

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2024
(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	Every square matrix satisfies its own characteristic equation is known as a) Euler b) Cayley Hamilton c) Fermat d) Lagrange	K1	CO1
	2	If $ A = 0$ then matrix called as a) Symmetric b) identity c) diagonal d) singular	K2	CO1
2	3	If $x = \cos\theta + i \sin\theta$, What is the value of $\left(x + \frac{1}{x}\right)^n$? a) $(2)^n \cos n\theta$ b) $(2i)^n \sin n\theta$ c) $(2)^n \cos^n \theta$ d) $(2i)^n \sin^n \theta$	K1	CO2
	4	$\cos^6\theta - 6C_2\cos^{6-2}\theta\sin^2\theta + 6C_4\cos^{6-4}\theta\sin^4\theta + 6C_6\cos^{6-6}\theta\sin^6\theta = \dots?$ a) $\cos 6\theta$ b) $\sin 6\theta$ c) $\cos^6\theta$ d) $\sin^6\theta$	K2	CO2
3	5	The form $z = px + qy + f(p, q)$ type is also called as a) Clairaut's b) Cayley c) De morgan's d) Lagranges	K1	CO3
	6	Find the complete solutions of $z = px + qy + pq$ a) $z = ax + by + ab$ b) $z = ax + by$ c) $z = ax + ab$ d) $z = by + ab$	K2	CO3
4	7	$L(e^{-at})$ a) 0 b) $\frac{1}{s-a}$ c) $\frac{1}{s+a}$ d) 1	K1	CO4
	8	$L^{-1}\left[\frac{1}{s}\right]$ a) t b) 1 c) t^2 d) e^t	K2	CO4
5	9	In Fourier series, a_n value in $(0, 2\pi)$ is _____. 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 odd function in the interval $(-\pi, \pi)$ then $a_n = ?$ a) π b) $-\pi$ 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.	Verify Cayley Hamilton theorem of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 5 & 2 & 6 \\ -2 & -1 & -3 \end{bmatrix}$	K4	CO1
		(OR)		
	11.b.	Find the sum and product of the eigen values of the matrix $A = \begin{bmatrix} 1 & -4 & 4 \\ 1 & -2 & 4 \\ 1 & -1 & 3 \end{bmatrix}$		
2	12.a.	Prove that $\cos^5 \theta = \frac{1}{16} [\cos 5\theta + 5\cos 3\theta + 10\cos \theta]$	K6	CO2
		(OR)		
	12.b.	Express $\sin 7\theta$ in terms $\sin \theta$		
3	13.a.	Form the P.D.E. by eliminating the arbitrary constants from $z = (x^2 + a)(y^2 + b)$	K6	CO3
		(OR)		
	13.b.	Solve $p^2 + q^2 = x + y$		
4	14.a.	Find $L(e^{-at} \cos bt)$	K2	CO4
		(OR)		
	14.b.	Find $L^{-1} \left[\frac{1}{s(s+1)(s+2)} \right]$		
5	15.a.	Find the Fourier series for $f(x) = x^2$ in $(-\pi, \pi)$	K1	CO5
		(OR)		
	15.b.	Find half range cosine series for $f(x) = x(\pi - x)$ in $(0, \pi)$		

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 $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$	K3	CO1
2	17	Show that $\frac{\sin 6\theta}{\sin \theta} = 32\cos^5 \theta - 32\cos^3 \theta + 6\cos \theta$	K2	CO2
3	18	Find the complete and singular solutions of $z = px + qy + p^2 - q^2$	K4	CO3
4	19	Formulate (i) $L(t^2 + 2t + 3)$ (ii) $L(te^{-t} \sin t)$	K6	CO4
5	20	Find the Fourier series for $f(x) = \frac{(\pi - x)^2}{4}$ in $(0, 2\pi)$	K5	CO5