O.P.Code: 20HS0831	R20	H.T.No.

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

B.Tech I Year II Semester Regular & Supplementary Examinations August-2023

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 $x\frac{dy}{dx} + y = logx$.	CO1	L6	6M
	b	Solve $\frac{dy}{dx} + 2xy = e^{-x^2}$	CO1	L3	6M
		OR			
2	a	Solve $(D^2 + 4)y = e^x + sin2x + cos2x$.	CO1	L6	6M
	b	Solve $(D^2 + D + 1)y = x^3$	CO1	L6	6M
		UNIT-II			
3	a	Solve $(D^2 + a^2)y = \tan ax$ by the method of variation of parameters.	CO2	L3	6M
	b	Solve $(x^2D^2 - 4xD + 6)y = x^2$	CO2	L3	6M
		OR			
4		Find the current 'i' in the LCR circuit assuming zero initial current and charge q. If R=80 ohms, L=20 henrys, C=0.01 farads and E=100 V.	CO2	L1	12M
		UNIT-III			
5	a	Form the partial differential equation by eliminating the constants from $z = a.\log\left[\frac{b(y-1)}{(1-x)}\right]$.	CO3	L2	6M
	b	Form the partial differential equation by eliminating the arbitrary function from $z = xy + f(x^2 + y^2)$	CO3	L2	6M
		OR			
6		Find the temperature $u(x, t)$ in a bar OA of length l which is perfectly insulated laterally and whose ends O and A are kept at0°C ,given that the initial temperature at any point P of the rod (where OP=x) is given as $u(x, o) = f(x), (0 \leq x \leq l)$.	CO3	L1	12M
		UNIT-IV			
7	a	Show that $u = \frac{1}{2}log(x^2 + y^2)$ is harmonic.	CO4	L2	6M
	b	Find the analytic function whose imaginary part is $e^x(x\sin y + y\cos y)$.	CO4	L1	6M
		OR			
8	a	Find the bilinear transformation which maps the points (∞, i ,0) into the points(0,i,∞) .	CO4	L1	6M
	b	Prove that the transformation $w = \sin z$maps the families of lines $x = y = constant$ into two families of confocal central conics.	CO4	L5	6M
		UNIT-V			
9	a	Evaluate $\int_0^{1+i}(x^2 - iy)\,dz$ along the path $y = x$.	CO5	L5	6M
	b	Evaluate using Cauchy's integral formula $\int_c \frac{\sin^6 z}{\left(z - \frac{\pi}{2}\right)^3} dz$ around the circle $c:\lvert z\rvert=1$	CO5	L5	6M
		OR			
10		Evaluate $\int_0^{2\pi} \frac{1}{a+b\cos\theta}\, d\theta = \frac{2\pi}{\sqrt{a^2-b^2}}, a > b > 0$	CO5	L5	12M

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