R18

Code No: 154BG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year II Semester Examinations, March/April – 2021
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. Using Laplace transforms, solve $\frac{d^2y}{dt^2}-4\frac{dy}{dt}-12y=e^{3t}$, given that $y(0)=1$ and $y'(0)=-2$. [15]

2.a) Find a real root of the equation $x\log_{10}x=1.2$ by Bisection method.

b) Prove that $E\nabla=\Delta=\nabla E$ *and* $\nabla\Delta=\Delta-\nabla=\delta^2$. [8+7]

3. Using Lagrange's interpolation formula, find y(6) from the following table. [15]

x	3	5	7	9	11
y	6	24	58	108	74

4. Taking n = 6, evaluate the approximate value of $\int_4^{5.2}\log x\,dx$ by using a) Trapezoidal rule b) Simpson's $1/3^{rd}$ and c) Simpson's $3/8^{th}$ rules. [5+5+5]

5. Using Runge – Kutta method of fourth order, solve $\frac{dy}{dx}=\frac{y^2-2x}{y^2+x}$, $y(0)=1$. Compute y(0.1) and y(0.2). [15]

6.a) Find the value of 'p', if the function $f(z)=\frac{1}{2}\log(x^2+y^2)+i\tan^{-1}\left(\frac{px}{y}\right)$ is analytic.

b) Show that $u=e^{-x}(x\sin y-y\cos y)$ is harmonic. [8+7]

7.a) Using Cauchy's integral formula, evaluate $\oint\frac{e^z}{(z+2)(z+1)^2}dz$ where C is the circle $|z| = 3$.

b) Determine the poles and residues of the function $f(z)=\frac{z+1}{z^2(z-2)}$. [7+8]

8.a) Find $L\left[\frac{\cos 2t - \cos 3t}{t}\right]$

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

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