

all formula of first year engineering maths File PDF

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Understanding the fundamental mathematical formulas is essential for first-year engineering students. These formulas serve as the backbone for solving complex engineering problems and form the foundation for advanced topics. In this comprehensive guide, we will cover all the vital formulas in first-year engineering mathematics, categorized for easy reference and better understanding.

1. Algebra and Polynomial Equations

1.1 Basic Algebraic Identities

- $(a + b)^2 = a^2 + 2ab + b^2$
- $(a - b)^2 = a^2 - 2ab + b^2$
- $a^2 - b^2 = (a + b)(a - b)$
- $(a + b)(a - b) = a^2 - b^2$
- $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

1.2 Polynomial Equations

- Quadratic Equation: $ax^2 + bx + c = 0$
- Roots: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- Sum of roots: $\alpha + \beta = -\frac{b}{a}$
- Product of roots: $\alpha \beta = \frac{c}{a}$

2. Trigonometry

2.1 Basic Trigonometric Ratios

- $\sin \theta = \frac{\text{Opposite}}{\text{Hypotenuse}}$
- $\cos \theta = \frac{\text{Adjacent}}{\text{Hypotenuse}}$
- $\tan \theta = \frac{\text{Opposite}}{\text{Adjacent}}$

2.2 Trigonometric Identities

- $\sin^2 \theta + \cos^2 \theta = 1$
- $1 + \tan^2 \theta = \sec^2 \theta$
- $1 + \cot^2 \theta = \csc^2 \theta$
- $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
- $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$

2.3 Key Formulas

- Law of Sines: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
- Law of Cosines: $c^2 = a^2 + b^2 - 2ab \cos C$

3. Coordinate Geometry

3.1 Distance Formula

- Distance between points (x_1, y_1) and (x_2, y_2) :

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

3.2 Midpoint Formula

- Midpoint between two points:

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

3.3 Equation of a Line

- Slope-intercept form: $y = mx + c$
- Point-slope form: $y - y_1 = m(x - x_1)$
- Two-point form:

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

3.4 Area of a Triangle

