

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

**BSc DEGREE EXAMINATION DECEMBER 2025
(Second Semester)**

Branch- **PHYSICS**

MATHEMATICS-II FOR PHYSICS

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 sum of the Eigen values of $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 2 \\ 1 & 2 & 3 \end{pmatrix}$ a) 6 b) 1 c) 0 d) -2	K1	CO1
	2	If the Eigen values of $A = \begin{pmatrix} 0 & 1 & 1 \\ -4 & 4 & 2 \\ 4 & -3 & -1 \end{pmatrix}$ are 0,1,2 then the Eigen values of A^3 are a) 0,1,2 b) 0, -1, -2 c) 0,1,8 d) 0, $\frac{1}{3}$, $\frac{2}{3}$	K2	CO1
2	3	A Solution obtained by giving particular values to the arbitrary constants in a complete integral is called _____ integral a) Particular b) Singular c) General d) Complete	K1	CO2
	4	A complete solution of $z = px + qy + \log pq$ is a) $z = ax + by + c$ b) $z = ax + by + \log \frac{a}{b}$ c) $z = ax - by + \log ab$ d) $z = ax + by + \log ab$	K2	CO2
3	5	$L(e^{-at}) =$ a) $\frac{1}{s+a}$ b) $\frac{1}{s-a}$ c) $\frac{s}{s+a}$ d) $\frac{a}{s+a}$	K1	CO3
	6	$L(\cos 5t) =$ a) $\frac{s}{s+5}$ b) $\frac{s}{s^2+25}$ c) $\frac{5}{s^2+5}$ d) $\frac{5}{s^2+25}$	K2	CO3
4	7	The period of $\tan x$ is a) π b) 2π c) $\frac{\pi}{2}$ d) $\frac{3\pi}{4}$	K1	CO4
	8	$\int_{-\pi}^{\pi} x^3 =$ _____ a) $\frac{2\pi^4}{4}$ b) $\frac{2\pi^3}{3}$ c) 0 d) π	K2	CO4
5	9	$F\{e^{iax}f(x)\} =$ _____ a) $F(s-a)$ b) $F(s)$ c) $F(a)$ d) $F(s+a)$	K1	CO5
	10	$F_s\left(\frac{1}{\sqrt{x}}\right) =$ _____ a) $-\frac{1}{\sqrt{x}}$ b) $\frac{1}{\sqrt{s}}$ c) $-\sqrt{x}$ d) $-\sqrt{s}$	K2	CO5

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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.	Examine the Cayley Hamilton Theorem for the matrix $A = \begin{bmatrix} 1 & -1 & 2 \\ -2 & 1 & 3 \\ 3 & 2 & -3 \end{bmatrix}$	K4	CO1
		(OR)		
	11.b.	Find the eigen values and eigen vectors of $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$		
2	12.a.	Solve $p^2 + q^2 = npq$.	K3	CO2
		(OR)		
	12.b.	Solve $z = px + qy + p^2q^2$.		
3	13.a.	Find the Laplace transform of $t^2 \cos 3t$.	K2	CO3
		(OR)		
	13.b.	Find the Laplace transform of $t \sin(2t + 3)$.		
4	14.a.	Find the half range Fourier cosine series for $f(x) = x$ in $0 < x < \pi$.	K4	CO4
		(OR)		
	14.b.	Obtain the half range Fourier sine series for $f(x) = x(\pi - x)$, $0 < x < \pi$.		
5	15.a.	Find Fourier cosine transform of $f(x) = \begin{cases} \cos x, & 0 < x < a \\ 0, & x \geq a \end{cases}$	K3	CO5
		(OR)		
	15.b.	Obtain the Fourier sine transform of $\frac{1}{x}$.		

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.	K4	CO1
2	17	Solve: $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$	K4	CO2
3	18	Solve $(D + 1)^2 y = 6te^{-t}$ given $y(0) = 2$ and $y'(0) = 5$.	K4	CO3
4	19	Outline the Fourier Series of $f(x) = x + x^2$ in $(-\pi, \pi)$ of periodicity 2π . Hence deduce $\sum \frac{1}{n^2} = \frac{\pi^2}{6}$	K4	CO4
5	20	Outline the Fourier Cosine and Sine Transform of e^{-ax} , $a > 0$ and hence deduce the inversion formula	K4	CO5

Z-Z-Z END