Q.P. Code: 20HS0831

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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech I Year II Semester Supplementary Examinations May-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 $(y^2 - 2xy)dx + (2xy - x^2)dy = 0$	L6	6M
	b	Solve $\frac{dy}{dx} + 2xy = e^{-x^2}$	L3	6M

OR

2	a	Solve $(D^2 + 5D + 6)y = e^x$	L3	6M
	b	Solve $(D^2 - 3D + 2)y = xe^{3x} + sin2x$	L3	6M

UNIT-II

3	a	Solve $(D^2 + a^2)y = \tan ax$ by the method of variation of parameters	L3	6M
	b	Solve $\frac{d^2y}{dx^2} + \frac{1}{x}\frac{dy}{dx} = \frac{12\ logx}{x^2}$	L6	6M

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	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		A tightly stretched string with fixed end points $x = 0\ and\ x = l$ is initially at rest in its equilibrium position. If it is set to vibrate by giving each of its points a velocity $kx(l - x)$ find the displacement of the string at any distance from one end at any time t.	L1	12M

UNIT-IV

7	a	Show that $u = \frac{1}{2}log(x^2 + y^2)$ is harmonic.	L2	6M
	b	If $W = f(z)$ is analytic function then prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)\lvert \text{Re}\,al\, f(z)\rvert^2 = 2\lvert f^1(z)\rvert^2$	L5	6M

OR

8	a	Find the bilinear transformation that maps the points $(1, i, -1)$ into the points $(2, i, -2)$ in w-plane.	L1	6M
	b	Find the image of the infinite strip $0 < y < \frac{1}{2}$ under the transformation $w = \frac{1}{z}$	L1	6M

UNIT-V

9	a	Evaluate using Cauchy's integral formula $\int_c \frac{\sin^6 z}{\left(z-\frac{\pi}{2}\right)^3} dz$	L5	6M
	b	Find the Laurent's series of the function $f(z)=\frac{z}{(z+1)(z+2)}$ about $z=-2$.	L1	6M
		OR		
10	a	Determine the poles of the function $f(z)=\frac{z^2}{(z-1)^2(z+2)}$ and the residues at each pole.	L5	6M
	b	Find the residue of the function $f(z)=\frac{1}{(z^2+4)^2}$ where c is $\lvert z-i\rvert=2$	L1	6M

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