DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Summer Examination – 2023

Branch : B. Tech (Common to all) **Semester : III**

Subject with code: Engineering Mathematics – III (BTBS 301) **Max Marks: 60**

Date: 08/08/2023 **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.**		**12**
A)	**Find the Laplace transform of** $\boldsymbol{f(t) = \frac{e^t - \cos t}{t}}$	**Understand/ (CO1)**	**6**
B)	**Using Laplace transform prove That** $\int_0^\infty t\ e^{-3t} \sin t\, dt = \frac{3}{50}$	**Understand/ (CO1)**	**6**
C)	**Find the Laplace transform of the triangular wave function of period** $2c$ **given by** $f(t) = \begin{cases} t, & 0 \le t \le c \\ 2c - t, & c < t < 2c \end{cases}$	**Remember/ (CO1)**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	**Find the inverse Laplace transforms of** $\bar{f}(s) = \frac{s\, e^{-4s}}{s^2+9}$	**Understand/ (CO2)**	**6**
B)	**By convolution theorem, find the inverse Laplace Transforms of** $\bar{f}(s) = \frac{1}{s(s^2-a^2)}$	**Understand/ (CO2)**	**6**
C)	**Solve the equation** $\frac{d^3y}{dt^3} + 2\frac{d^2y}{dt^2} - \frac{dy}{dt} - 2y = 0$ **, where** $y = 1, \frac{dy}{dt} = 2, \frac{d^2y}{dt^2} = 2$ **at** $t = 0$**, by Laplace transform method.**	**Remember/ (CO2)**	**6**
Q. 3	**Solve Any Two of the following.**		**12**
A)	**Using the Fourier integral representations, show that** $\int_0^\infty \frac{\cos x\omega}{1+\omega^2}\, d\omega = \frac{\pi}{2} e^{-x}\ \ (x \ge 0)$	**Understand/ (CO3)**	**6**
B)	**Find the Fourier sine transform of** $\frac{e^{-ax}}{x}$**.**	**Understand/ (CO3)**	**6**
C)	**Using Parseval's identity Evaluate** $\int_0^\infty \frac{\sin^2 x}{x^2} dx$	**Remember/ (CO3)**	**6**

Q.4	**Solve Any Two of the following.**		**12**
A)	**Form the partial differential equation by eliminating the arbitrary functions from $z = f(x + it) + g(x - it)$**	**Understand/ (CO4)**	**6**
B)	**Solve the partial differential equation $x(y^2 + z)p - y(x^2 + z)q = z(x^2 - y^2)$**	**Understand/ (CO4)**	**6**
C)	**Use the method of separation of variables to solve the equation $\frac{\partial^2 u}{\partial x^2} - 2\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 0$.**	**Remember/ (CO4)**	**6**
Q. 5	**Solve Any Two of the following.**		**12**
A)	**Find a function $w = u + iv$ which is analytic if $u = x^2 - y^2$.**	**Understand/ (CO5)**	**6**
B)	**Evaluate $\int_C \frac{\cos \pi z^2}{(z-1)(z-2)} dz$, where C is $\|z\| = \frac{3}{2}$.**	**Understand/ (CO5)**	**6**
C)	**By Residue theorem evaluate $\int_c \frac{dz}{(z^2+4)^2}$, where C is the circle $\|z - i\| = 2$.**	**Understand/ (CO5)**	**6**

***** End *****