

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

B.Tech I Year II Semester Supplementary Examinations May/June-2024
MATHEMATICS – II
(Common to All)

Time: 3 Hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

- | | | | | | |
|---|---|--|-----|----|----|
| 1 | a | Solve $\frac{dy}{dx} + y = x$. | CO1 | L3 | 2M |
| | b | Write the formula for Bessel's function $J_n(x)$. | CO2 | L1 | 2M |
| | c | Evaluate $\int_0^1 \int_0^x e^{x+y} dx dy$. | CO3 | L4 | 2M |
| | d | Define Bilinear Transformation. | CO4 | L1 | 2M |
| | e | State Cauchy's Residue theorem | CO5 | L1 | 2M |

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

- | | | | | | |
|---|---|---|-----|----|----|
| 2 | a | Solve $y(2xy + e^x)dx - e^x dy = 0$. | CO1 | L3 | 5M |
| | b | Solve $x \frac{dy}{dx} + y = x^3 y^6$. | CO1 | L3 | 5M |

OR

- | | | | | | |
|---|---|------------------------------------|-----|----|----|
| 3 | a | Solve $y = 2px + y^2 p^3$. | CO1 | L3 | 5M |
| | b | Solve $(px - y)(py + x) = a^2 p$. | CO1 | L3 | 5M |

UNIT-II

- | | | | | | |
|---|---|---|-----|----|----|
| 4 | a | Solve $(D^2 + 4)y = e^x + \sin 2x$. | CO2 | L3 | 5M |
| | b | Solve $(D^2 + 1)y = \cos x$ by the method of variation of parameters. | CO2 | L3 | 5M |

OR

- | | | | | | |
|---|--|---|-----|----|----|
| 5 | | Prove that $J_{5/2} = \frac{3}{x} \left[\sqrt{\frac{2}{\pi x}} \left(\frac{\sin x}{x} - \cos x \right) \right] - \sqrt{\frac{2}{\pi x}} \sin x$. | CO2 | L3 | 5M |
|---|--|---|-----|----|----|

UNIT-III

- | | | | | | |
|---|---|--|-----|----|----|
| 6 | a | Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. | CO3 | L1 | 5M |
| | b | Evaluate $\int_0^{\pi} \int_0^{a(1+\cos\theta)} r dr d\theta$. | CO3 | L4 | 5M |

OR

- | | | | | | |
|---|--|---|-----|----|-----|
| 7 | | Change the order of integration in $I = \int_0^1 \int_{x^2}^{2-x} (xy) dy dx$ and hence evaluate. | CO3 | L4 | 10M |
|---|--|---|-----|----|-----|

UNIT-IV

- | | | | | | |
|---|---|---|-----|----|----|
| 8 | a | Show that $u = \frac{1}{2} \log(x^2 + y^2)$ is Harmonic. | CO4 | L2 | 5M |
| | b | Find the analytic function whose imaginary part is $e^x(x \sin y - y \cos y)$. | CO4 | L1 | 5M |

OR

9 a Find the image of the infinite strip $0 < y < \frac{1}{2}$ under the transformation CO4 L1 5M

$$w = \frac{1}{z}.$$

b Find the bilinear transformation $(1, i, -1)$ into the $(2, i, -2)$ in w-plane CO4 L1 5M

UNIT-V

10 Verify Cauchy's theorem for the function $f(z) = 3z^2 + iz - 4$ if C is the square with vertices at $1 \pm i$ and $-1 \pm i$. CO5 L4 10M

OR

11 Show that $\int_0^{2\pi} \frac{d\theta}{1+a^2-2a \cos \theta} = \frac{2\pi}{1-a^2}, 0 < a < 1$. CO5 L2 10M

*** END ***