PES UNIVERSITY, BANGALORE

(Established under Karnataka Act 16 of 2013)

Department of Science and Humanities
B Tech First Semester
Session: Aug-Dec 2023
Subject Name: Engineering Mathematics I (4-0-0-4-4)
Subject Code: UE23MA141A

Self-learning component

Unit 1:

1. In estimating the cost of a pile of bricks measured as 2m x 15m x 1.2m, the tape is stretched 1% beyond the standard length. If the count is 450 bricks to 1 cu. m. and bricks costs Rs. 530 per 1000, find the approximate error in the cost**. Ans: 257.58**
2. The diameter and height of a right circular cylinder are measured to be 5 and 8 inches respectively. If each of these dimensions may be in error by $\pm 0.1\ inch$, find the relative percentage error in volume of the cylinder. **Ans:** $\boldsymbol{\pm 0.0525}$

Unit 2:

3. Solve: $yp^2 - 2xp + y = 0$. **Ans:** $\boldsymbol{y^2 = 2cx - c^2}$
4. Solve: $xp^2 - yp - y = 0$. **Ans:** $\boldsymbol{x = c(1 + p); y = p^2 e^p c}$

Unit 3:

5. Solve the differential equation: $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 6y = x^4 sinx$ **Ans:** $\boldsymbol{y = c_1 x^2 + c_2 x^3 - x^2 sinx}$
6. Solve the differential equation: $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} - y = \frac{x^3}{1+x^2}$ **Ans:** $\boldsymbol{y = c_1 x + \frac{c_2}{x} + \frac{1}{4}\left(x + \frac{1}{x}\right) log(1 + x^2) - \frac{x}{4}}$

Unit 4:

7. Form the PDE of the family of all the spheres whose centres lie on the xy-plane and have the constant radius r. **Ans:** $\boldsymbol{z^2(p^2 + q^2 + 1) = r^2}$
8. Form the PDE by eliminating the arbitrary functions from $z = (x + y)\emptyset(x^2 - y^2)$. **Ans:** $\boldsymbol{py + qz = z}$