UNIVERSITY OF PETROLEUM & ENERGY STUDIES, DEHRADUN

Program	B.Tech (All SoCSBranches)	Semester	I
Course	Engineering Mathematics	Course Code	MATH 1036

1. Solve the differential equation $\sin x \cos y\, dx + \cos x \sin y\, dy = 0$.

2. Solve the differential equation $y'' + 4y' + 8y = sinx$, $y(0) = 1$ and $y'(0) = 0$.

3. Solve the differential equation $(D^2 + D + 1)y = (1 + e^x)^2$.

4. Solve the differential equation $(D^3 + 1)y = e^{2x} \sin x + e^{\frac{x}{2}} \sin \frac{\sqrt{3}}{2} x$

5. Solve the differential equation $y'' + y' + (\pi^2 + 1/4)y = e^{-\frac{x}{2}} \sin \pi x$.

6. Apply the method of variation of parameters to solve the differential equation $\frac{d^2y}{dx^2} + (1 - \cot x)\frac{dy}{dx} - y \cot x = \sin^2 x$.

7. Solve the differential equation $\frac{d^3y}{dx^3} + \frac{dy}{dx} - 2y = x^2,\ y(1) = 1,\ y'(1) = 3, y''(1) = 14$..

8. Solve the differential equation $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 36y = 3x^2 + 4x + 1$.

9. If the particular integral of $(D^2 - 4D + 4)y = F(x)$, is $\frac{1}{8}(2x^2 + 4x + 3) + \frac{1}{8}cos2x + e^x$ then find the function $F(x)$.

10. If on the average, 2 cars enter a certain parking lot per minute, what is the probability that during any given minute 4 or more cars will enter the lot?

11. A shipment of 6 television sets contains 2 defective sets. A hotel makes a random purchase of 3 of the sets. If X is the number of defective sets purchased by the hotel, find the probability distribution of X.

12. The probability that a pen manufactured by a company will be defective is 1/10. If 12 such pens are manufactured, find the probability that atleast two will be defective.