

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

**BSc DEGREE EXAMINATION MAY 2024
(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
1	1	If A is orthogonal then $ A = \underline{\hspace{2cm}}$. (a) 100 (b) 0 (c) ± 1 (d) A	K1
	2	The sum of all the eigen values of the matrix $\begin{pmatrix} 1 & 1 & 1 \\ 0 & 2 & 2 \\ 0 & 0 & 3 \end{pmatrix}$ is ----. (a) 3 (b) 4 (c) 5 (d) 6	K1
2	3	$\cosh^2 x + \sinh^2 x = \underline{\hspace{2cm}}$. (a) 1 (b) 0 (c) $\cosh 2x$ (d) $\sinh 2x$	K1
	4	Imaginary part of $\log(4 + 3i)$ is _____. (a) $\tan^{-1}\left(\frac{3}{4}\right)$ (b) $\tan^{-1}\left(\frac{4}{3}\right)$ (c) $\cot^{-1}\left(\frac{3}{4}\right)$ (d) $\log 5$	K1
3	5	$\int_0^{\frac{\pi}{2}} \cos^4 x \, dx = \underline{\hspace{2cm}}$. (a) $\frac{3}{16}$ (b) $\frac{1}{16}$ (c) $\frac{3\pi}{16}$ (d) $\frac{\pi}{16}$	K1
	6	If $f(x)$ is an even function then $\int_{-a}^a f(x) \, dx = \underline{\hspace{2cm}}$. (a) 0 (b) 1 (c) $\frac{1}{2} \int_0^a f(x) \, dx$ (d) $2 \int_0^a f(x) \, dx$	K1
4	7	$\int_0^1 \int_0^1 (x + y) \, dx \, dy = \underline{\hspace{2cm}}$. (a) $\frac{1}{2}$ (b) 3 (c) $\frac{3}{2}$ (d) 2	K1
	8	$\int_0^1 \int_0^1 \int_0^1 xyz \, dx \, dy \, dz = \underline{\hspace{2cm}}$. (a) $\frac{1}{3}$ (b) $\frac{1}{8}$ (c) $\frac{3}{8}$ (d) $\frac{3}{2}$	K1
5	9	_____ method is a self correcting method. (a) Iterative (b) Direct (c) Gauss -Jordan (d) Gauss-elimination	K1
	10	The rate of convergence of Gauss-seidel method is twice that of _____ method. (a) Iterative (b) Gauss-Jordan (c) Gauss-elimination (d) Gauss Jacobi	K1

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level
1	11.a.	Define Unitary matrix. Show that the matrix $A = \begin{pmatrix} \frac{1}{\sqrt{2}} & \frac{i}{\sqrt{2}} \\ -\frac{i}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix}$.	K2
	(OR)		
	11.b.	Verify Cayley-Hamilton theorem for the matrix $A = \begin{pmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{pmatrix}$.	

Cont...

2	12.a.	Express $\cos 8\theta$ interms of $\sin \theta$.	K3
	(OR)		
	12.b.	Expand $\cos^5 \theta$ interms of cosines of multiples of θ .	
3	13.a.	Obtain the reduction formula for $\int \cos^n x dx$. (n being +ve integer)	K4
	(OR)		
	13.b.	Evaluate $\int \tan^6 x dx$ using reduction formula.	
4	14.a.	Evaluate the double integral $\iint_R (4 - x^2 - y^2) dx dy$ if the region R is bounded by the straight lines $x = 0, x = 1, y = 0$ and $y = \frac{3}{2}$.	K4
	(OR)		
	14.b.	Evaluate $\int_0^{2\pi} \int_0^{\frac{\pi}{4}} \int_0^a r^2 \sin \theta dr d\theta d\phi$.	
5	15.a.	Solve by Gauss elimination method, the system of equations $3x - y + 2z = 12, x + 2y + 3z = 11, 2x - 2y - z = 2$.	K3
	(OR)		
	15.b.	Solve by Gauss-Jordon method the equations $2x + y + 4z = 12, 8x - 3y + 2z = 20, 4x + 11y - z = 33$.	

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level
1	16	Find the eigen values and eigen vectors of the matrix $\begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$.	K4
2	17	Separate into real and imaginary parts of $\tan^{-1}(\alpha + i\beta)$.	K4
3	18	Evaluate $\int_0^{\frac{\pi}{2}} \frac{x \tan x}{\sec x + \tan x} dx$.	K5
4	19	Change the order of integration and then evaluate $\int_0^{1-x} \int_{x^2}^{2-x} xy dy dx$.	K5
5	20	Solve the system of equations $28x + 4y - z = 32, x + 3y + 10z = 24, 2x + 17y + 4z = 3$ by Gauss-Seidel iteration method.	K4

Z-Z-Z

END