Roll No. | | | | | | | | | | | | | |

SHAMBHUNATH INSTITUTE OF ENGINEERING AND TECHNOLOGY, PRAYAGRAJ

Subject Code:BAS 203 **Subject: Engineering Mathematics II**

Course: B.Tech. **SEMESTER: II**

SECOND SESSIONAL EXAMINATION, EVEN SEMESTER, (2024-2025)

Common To All

Time –1:30 hrs. **Maximum Marks – 30**

1. Attempt any *FIVE* questions.

Q N	QUESTION	Marks	CO	BL
a.	Find the Laplace transform of $t\,e^{-2t}cos3t$.	2	CO2	L2
b.	Evaluate $L\left[\frac{1}{2a}\,t\sin at\right]$	2	CO2	L1
c.	Find the Laplace transform of $\int_0^t \frac{\sin t}{t}\,dt$	2	CO2	L2
d.	Evaluate $L^{-1}\left[log\left(\frac{s+6}{s+2}\right)\right]$	2	CO2	L1
e.	Find the Inverse Laplace transform of $\frac{1}{s(s^2+1)}$	2	CO2	L2
f.	Find $f(t)$ if $L[f(t)]$ is given by $\frac{e^{-2s}}{s-3}$.	2	CO2	L2

2. Attempt any *ONE* of the following.

Q N	QUESTION	Marks	CO	BL
a.	Using Laplace transform, evaluate $\int_0^\infty \frac{cos\,at-cos\,bt}{t}dt$.	5	CO2	L3
b.	Use convolution theorem to evaluate $L^{-1}\left\{\frac{p}{(p^2+4)^2}\right\}$.	5	CO2	L4
c.	Using Laplace transform, find the solution of the initial value problem: $\frac{d^2y}{dt^2}+9y = 6\,cos\,3\,t; y(0)=2, y'(0)=0.$	5	CO2	L3

3. Attempt any *FIVE* questions.

Q N	QUESTION	Marks	CO	BL
a.	Write down the Fourier series expansion formula for $x \in [0,2\pi]$.	2	CO3	L2
b.	Find the constant term if the function $f(x) = \pi - x$ is expanded in Fourier series defined in $(0, 2\pi)$.	2	CO3	L2
c.	Find the Fourier constant a_1 of $f(x) = x^2, \quad -\pi \le x \le \pi$.	2	CO3	L2
d.	If $f(x) = 1$ is expanded in a Fourier sine series in $(0, \pi)$, then find the value of b_n.	2	CO3	L1
e.	For an even function defined in the interval $(0, 2p)$, write down the Fourierseries.	2	CO3	L2
f.	if $f(x) = x\,sinx$ in $(-\pi, \pi)$, then find b_n.	2	CO3	L1

4. Attempt any *ONE* of the following.

Q N	QUESTION	Marks	CO	BL
a.	Find the Fourier series to represent the function $f(x) = \frac{1}{4}(\pi - x)^2$ in the interval $0 \ll x \le 2\pi$. Hence obtain the following relations $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \ldots\ldots$	5	CO3	L3
b.	Obtain a Fourier series to represent the function $f(x) = \lvert x\rvert, \quad -\pi < x < \pi$ and hence deduce $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots\ldots$	5	CO3	L4
c.	Find half range Fourier sine series of $f(x) = \begin{cases} x & 0 < x < \pi \\ \pi - x & \pi < x < 2\pi \end{cases}$	5	CO3	L3

Bloom's Taxonomy Level (BL) :-
Remember (L1), Understanding (L2), Apply (L3), Analyze (L4), Evaluating (L5), Creating (L6)

P.T.O.