Q.P. Code: 20HS0831 **R20**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year II Semester Regular & Supplementary Examinations October-2022

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 $(y^2 - 2xy)dx + (2xy - x^2)dy = 0$	L3	6M
	b	Solve $x\frac{dy}{dx} + y = x^3y^6$	L3	6M
		OR		
2	a	Solve $\frac{dy}{dx} + 2xy = e^{-x^2}$	L3	6M
	b	Solve $(D^2 + 4)y = e^x + sin2x + cos2x$	L3	6M
		UNIT-II		
3	a	Solve $(D^2 + 4)y = Sec2x$ by the method of variation of parameters	L3	6M
	b	Solve $(x^2D^2 - 4xD + 6)y = x^2$	L3	6M
		OR		
4		Solve $\frac{dx}{dt} + 2x + y = 0$; $\frac{dy}{dt} + x + 2y = 0$;given $x = 1$ & $y = 0$, $when\ t = 0$	L3	12M
		UNIT-III		
5	a	Form the partial differential equation by eliminating the constants from $2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$	L2	6M
	b	Solve by the method of separation of variables $u_x = 2u_y + u$, $where$ $u(x,0) = 6e^{-3x}$	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 $u(x,a) = \sin\left(\frac{n\pi x}{l}\right)$	L3	12M
		UNIT-IV		
7	a	Show that $u = \frac{1}{2}log(x^2 + y^2)$ is harmonic	L2	6M
	b	Find all values of k, such that $f(z) = e^x(cosky + i\ sinky)$ is analytic	L3	6M
		OR		
8	a	Find the image of the infinite strip $0 < y < \frac{1}{2}$ under the transformation $w = \frac{1}{z}$	L3	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	Determine the poles of the function $f(z) = \frac{z^2}{(z-1)^2(z+2)}$ and residues at each pole.	L3	6M
		OR		
10		Evaluate $\int_0^{2\pi} \frac{1}{a+b\cos\theta}\, d\theta = \frac{\pi}{\sqrt{a^2-b^2}}$, $a > b > 0$	L5	12M

*** END ***