

1. Linear Algebra:

- Matrix operations, inverse, rank, determinants.
- Eigenvalues and eigenvectors.

2. Calculus:

- Limits, continuity, derivatives.
- Maxima, minima, curve sketching.
- Integration techniques and definite integrals.

3. Differential Equations:

- First and second-order DEs.
- Homogeneous and non-homogeneous.
- Applications in circuits and mechanics.

4. Probability and Statistics:

- Mean, median, mode, standard deviation.
- Probability distributions (binomial, normal, Poisson).
- Hypothesis testing, confidence intervals.

5. Complex Numbers:

- Euler's formula, polar form.
- Complex integration and residues.

6. Vector Calculus:

- Gradient, divergence, curl.
- Line, surface, and volume integrals.

7. Laplace and Fourier Transforms:

- Solve DEs and analyze signals.
- Laplace for system control, Fourier for signal processing.

8. Common Formulae:

- Derivative of x^n : $d/dx(x^n) = n \cdot x^{n-1}$
- Integration by parts: $\int u \, dv = uv - \int v \, du$
- Bayes' Theorem: $P(A|B) = [P(B|A) \cdot P(A)] / P(B)$
- Laplace Transform: $L\{f(t)\} = \int_0^\infty e^{-st} f(t) \, dt$
- Fourier Series:
$$f(x) = a_0 + \sum (a_n \cos(nx) + b_n \sin(nx))$$
 for periodic functions