

Code No: 154BG

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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

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

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

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

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

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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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