

**ANURAG Engineering College**

(An Autonomous Institution)

II B.Tech I Semester Supplementary Examinations, December-2024

MATHEMATICS - III

(COMMON TO EEE &amp; ECE)

Time: 3 Hours

Max. Marks: 75

**Section – A (Short Answer type questions)****(25 Marks)****Answer All Questions**

Course Outcome	B.T Level	Marks
CO1	L1	2M
CO1	L2	3M
CO2	L1	2M
CO2	L2	3M
CO3	L1	2M
CO3	L2	3M
CO4	L2	2M
CO4	L2	3M
CO5	L1	2M
CO5	L2	3M

1. State the change of Scale property.
2. Find the Laplace transform of  $\sin^2(at)$
3. Define the Even function.
4. Find the Fourier series of the function  $f(x) = x^2$
5. Write the formula for Fourier Sine transform of a function.
6. Find the Fourier sine transform of  $f(x) = e^{-at}$
7. Write a short note on Newton-Rapshon method.
8. Using Newton-Rapshon method find an iterative scheme to compute the cube root of a positive number.
9. Write the mathematical formula for trapezoidal rule.
10. Use the trapezoidal rule to estimate the integral  $\int_0^6 \frac{1}{1+x^2} dx$

**Section B (Essay Questions)****Answer all questions, each question carries equal marks.****(5 X 10M = 50M)**

11. A) Determine the inverse Laplace transform of  $\log\left(\frac{s+a}{s+b}\right)$  CO1 L3 10M  
**OR**  
 B) Solve the differential equation by using the Laplace transform  $y^{11} + 9y = 6 \cos 3t, y(0) = 2, y'(0) = 0$  CO1 L3 10M
12. A) By using the series for  $f(x) = 1, \text{ in } 0 < x < \pi$  and hence show that  $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \dots$  CO2 L3 10M  
**OR**  
 B) Obtain the Fourier series expansion for  $f(x) = x + \frac{x^2}{4}$  if  $-\pi \leq x \leq \pi$  CO2 L3 10M
13. A) Determine the Fourier transform of the function  $f(x) = \begin{cases} 1 + \frac{x}{a} & \text{if } -a < x < 0 \\ 1 - \frac{x}{a} & \text{if } 0 < x < a \\ 0 & \text{otherwise} \end{cases}$  CO3 L3 10M  
**OR**  
 B) Obtain the Fourier Sine transform of  $f(x) = \begin{cases} x, & \text{for } 0 < x < 1 \\ 2 - x, & \text{for } 1 < x < 2 \\ 0, & \text{for } x > 2 \end{cases}$  CO3 L3 10M

14. A) Evaluate the real root of the equation  $f(x) = x \sin x + \cos x$  in between (2,3) using Bi-section method

CO4 L3 10M

**OR**

- B) From the following table estimate the number of students who obtain the marks between 40 and 45

CO4 L3 10M

Marks	30-40	40-50	50-60	60-70	70-80
No.of students	31	42	51	35	31

15. A) Compute the value of  $\int_{0.2}^{1.4} (\sin x - \log x + e^x) dx$  using Simpson's 3/8 rule

CO5 L3 10M

**OR**

- B) Using the Runge-Kutta method of fourth order method to find y for  $x=0.8$  given that  $\frac{dy}{dx} = 3e^x + 2y$ ,  $y(0) = 0$  and  $h = 0.4$

CO5 L3 10M