

Subject: Advanced Mathematics

Class: Second year

Hours : 2 hrs (Theoretical) , 2hrs (Practical)

Objectives :

The student must know the advanced theories in mathematics needed in construction engineering .

Week	Syllabus
1&2	Multiple integrals ,double integrals , area by double integration , triple integrals , volume by double and triple integrations.
3&4	Polar coordinates , curves by polar coordinates ,area by polar double integrations , cylindrical and spherical coordinates, equations of solids
5&6&7	Ordinary differential equations of first order ,separable , homogeneous , exact and not exact , linear and Bernoulli first order equations , general and condition solutions , applications
8&9	Linear differential equations with constant coefficients, homogeneous and non-homogeneous equations , equation of higher order , general and condition solutions , applications.
10&11	Partial derivatives with two and more two variables , higher- order partial derivatives , chain rule for partial derivatives , maxima & minima of function of two variables , saddle point and relative extrema.
12&13	Vector analysis , dot and cross product of vector functions , velocity and acceleration ,gradient of vector fields,divergance and curl of vector fields .
14&15	Equations of the lines and surfaces in space , intersection of lines and surfaces using vectors , lagrange multipliers with two and more constraints.
16&17	Complex numbers and functions , demoivres theorem, roots ,argand diagram, cauchy – rehmann equations.
18&19	Limits , Infinite sequences , convergence and divergence , infinite series , geometric and ordinary series , positive and alternative series , test of convergences
20&21	Power series , maclaurin series taylor and trigonometric series .

22&23	Fourier series for periodic function , euler coefficients , applications
24&25	Green's theorem for enclosed curves , line integral
26&27&28	Matrices , Adjoins & inverses , solving linear equations using the inverse of matrix , determinants and cramer method to solve linear equations , Gaussian elimination and gauss-seidel elimination.
29&30	Improper integration and Laplace transform of some common functions , properties of Laplace transform.

References:

- 1. Advanced Engineering Mathematics /C. Ray Wylie**
- 2. Engineering mathematics / G. S . Sharma &I . J. S . Sarna**
- 3. Applied Mathematics for Engineers & physicists / Pipes & Harvill .**