22CHU206N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(Second Semester)

Branch - **CHEMISTRY**

MATHEMATICS – II FOR CHEMISTRY

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 Matrix $A = \begin{bmatrix} 2 & -1 & 3 \\ -1 & 4 & 1 \\ 3 & 1 & 5 \end{bmatrix}$ is called as a) Symmetric b) identity c) diagonal d) singular	K1	CO1
	2	Every ____ matrix satisfies its own characteristic equation. a) Symmetric b) identity c) diagonal d) square	K2	CO1
2	3	If x = cosθ + i sinθ, What is the value of $\left(x - \frac{1}{x}\right)^n$? a) $(2)^n cosn\theta$ b) $(2i)^n sinn\theta$ c) $(2)^n cos^n\theta$ d) $(2i)^n sin^n\theta$	K1	CO2
	4	$7C_1\cos^{7-1}\theta\sin\theta - 7C_3\cos^{7-3}\theta\sin^3\theta + 7C_5\cos^{7-5}\theta\sin^5 - 7C_7\cos^{7-7}\theta\sin^7\theta \ldots = \cdots$ a) $cos7\theta$ b) $sin7\theta$ c) $cos^7\theta$ d) $sin^7\theta$	K2	CO2
3	5	Find the complete solutions of $z = px + qy + p^2q^2$ a) $z = ax + by + a^2b^2$ b) $z = ax + by$ c) $z = ax + ab$ d) $z = by + ab$	K1	CO3
	6	The form z =px +qy+f(p,q) is called as _____. a) Clairaut's b) Cayley c)De morgans d) Lagranges	K2	CO3
4	7	L(sin2t)= _____. a) $\frac{2}{s^2+2^2}$ b) $\frac{1}{s-2}$ c) $\frac{1}{s+2}$ d) $\frac{s}{s^2+2^2}$	K1	CO4
	8	$L^{-1}\left[\frac{1}{s+3}\right]$ = _____. a) e^{-3t} b) e^{3t} c) e^{-t} d) e^{t}	K2	CO4
5	9	In Fourier series, *the value of* a_n is _____ in (0,2π) a) $\frac{1}{\pi}\int_0^{2\pi} f(x)dx$ b) $\frac{1}{\pi}\int_0^{2\pi} f(x)\sin nx\,dx$ c) $\frac{1}{\pi}\int_0^{2\pi} f(x)\cos nx\,dx$ d) $\frac{1}{\pi}\int_0^{\pi} f(x)\cos nx\,dx$	K1	CO5
	10	In Fourier series f(x) is even function in the interval (-π,π) then b_n=? a)π b) -π c) 0 d)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
1	11.a.	Using Cayley Hamiltonian theorem find the inverse of the matrix $\begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix}$	K1	CO1
		(OR)		
	11.b.	Find the eigen values of $A = \begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$	K4	CO1
2	12.a.	Express $\cos 5\theta$ in terms $\cos\theta$.	K1	CO2
		(OR)		
	12.b.	Show that $\sin^8\theta = \frac{1}{2^7}[\cos 8\theta - 8\cos 6\theta + 28\cos 4\theta - 56\cos 2\theta + 35]$	K6	CO2
3	13.a.	Form the P.D.E. by eliminating the arbitrary function from $z = f(x^2 + y^2)$.	K3	CO3
		(OR)		
	13.b.	Solve $p^2 + q^2 = npq$.	K5	CO3
4	14.a.	Find $L(sin^2 t)$.	*K1*	CO4
		(OR)		
	14.b.	Find $L^{-1}\left[\frac{s-3}{s^2+4s+13)}\right]$.	*K2*	CO4
5	15.a.	Find half range cosine series for $f(x) = x^2$ in $(0, \pi)$.	*K1*	CO5
		(OR)		
	15.b.	Find the Fourier series for $f(x) = \|x\|$ in $(-\pi, \pi)$	K1	CO5

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 eigen value and eigen vectors of the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$	K2	CO1
2	17	Show that $\frac{\sin 6\theta}{\sin\theta} = 32\cos^5\theta - 32\cos^3\theta + 6\cos 6\theta$.	K3	CO2
3	18	Solve $p^2 + q^2 = z^2(x + y)$.	K4	CO3
4	19	Find : (i) $L(\sin^2 2t)$ (ii) $L(e^{-at}\cos bt)$.	K5	CO4
5	20	Find the Fourier series for $f(x) = \frac{1}{2}(\pi - x)$ in $(0, 2\pi)$.	K5	CO5

Z-Z-Z END