GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY
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QUESTION BANK(DESCRIPTIVE)

Subject Name with Code: Differential Equations &Vector Calculus - 22A0002T
Course&Branch: B.Tech & Common to All
Year& Semester: I B.Tech II Sem **Regulation:**RG22

		UNIT- I
		***** Linear Diferential Equations of Second Order*****
1	a)	Solve $(D^2+a^2)y = cosax$
	b)	Solve $(D-2)^2 y = 8(e^{2x} + sin2x + x^2)$
2	a)	Solve $\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = (1-e^x)^2$
	b)	Solve $y'' + 4y' + 4y = 3sinx + 4cosx\ y(0) = 1, y'(0) = 0$
3	a)	Solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = e^{3x} + sin2x$
	b)	Solve $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = xe^x sinx$
4	(a)	Solve $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 3y = e^x cosx$
	(b)	Using the method of variation of parameters, solve $\frac{d^2y}{dx^2} + 4y = tan2x$
5	(a)	Solve $\frac{d^3y}{dx^3} + y = 3 + e^{-x} + 5e^{2x}$
	(b)	Solve by the method of variation of parameters $y'' + y = cosecx$
6		Solve the Simultaneous equations $\frac{dx}{dt} + 2y + sint = 0, \frac{dy}{dt} - 2x - cost = 0$. Given that $x = 0\ and\ y = 1\ when\ t = 0$
7		Solve the Simultaneous equations $\frac{dx}{dt} + \frac{dy}{dt} - 2y = 2cost - 7sint, \frac{dx}{dt} - \frac{dy}{dt} + 2x = 4cost - 3sint$
8		In an L-C-R circuit, the charge q on a plate of a condenser is given by $L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{C} = Esinpt$. The circuit is tuned to resonance so that$p^2 = \frac{1}{LC}$. If initially the current i and the charge q be zero. Show that for small values of $\frac{R}{L}$,The current in the circuit at time t is given by $\left(\frac{Et}{2L}\right) sinpt.$
9		A condenser of capacity C discharged through an inductance L and resistance R in series and the charge q at time t satisfies the equation $L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{C} = 0. Given\ that\ L = 0.25\ heneries, R = 250\ ohms, C = 2\times 10^{-6}$farads and that when t=0, charge q is 0.0020 coulombs and the current $\frac{dq}{dt} = 0$, obtain the value of q in terms of t.

10		A body weighing 10kg is hung from a string. A pull of 20kg, weight will stretch the spring to 10cm. The body is pulled down to 20cm below the static equilibrium position and then released. Find the displacement of the body from its equilibrium position at time t second, the maximum velocity and the period of oscillation.

UNIT- II

***** Partial Differential Equtations*****

1	a)	Form the PDE by eliminating arbitrary function from $z = x+y+ f(xy)$.
	b)	Solve $(y^2 + z^2) p + x (y q - z) = 0$.
2	a)	Form the PDE by eliminating arbitrary functions from $z= f(y/x) + \emptyset(xy)$.
	b)	Solve $p - q = \log(x + y)$
3	a)	Form the PDE by eliminating arbitrary function from $z = y^2 + 2 f(\frac{1}{x} + \log y)$.
	b)	Solve $x^2(y - z) p + y^2 (z - x) q = z^2 (x - y)$.
4	a)	Form the PDE by eliminating arbitrary constants a, b from $2z = x^2/a^2 + y^2/b^2$.
	b)	Solve $z = p^2 + q^2$.
5	a)	Form the PDE by eliminating arbitrary constants a,b from $z = xy + y\sqrt{x^2 - a^2} + b$.
	b)	Solve $p^2 + pq = z^2$
6	a)	Solve $(y + z) p - (z + x) q = x - y$.
	b)	Solve . $p^2 + q^2 = x + y$
7	a)	Form the PDE by eliminating arbitrary constants a,b,c, from $1= x^2/a^2 + y^2/b^2 + z^2/c^2$.
	b)	Solve $p^2 + q^2 = x^2 + y^2$
8	a)	Solve $3p^2 - 2q^2 = 4pq$
	b)	Form the PDE by eliminating arbitrary function from $xyz = f(x + y + z)$
9	a)	Solve $(x^2 - y^2 - z^2) p + 2xy q = 2xz$.
	b)	Solve $xp - y^2q^2 = 1$.
10	a)	Solve $xp - yq = y^2 - x^2$
	b)	Solve $q = px + p^2$