	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE **Supplementary Examination – Summer 2024** **Course: B. Tech. Branch: Common to all Branches Semester : III** **Subject Name & Code: Engineering Mathematics – III (BTBS301/BTES301)** **Max Marks: 60 Date:29/06/2024 Duration: 3 Hrs.**	
	Instructions to the Students: *1. All the questions are compulsory.* *2. Use of non-programmable scientific calculators is allowed.* *3. Assume suitable data wherever necessary and mention it clearly.*	
		Marks
Q. 1	**Solve Any Two of the following.**	**12**
A)	Find the Laplace transform of $\frac{sin2t}{t}$.	**6**
B)	Find the Laplace transform of $\int_0^t \left(\frac{e^{-at}-e^{-bt}}{t}\right) dt$.	**6**
C)	Find the Laplace transform of $erf\left(\sqrt{t}\right)$.	**6**
Q.2	**Solve Any Two of the following:**	**12**
A)	Find the inverse Laplace transform of $\log\left(1+\frac{1}{s^2}\right)$	**6**
B)	Using Partial Fraction method, find the inverse Laplace Transform $\frac{s}{(s^2+1)(s^2+4)}$	**6**
C)	Find the inverse Laplace transform of $\frac{4s+15}{16s^2-25}$	**6**
Q. 3	**Solve any Two of the following:**	**12**
A)	Find the Fourier transform of $f(x)=\begin{cases}1, & \text{for } \lvert x\rvert<1\\ 0, & \text{for } \lvert x\rvert>1\end{cases}$. Hence evaluate that $\int_0^\infty \frac{\sin x}{x} dx$.	**6**
B)	Find the Fourier sine transform of $e^{-\lvert x\rvert}$, and hence show that $\int_0^\infty \frac{x\sin mx}{1+x^2} dx = \frac{\pi e^{-m}}{2}$, $m>0$.	**6**
C)	Evaluate the integral $\int_0^\infty \frac{dx}{(a^2+x^2)(b^2+x^2)}$.	**6**
Q.4	**Solve any Two of the following:**	**12**
A)	Form the partial differential equation by eliminating the arbitrary function from $z=f(x^2-y^2)$.	**6**
B)	The partial differential equations by eliminating the arbitrary constant $z=(x^2+a)(y^2+b)$	**6**
C)	Solve the following partial differential equations $p+3q=5z+\tan(y-3x)$ where the symbols have got their usual meanings.	**6**
Q. 5	**Solve any Two of the following:**	**12**
A)	Show that $u=x^3-3xy^2+3x^2-3y^2+1$ is a harmonic function and hence determine the corre-	**6**

	sponding analytic function	
B)	Evaluate $\oint_C \frac{e^{-z}}{z+1} dz$ where C is the circle $\|z\| = 2$ and $\|z\| = \frac{1}{2}$	**6**
C)	Use Cauchy's integral formula to evaluate $\oint_C \frac{e^{2z}}{(z+1)^4} dz$, where C the circle is $\|z\| = 2$.	**6**
	END	