TOTAL PAGES : 2

22ELU103N/22ELU103

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(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)

Question No.	Question	K Level	CO
1	A square matrix is called singular if its determinant is _____. a) zero b) one c) $\neq 0$ d) Greater than 1	K1	CO2
2	A square matrix A is said to be unitary if _____. a) $(\bar{A}) = A^{-1}$ b) $(\bar{A}) = -A^{-1}$ c) $(\bar{A})' = A^{-1}$ d) $(\bar{A})' = -A^{-1}$	K2	CO2
3	Identify the value of $\frac{e^{i\theta}-e^{-i\theta}}{2i}$. a) $\cos\theta$ b) $\cosh 2\theta$ c) $\sin\theta$ d) $\sinh 2\theta$	K1	CO1
4	If $x = \cos\theta + i\sin\theta$, then the value of $x^n - \frac{1}{x^n}$ is _____. a) $2\sin n\theta$ b) $2\cos n\theta$ c) $2i\sin n\theta$ d) $2i\cos n\theta$	K2	CO1
5	Which of the following is the value of $\int_0^{\frac{\pi}{2}} \sin^6 x\,dx$? a) $\frac{5\pi}{32}$ b) $\frac{5}{32}$ c) $\frac{15\pi}{32}$ d) $\frac{32\pi}{15}$	K1	CO4
6	If $f(x)$ is an odd function then $\int_{-a}^{a} f(x)dx =$ _____. a) $2\int_0^a f(x)dx$ b) 0 c) 1 d) $-2\int_0^a f(x)dx$	K2	CO4
7	What is the value of $\int_0^1 \int_1^2 (x^2+y^2)dx\,dy$? a) $\frac{3}{8}$ b) $\frac{4}{5}$ c) $\frac{8}{3}$ d) $\frac{5}{6}$	K1	CO4
8	What is the limit of x (x as constant limit) after changing the order of integration in $\int_0^a \int_x^a xdxdy$? a) $x = y$ to $x = a$ b) $x = a$ to $x = 0$ c) $x = a$ to $x = y$ d) $x = -a$ to $x = a$	K2	CO4
9	Which of the following is the indirect method? a) Gauss-Elimination method b) Gauss-Jordan method c) Gauss-Jacobi method d) both (c) and (a)	K1	CO5
10	In Gauss-Jacobi method, we start the initial itetration by substituting _____. a) random values for x, y and z b) The values of x, y and z from a previous calculation c) $x = y = z = 0$ d) $x = y = z = 1$	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
	11.a	Show that the matrix $\frac{1}{3}\begin{bmatrix} 2 & 2 & 1 \\ -2 & 1 & 2 \\ 1 & -2 & 2 \end{bmatrix}$ is orthogonal.	K3	CO1
		(OR)		
	11.b.	Find the Characteristic equation of the matrix $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and hence obtain its inverse.		
2	12.a.	Prove that $cos\,8\theta = 1 - 32\,sin^2\theta + 160\,sin^4\theta - 256\,sin^6\theta + 128\,sin^8\theta$.	K4	CO2
		(OR)		
	12.b.	Prove that $cos^5\theta\,sin^4\theta = \frac{1}{2^8}\,[cos\,9\theta + cos\,7\theta - 4\,cos\,5\theta - 4\,cos\,3\theta + 6\,cos\,\theta]$.		
3	13.a.	(i) Derive the reduction formula for $\int cot^n x\,dx$ (n being a positive integer) (ii) Evaluate $\int cos^5 x\,dx$ using reducion formula.	K4	CO4
		(OR)		
	13.b.	Evaluate $\int x^5 e^{2x}\,dx$.		
4	14.a.	Evaluate $\int\int_R (x^2 + y^2)\,dx\,dy$ where R is the region in the positive quadrant for which $x + y \leq 1$.	K3	CO2
		(OR)		
	14.b.	Evaluate $\int\int\int_V (x + y + z)\,dx\,dy\,dz$, where the region V is bounded by $x + y + z = a\ (a > 0), x = 0, y = 0, z = 0$.		
5	15.a.	Solve by Gauss-elimination procedure, the equations $3.15x - 1.96y + 3.85z = 12.95$; $2.13x + 5.12y - 2.89z = -8.61$; $5.92\,x + 3.05y + 2.15z = 6.88$.	K5	CO5
		(OR)		
	15.b.	Solve the following equations by Gauss-Jordan method: $2x - 3y + z = -1; x + 4y + 5z = 25; 3x - 4y + z = 2$.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

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

Question No.	Question	K Level	CO
16	Find the eigenvalues and eigenvectors of $\begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$.	K4	CO1
17	(i) Evaluate $Lim\ \lim_{\theta \to 0} \frac{tan\,\theta - sin\,\theta}{\theta^3}$ (ii) Separate into real and imaginary parts of $tan(x + iy)$.	K5	CO1
18	Evaluate $\int_0^{\frac{\pi}{2}} log(sin\,x)\,dx$.	K4	CO4
19	Change the order of integration and hence evaluate it $\int_0^{4a}\int_{\frac{x^2}{4a}}^{2\sqrt{ax}} xy\,dy\,dx$.	K4	CO4
20	Solve by Gauss-seidal method of iterartion the equations $27x + 6y - z = 85$; $6x + 15y + 2z = 72$; $x + y + 54z = 110$.	K5	CO5

Z-Z-Z END