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25PHU206

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2026
(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)

Question No.	Question	K Level	CO
1	Identify the Symmetrix matrix. a) $\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$ b) $\begin{bmatrix}1 & 2\\3 & 4\end{bmatrix}$ c) $\begin{bmatrix}1 & -2\\3 & 4\end{bmatrix}$ d) $\begin{bmatrix}1 & 0\\3 & 4\end{bmatrix}$	K1	CO1
2	Select Eigen values of $\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$. a) $1,-1$ b) $1,1$ c) $1,2$ d) $0,1$	K2	CO1
3	Name the notation for $\frac{\partial z}{\partial x}$. a) s b) r c) p d) q	K1	CO2
4	Classify Lagrange's linear equation. a) $Pp+Qq=R$ b) $Pp-Qq=R$ c) $Pp+q$ d) $p+q=R$	K2	CO2
5	Match $L[1]$ a) $\frac{1}{s}$ b) S c) 1 d) $\frac{1}{s^2}$	K1	CO3
6	Give $L[t^2]$ a) $\frac{1}{s^3}$ b) $\frac{3}{s^3}$ c) $\frac{2}{s^3}$ d) $\frac{1}{s^3}$	K2	CO3
7	State the periodic function a) $f(x-p)=f(x)$ for all x b) $f(x+p)=f(x)$ for all x c) $f(x+p)=f(p)$ for all x d) $f(x-p)=f(p)$ for all x	K1	CO4
8	Predict even function a) x b) x^2 c) x^3 d) $\frac{1}{x}$	K2	CO4
9	Relate $F[f(x)]$ a) $\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} f(x)\,dx$ b) $\int_{-\infty}^{\infty} f(x)e^{-isx}\,dx$ c) $\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} e^{-isx}\,dx$ d) $\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} f(x)e^{-isx}\,dx$	K1	CO5
10	Classify Fourier sine transform of $\frac{1}{x}$ a) π b) $\frac{\pi}{2}$ c) $\frac{\pi}{3}$ d) 1	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	Estimate the Eigen values of $\begin{bmatrix}1 & 1\\3 & -1\end{bmatrix}$	K3	CO1
	(OR)		
11.b.	Show that the matrix satisfies Cayley-Hamilton theorem $\begin{bmatrix}1 & -2\\2 & 1\end{bmatrix}$.		
12.a.	Solve $pq + p + q = 0$.	K2	CO2
	(OR)		
12.b.	Discuss Clairaut's equation.		
13.a.	Show that $L[e^{at}] = \frac{1}{s-a}$.	K3	CO3
	(OR)		
13.b.	Compute $L^{-1}\left[\frac{1}{s-3} + \frac{1}{s} + \frac{s}{s^2-9}\right]$.		
14.a.	Discuss even and odd functions with example.	K2	CO4
	(OR)		
14.b.	Express Fourier series in the interval $(0,2\pi)$.		
15.a.	State and prove Change of scale property.	K3	CO5
	(OR)		
15.b.	Compute Fourier sine transform of $e^{-\frac{x}{2}}$.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

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

Question No.	Question	K Level	CO
16	Compute the Eigen values and Eigen vectors of $\begin{bmatrix}1 & 0 & -1\\1 & 2 & 1\\2 & 2 & 3\end{bmatrix}$.	K2	CO1
17	Solve $pyz + qzx = xy$.	K2	CO2
18	Examine $(D^2 + 2D + 5)y = 0$ where $y = 2, y' = -4$ at $t = 0$.	K4	CO3
19	Develop $f(x) = x^2$ as Fourier series in the interval $(-\pi, \pi)$.	K3	CO4
20	Analyze Fourier transform of $f(x) = \begin{cases}1, & for\ |x| < a\\0, & for\ |x| > a\end{cases}$ and deduce $\int_0^\infty \frac{sinx}{x}\,dx$.	K4	CO5

Z-Z-Z END