

NATIONAL INSTITUTE OF TECHNOLOGY, JAMSHEDPUR

Department of Mathematics

Autumn Semester 2018-2019

SEMESTER-I

Course Handout

Date: 22/08/2018

Course No : MA1101

Course title : Engineering Mathematics-I Credit-4(4-0-0)

Instructor In-charge : Dr. Mahendra Kumar Gupta

Syllabus

Successive differentiation, Leibniz theorem, Taylor's and Maclaurin's theorem with remainders, Indeterminate forms, Concavity and Convexity of a curve, Points of inflexion, Asymptotes and Curvature

Limit, Continuity and Differentiability of function of several variables, Partial derivatives and their geometrical interpretation, Directional derivatives of composite and implicit functions,

Euler's theorem on homogeneous functions, Taylor's expansion of functions of several variables, maxima and minima of functions of several variables, Lagrange's Method of multipliers

First order differential equations: exact, linear and Bernoulli's form, Second order differential equations with constant coefficients, Method of undetermined coefficients, Variation of parameters, Euler's equations, system of differential equations

Review of Limit, Continuity, differentiability of functions of complex variable, Analyticity of functions, Cauchy-Riemann equations, Harmonic functions

Reduction formula for indefinite and definite integrals of type $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$ and their evolution.

Scope

- ❖ To study advanced calculus of several variables
- ❖ To study different types of differential equations and methods to find their solutions
- ❖ To deal with many aspects of complex numbers and their use.

Objectives

- ❖ To develop skills so that student might be able to handle problems arising in Engineering disciplines
- ❖ To strengthen fields like complex analysis to solve different problems arising in Mechanical & Electrical discipline

Text Books

- Advanced Engineering Mathematics by Erwin Kreyszig (Wiley)
- Higher Engineering Mathematics by B S Grewal
- Differential and Integral Calculus by B C Das & B N Mukherjee

Reference Books

- Advanced Engineering Mathematics R.K. Jain and S. R. K. Iyengar

- Differential calculus and Integral Calculus by Piskunov (Mir publishers)
- Calculus and analytical geometry by Thomas & Finney

Course Plan:

Lecture No	Learning objectives	Topics to be covered
1-3	Successive Differentiation, Leibniz Formula	Differential Calculus
4-6	Taylor's and Maclaurin's theorem with remainders, Indeterminate forms	Differential Calculus
7-9	Concavity and Convexity of a curve, points of inflexion,	Differential Calculus
10-11	Asymptotes	Differential Calculus
12-14	Curvature	Differential Calculus
15-19	Limit, Continuity and Differentiability of function of several variables, partial derivatives and their geometrical interpretation, differentials derivatives of composite and implicit functions,	Analysis
22-23	Euler's theorem on homogeneous functions, Taylor's expansion of functions of several variables	Analysis
24-26	Maxima and Minima of functions of several variables- Lagrange's Method of multipliers	Analysis
27-29	First order differential equations: exact, linear and Bernoulli's form	Differential Equations
30-34	Second order differential equations with constant coefficients, Method of undetermined coefficients, Variation of parameters, Euler's equations, system of differential equations	Differential Equations
35-38	Review of Limit, Continuity, differentiability of functions of complex variable, Analyticity of functions, Cauchy-Riemann equations, Harmonic function,	Complex Analysis
38-40	Reduction formula for indefinite and definite integrals of type $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$ and their evolution.	Complex Analysis

Evaluation Scheme:

EC No	Evaluation Component	Duration	Weightage	Date and Time
1.	Mid sem. Exam	2 hours	30%	As per Academic Calendar
2.	End Sem. Exam	3 hours	50%	As per Academic Calendar
3.	2 Quiz	30 min	5%+5%	During Theory Classes
4.	Assignments		5%	Take home
5.	Attendance, discipline and responses in the class		5%	Theory Classes

Chamber Consultation hour: Book an appointment at mkgupta.math@nitjsr.ac.in

Notices: All notices regarding the course will be displayed only on the Notice Board of Department of Mathematics.