Code No: 154BG

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year II Semester Examinations, August/September - 2021
LAPLACE TRANSFORMS, NUMERICAL METHODS AND COMPLEX VARIABLES
(Electrical and Electronics Engineering)

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

Answer any five questions
All questions carry equal marks

1.a) Find $L\left[te^{2t}\sin 3t\right]$

b) Find Inverse Laplace transform of $\frac{3s+7}{(s^2-2s-3)}$. [7+8]

2.a) Use convolution theorem to find $L^{-1}\left[\frac{s}{(s^2+4)^2}\right]$

b) Find $L^{-1}\left[\frac{S+3}{S^2-10S+29}\right]$. [8+7]

3.a) Find a real root of $xe^x = 3$ using Regula falsi method.

b) Using Newton's forward interpolation formula find the value of $f(1.6)$ if [7+8]

x	1	1.4	1.8	2.2
y	3.49	4.82	5.96	6.5

4.a) Find a real root of the equation $x^3 - 3x + 1 = 0$ using iterative method.

b) Find y(43) if y(20) = 0.939, y(25) = 0.906, y(32) = 0.848 and y(49) = 0.56 using Lagrange's formula. [7+8]

5. Given $\frac{dy}{dx} = x + \sin y$ and y(0)=1 compute y(0.2) and y(0.4) with h=0.2 using Euler's modified method. [15]

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

b) If f(z) is an analytic function then show that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$. [7+8]

7.a) Expand $\frac{z}{(z+2)(z+1)}$ about z=2.

b) The function defined by $f(z) = \frac{x^3(1+i)-y^3(1-i)}{(x^2+y^2)}$ at $z \neq 0$, and $f(0) = 0$ is continuous and satisfies C.R equations at the origin, but $f'(0)$ does not exist. [7+8]

8.a) Expand $\frac{2z^3+1}{(z+z^2)}$ about z = =1 as a Taylor's series about z = 0 as a Laurent series.

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

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