

	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 $\frac{\sin 2t}{t}$.	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 $\operatorname{erf}(\sqrt{t})$.	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 $f(x) = \begin{cases} 1, & \text{for } x < 1 \\ 0, & \text{for } x > 1 \end{cases}$. Hence evaluate that $\int_0^\infty \frac{\sin x}{x} dx$.	6
B)	Find the Fourier sine transform of $e^{- x }$, 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	

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