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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR

(AUTONOMOUS)

B. Tech I Year II Semester Regular Examinations October-2021

DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS

(Common to CE, EEE, ME, ECE & AGE)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1 **a** Solve $(x^2 - ay)dx = (ax - y^2)dy$ [L3] **6M**

b Solve $x\frac{dy}{dx} + y = x^3y^6$. [L6] **6M**

OR

2 **a** Solve $(D^2 - 3D + 2)y = cos3x$ [L3] **6M**

b Solve $(D^2 + 4D + 3)y = e^{-x}sinx + x$. [L6] **6M**

UNIT-II

3 Solve $(1 + x)^2\frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} + y = sin2[\log(1 + x)]$ [L6] **12 M**

OR

4 An uncharged condenser of capacity is charged applying an e.m.f $E\ sin\frac{t}{\sqrt{LC}}$ through leads of self-inductance L and negligible resistance. Prove that at time't' the charge on one of the plates is $\frac{EC}{2}\left[sin\frac{t}{\sqrt{LC}} - \frac{t}{\sqrt{LC}}cos\frac{t}{\sqrt{LC}}\right]$. [L5] **12 M**

UNIT-III

5 **a** Form the partial differential equation by eliminating the constants from $z = a.log\left[\frac{b(y-1)}{(1-x)}\right]$. [L2] **6M**

b Solve by the method of separation of variables $3u_x + 2u_y = 0, where\ u(x,0) = 4e^{-x}$ [L3] **6M**

OR

6 Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0\ with\ u(0,y) = 0 = u(x,0), u(l,y) = 0\ and\ u(x,a) = sin(\frac{n\pi x}{l})$ [L3] **12M**

UNIT-IV

7 **a** Determine p such that the function $f(z)=\frac{1}{2}\log(x^2+y^2)+i\tan^{-1}\left(\frac{px}{y}\right)$ is analytic. [L5] **6M**

b Find the analytic function whose imaginary part is $e^x(xsiny+ycosy)$. [L1] **6M**

OR

8 **a** Find the bilinear transformation which maps the points (∞, i, 0) into the points (−1, −i, 1) in w-plane. [L1] **6M**

b Show that the function $w = \frac{4}{z}$ transforms the straight line $x = c$ in the z-plane into a circle in the $w - plane$. [L2] **6M**

UNIT-V

9	a	Evaluate $\int_c \frac{\log z\, dz}{(z-1)^3}$ where $c: \lvert z-1 \rvert = \frac{1}{2}$ using Cauchy's integral formula.	[L5]	6M
	b	Expand $f(z) = \sin z$ in Taylor's series about $z = \frac{\pi}{4}$.	[L2]	6M

OR

10	Evaluate $\int_0^{2\pi} \frac{1}{a+b\cos\theta}\, d\theta = \frac{2\pi}{\sqrt{a^2-b^2}}, a > b > 0$	[L5]	12M

*** END ***