Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

**B.Tech I Year II Semester Supplementary Examinations February-2022**

**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 $( x^2 - ay ) dx = (ax - y^2 ) dy$ | 2M |
| | b | Find the particular integral of $( D^2 + 6D + 9) = y\ 2e^{-3x}$. | 2M |
| | c | Evaluate $\int_0^{\pi} \int_0^{\sin\theta} r\, dr\, d\theta$. | 2M |
| | d | Show that $f(z) = Z^2$ is analytic. | 2M |
| | e | State Cauchy's residue theorem. | 2M |

**PART-B**

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

**UNIT-I**

| | | | |
|---|---|---|---|
| 2 | a | Solve $y (2xy + e^x ) dx - e^x dy = 0$ | 5M |
| | b | solve $\frac{dy}{dx} + y \tan x = y^2 \sec x$ | 5M |

**OR**

| | | | |
|---|---|---|---|
| 3 | a | solve $p^2 + 2py \cos x = y^2$ | 5M |
| | b | solve $(px-y) (py+x) = a^2 p$ | 5M |

**UNIT-II**

| | | | |
|---|---|---|---|
| 4 | a | Solve $( D^2 +4) y = e^x + \sin 2x$. | 5M |
| | b | Solve $( D^2 + a^2 ) y = \tan ax$ *by method of variation of partameters.* | 5M |

**OR**

| | | | |
|---|---|---|---|
| 5 | a | Express the following in terms of Legendre's polynomial $f(x) = x^3 + 2x^2 - x - 3$. | 5M |
| | b | Prove that $\frac{d}{dx} [x^n J_n (x) ] = x^n J_{n-1} (x)$ | 5M |

**UNIT-III**

| | | | |
|---|---|---|---|
| 6 | a | Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ | 5M |
| | b | Evaluate $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)}$ *dx dy by converting to polar coordination.* | 5M |

**OR**

| | | | |
|---|---|---|---|
| 7 | a | Evaluate $\int_{-1}^{1} \int_0^{z} \int_{x-z}^{x+z} ( x+ y+ z)\, dx\, dy\, dz$ | 6M |
| | b | Calculate the volume of the solid bounded by the planes x =0, y =0, x+y+z =a, and z =0 | 4M |

**UNIT-IV**

| | | | |
|---|---|---|---|
| 8 | a | If $f(z) = U + i V$ is an analytic function of z and if $U + V = e^x ( \cos y - \sin y )$ then find f (z) in terms of z . | 6M |
| | b | Find the image of the triangular region with vertices at (0,0), (1,0), (0,1) under the transformation W= (1-i) z+3 | 4M |

OR

9 a Find the bilinear transformation that maps the point (1, i,-1) into the points (2, i, -2) in W- plane **5M**

b Find the image of infinite strip bounded by x=0 & x= $\frac{\pi}{4}$ under the transformation W= cos z. **5M**

**UNIT-V**

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

**OR**

11 Evaluate $\int_0^{2\pi} \frac{1}{a+b\cos\theta} d\theta = \frac{\pi}{\sqrt{a^2-b^2}}$, a > b >0. **10M**

***END***