

	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Supplementary Examination – Summer 2022 Course: B. Tech. Branch: Semester: III Subject Code & Name: BTBS301(Engineering Mathematics III) Max Marks: 60 Date: Duration: 3 Hr.		
	Instructions to the Students: 1. All the questions are compulsory. 2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly.		
		(Level/CO)	Marks
Q. 1	Solve Any Two of the following.		
A)	Find the Laplace Transform of $e^{4t} \sin^3 t$	CO1	6
B)	Evaluate $\int_0^\infty \frac{\cos at - \cos bt}{t} dt$ by using Laplace transform.	CO1	6
C)	Express in terms of Heaviside unit step function and find its Laplace transform. $f(t) = \sin t$, for, $0 < t < \pi$ $= \sin 2t$, for, $\pi < t < 2\pi$ $= \sin 3t$, for, $t > 2\pi$	CO1	6
Q.2	Solve Any Two of the following.		
A)	Find the inverse Laplace transform of $\log\left(\frac{s+a}{s+b}\right)$	CO2	6
B)	Find the inverse Laplace transform of $\frac{5s^2-15s-11}{(s+1)((s-2)^2)}$	CO2	6
C)	Solve using Laplace transform $3 \frac{dy}{dt} + 2y = e^{3t}, y = 1$ at $t = 0$.	CO2	6
Q. 3	Solve Any Two of the following.		
A)	Find the Fourier Transform of $f(x) = 1, \text{for } x < 1$ $= 0, \text{for } x > 1$ Hence evaluate that $\int_0^\infty \frac{\sin x}{x} dx$.	CO3	6
B)	Find the Fourier cosine transform of e^{-x^2}	CO3	6
C)	Using Parseval's Identity, prove that $\int_0^\infty \frac{t^2}{(t^2+1)^2} dt = \frac{\pi}{4}$	CO3	6
Q.4	Solve Any Two of the following.		

A)	Form the partial differential equation by eliminating the arbitrary function from: $f(x + y + z, x^2 + y^2 + z^2)$	CO4	6
B)	Solve the partial differential equation: $(mz - ny)p + (nx - lz)q = ly - mx$.	CO4	6
C)	If the initial displacement and velocity of a string stretched between $x = 0$ & $x = l$ are given by $y = f(x)$ & $\frac{dy}{dt} = g(x)$, determine the displacement y of any point at a distance x from one end at time t .	CO4	6
Q. 5	Solve Any Two of the following.		
A)	If $f(z) = u + iv$ is an analytic function and $u - v = e^x(\cos y - \sin y)$, find $f(z)$ in terms of z .	CO5	6
B)	Find the bilinear transformation that maps the points $z=0, -1, i$ into the points $w=i, 0, \infty$ respectively.	CO5	6
C)	Use Cauchy's Integral formula to evaluate $\oint_C \frac{e^{2z}}{(z+1)^4} dz$, Where C is the circle $ z = 2$	CO5	6
	*** End ***		

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