3E1216

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B.Tech. III sem. (Main) Examination, April/May - 2022
Electrical Engineering
3EE2-01 Advance Mathematics
EE, EX

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

*Attempt all ten questions from **Part A**. All five questions **Part B** and three questions out of **Five** questions from **Part C**.*

Schematic diagrams must be shown wherever necessary. Any data missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination (As mentioned in form No.205)

PART - A

(word limit 25) **(10×2=20)**

1. What is Numerical integration formula in simpson's 3/8 rule? **(2)**
2. Write Gauss forward and backward interpolation formula. **(2)**
3. Write Trapezoidal formula's for integration. **(2)**
4. State convolution theorem for fourier transform. **(2)**
5. What are the existence condition for Laplace Transform? **(2)**
6. Find the Laplace transform of following $F(t) = te^t sint$. **(2)**
7. Find the inverse laplace transform following function $\frac{4s+5}{(s-1)^2(s+2)}$. **(2)**
8. State fundamental theorem of finite difference calculus. **(2)**
9. Define Lagrange's formulae. **(2)**
10. List the properties of mobius transformations. **(2)**

PART - B

(word limit 100) **(5×4=20)**

1. Use stialing formula to find f(1.22) from following table : **(4)**

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
$f(x)$	.84147	.89121	.93204	.96356	.98545	.99749	.99957	.97385	.97385

2. Find inverse Laplace transform of the function. (4)

$$\frac{S}{S^4+S^2+1}.$$

3. Find the root of the following equation by Newton - Raphson method. (4)

$3x-\cos x+6=0$.

4. Find the Laplace transform of

a. $te^{-2t}\sin 3t$.

b. $Sinh3t\cos^2 t$. (4)

5. Given :

$\log_{10}654=2.8156$, $\log_{10}658=2.8182$, $\log_{10}659=2.8189$, $\log_{10}661=2.8202$ use Newton's divided difference formula to find value of $\log_{10}656$. (4)

PART - C

(Any three) (3×10=30)

1. Compute the value of following integral by Trapezoidal rule : - (10)

$$\int_{0.2}^{1.4}(\sin x-\log_e x+e^x)dx.$$

2. Show that the polar form of C-R equation's is. (10)

$$\frac{\partial u}{\partial r}=\frac{1}{r}\frac{\partial v}{\partial \theta},\frac{\partial v}{\partial r}=\frac{-1}{r}\frac{\partial u}{\partial \theta}$$

Using this result show that *log z* is analytic.

3. Find the bilinear transformation that map's the point 0, -i, -1 in z - plane onto the point's W = i, 1, 0. What are the invariant point's of this transformation? (10)

4. Find inverse Z transform of f(z) where R.O.C ; $|z|>2$. (10)

$$\frac{z^2}{(z+2)(z^2+4)}.$$

5. Prove that

$$L\left(\frac{\sin^2 t}{t}\right)=\frac{1}{4}\log\left(\frac{s^2+4}{s^2}\right)$$ and hence deduce the integral $\int_0^\infty \frac{\sin^2 t}{t^2}dt$. (10)