n x dx$.	K5	CO5