

**3RD SEM. E&M/EEE/ELE(I&C)/ELECT[PT]/ELECT/E&TC/AE&IE
2020(W)NEW
TH-1- ENGINEERING MATHEMATICS - III**

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions

2 x 10

- a. Define the rank of a matrix. Find the rank of the matrix $\begin{pmatrix} 1 & 2 \\ 2 & 4 \end{pmatrix}$
- b. Find the complementary function if the roots of the auxiliary equation are 0, -2, -2, -2.
- c. Derive a partial differential equation for the following:
 $z = xy + f(x^2 + y^2)$.
- d. Define gamma function. Evaluate $\Gamma\left(\frac{1}{2}\right)$.
- e. Define Numerical Integration and state Trapezoidal rule.
- f. Define even and odd functions with example.
- g. Find Laplace Transform of $\sin^2 t$.
- h. Find the value of Fourier co-efficient ' a_0 ' if
 $f(x) = x + x^2$ in $(-\pi, \pi)$
- i. Evaluate $\Delta(\tan^{-1} x)$
- j. Change into $a + ib$ form $\frac{2i}{3+4i}$

2. Answer **Any Six** Questions

6 x 5

a. Find the real roots of the equation

$$x^3 - 3x + 1 = 0$$

By Newton's Raphson method correct to two decimal places.

b. Find the Particular Integral (P.I) of the differential equation

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = x e^x \sin x$$

c. Show that

$$L(t \cos at) = \frac{s^2 - a^2}{(s^2 + a^2)^2}$$

d. Express $f(x) = |x|$ as a Fourier series in $-\pi < x < \pi$

e. Use Lagrange's Interpolation formula to fit a polynomial to the given data:

x	0	1	3
f(x)	1	3	55

- f. Find the square root of $-8 + \sqrt{-1}$
g. Using Simpson's $\frac{1}{3}$ rd rule and taking $h = 1$, evaluate

$$\int_0^6 \frac{dx}{1+x}$$

- 3 a. Investigate for what value of λ and μ the simultaneous equations $x + y + z = 6$, $x + 2y + 3z = 10$, $x + 2y + \lambda z = \mu$ have 7
(i) No solution
(ii) a unique solution
(iii) an infinite number of solution
- b. $(1 - \omega + \omega^2)^5 + (1 + \omega - \omega^2)^5 = 32$ 3
- 4 a. Obtain the Fourier series for $f(x) = \begin{cases} -k & \text{if } -\pi < x < 0 \\ k & \text{if } 0 < x < \pi \end{cases}$ 5
- b. Find the Laplace transform of $\frac{\sin 2t}{t}$ 5
- 5 a. Obtain the fourier series of $f(x)$ defined by 7
 $f(x) = \begin{cases} 0, & -\pi < x < 0 \\ x^2, & 0 < x < \pi \end{cases}$
- b. Estimate the missing term in the following table : 3
X: 0 1 2 3 4
Y: 2 4 10 ? 78
- 6 a. $x^2(y - z)p + y^2(z - x)q = z^2(x - y)$ 7
- b. Determine the rank of the matrix: 3
$$\begin{bmatrix} 1 & 0 & 1 \\ -1 & 1 & 0 \\ 0 & -1 & 1 \end{bmatrix}$$
- 7 a. Find the inverse Laplace transform of 5
$$\frac{3s + 7}{s^2 - 2s - 3}$$
- b. Using Trapezoidal rule and taking $h = \frac{1}{2}$, evaluate 5
$$\int_0^2 \frac{dx}{1+x}$$

https://www.sctevtonline.com

Whatsapp @ 9300930012

Send your old paper & get 10/-

अपने पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से