

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech I Year I Semester Supplementary Examinations June-2024**  
**ENGINEERING MATHEMATICS-I**

(Common to All)

**Time: 3 Hours**

**Max. Marks: 60**

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

1 a Solve  $(1 + e^{\frac{x}{y}}) dx + e^{\frac{x}{y}} (1 - \frac{x}{y}) dy = 0$ . CO1 L1 6M

b Solve  $x \frac{dy}{dx} + y = \log x$ . CO1 L2 6M

OR

2 a Solve  $(D^2 - 4D)y = e^x + \sin 3x \cos 2x$ . CO1 L2 6M

b A radioactive substance disintegrates at a rate proportional to its mass. When the mass is 10 mg, the rate of disintegration is 0.051 mg per day. How long will it take for the mass of 10 mg to reduce to its half? CO1 L3 6M

**UNIT-II**

3 a Expand  $\log_e x$  in powers of  $(x-1)$  and hence evaluate  $\log(1.1)$  correct to 4 decimal places. CO2 L2 6M

b Calculate the approximate value of  $\sqrt{10}$  correct to 4 decimal places using Taylor's series. CO2 L3 6M

OR

4 a Find a shortest and longest distance from the point  $(1, 2, -1)$  to the sphere  $x^2 + y^2 + z^2 = 24$ . CO2 L1 6M

b Find the volume of the largest rectangular parallelepiped that can be inscribed in the ellipsoid  $4x^2 + 4y^2 + 9z^2 = 36$ . CO2 L2 6M

**UNIT-III**

5 a Evaluate  $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dx dy$ . CO3 L1 6M

b Evaluate  $\int_1^e \int_1^{\log y} \int_1^{e^x} \log z dz dx dy$ . CO3 L2 6M

OR

6 a Evaluate the integral by changing the order of integration  $\int_0^{4a} \int_{\frac{x^2}{4a}}^{\sqrt{ax}} dy dx$ . CO3 L2 6M

b Evaluate  $\int \int r \sin \theta dr d\theta$  over the cardioids  $r = a(1 + \cos \theta)$  above the initial line. CO3 L3 6M

**UNIT-IV**

7 a Find Laplace transform of  $f(t) = e^{-3t} \sinh 3t$  using change of scale property. CO4 L1 6M

b To prove  $L(f^n(t)) = s^n \bar{f}(s) - s^{n-1} f(0) - s^{n-2} f'(0) - \dots - f^{(n-1)}(0)$ . CO4 L2 6M

OR

