Code No: 154BG **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, March - 2022
LAPLACE TRANSFORMS, NUMERICAL METHODS AND COMPLEX VARIABLES
(Common to EEE, ECE, EIE)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Find the Laplace transform of $t\,e^{-3t}\cos 2t$

b) Find $L^{-1}\left[\frac{s+2}{s^2-4s+13}\right]$ [7+8]

2.a) Find the laplace transform of $\frac{\sin 2t}{t}$

b) Using Laplace transform solve the differential equation $\frac{d^2x}{dt^2}-2\frac{dx}{dt}+x=e^t$, given that $x(0)=2, x'(0)=-1$ [7+8]

3.a) Find a real root of $x\log_{10}x-1.2=0$ correct to four decimal places using Regula falsi method.

b) Use Newton's Backward difference formula to find y(9). [8+7]

x	2	5	8	11
y	94.8	87.9	81.3	75.1

4.a) Find y(43) if y(20) = 0.939, y(25)=0.906, y(32) = 0.848 and y(49) = 0.56 using Lagrange's interpolation formula.

b) Using Regula-falsi method, solve $x^2+2x-4=0$ for a negative root. [8+7]

5.a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using: i) Trapezoidal rule ii) Simpson's 1/3rd rule by taking h=0.25.

b) Find y(0.1) and y(0.2) using Taylor series given that $\frac{dy}{dx}=x^2-y, y(0)=1$ [7+8]

6.a) Find the analytic function whose real part is $e^x(x\sin y - y\cos y)$

b) Evaluate $\int_C \left(y^2-xy-3x^2i\right)dz$ Where C is the straight line from z=0 to z=1+i. [7+8]

7.a) Find the Laurent series for f(z)= $z^2e^{\frac{1}{z}}$ about z=0.

b) Evaluate $\int_C \frac{dz}{z^3(z+4)}$ where C is $|z|=2$. [8+7]

8.a) Using Cauchy's integral formula evaluate $\int_C \frac{e^z}{(z-1)^2(z+1)}dz$ whose C is the circle $|z|=2.5$.

b) Evaluate using Residue theorem $\int_C \frac{z^3 dz}{(z-1)^2(z-3)}$ where C is $|z|=2$. [8+7]

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