Syllabus: Mathematics – I

Functions of one variable

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's (generalized) mean value theorem and its applications; evaluation of indeterminate forms; Taylor's and Maclaurin's theorems with remainders. **(Thomas's Calculus: Sections-4.2, 4.6, 11.8, 11.9)**

Functions of several variables (12 Lectures)

Limit continuity, partial derivatives and their geometrical interpretation, total differential and differentiability.

Derivatives of composite and implicit functions, derivatives of higher order and their commutativity; Euler's theorem on homogeneous functions, Taylor's expansion of functions, maxima and minima, constrained maximum/minimum problems using Lagrange's method of multipliers.***((*****Thomas's Calculus: Sections-14.1, 14.2, 14.3, 14.4, 14.5(page: 1021), 14.7, 14.8 ,14.9, 14.10)**

MID SEMESTER EXAMINATION (16 – 24 Sept 2019)

Differential equations (11 Lectures)

Review: Introduction, formation of differential equation from a given n-parameters family of curve; solution using separation of variables, solution of homogeneous equations.

First order differential equations - exact, integrating factors, linear and Bernoulli's equations. Higher order differential equations with constant coefficients, Cauchy-Euler equations, method of variation of parameters, system of differential equations.(E. Kreyszig, sections: 1.1-1.5, 2.2, 2.3, 2.5, 2.6,2.7, 2.10,3.1, 3.2, 3.3, 4.1, 4.2)

Complex variables (9 Lectures)

Limit, continuity, differentiability and analyticity of functions, Cauchy-Riemann equations, line integrals in complex plane, Cauchy's integral theorem, independence of path, Cauchy' s integral formula, derivatives of analytic functions.

Taylor's series, Laurent's series, zeros and singularities(E. Kreyszig, sections: 13.3, 13.4, 14.1, 14.2, 14.3, 14.4, 15.4, 16.1, 16.2)

Text Books Recommended:

1. ***Thomas's Calculus*** – Maurice D. Weir, Joel Hass, Christopher Heil, Pearson Publishers (11th Edition)
2. E. Kreyszig , 10th Edition: Advanced Engineering Mathematics

Reference Books:

3. N. Piskunov: Differential Calculus and Integral Calculus – I
4. N. Piskunov: Differential Calculus, Integral Calculus – II
5. S. Narayan: Integral Calculus

List of Holidays:

Independence Day	15.08.2019	
**Id-ul-Zuha (BakriId)	12.08.2019	
Muharram	10.09.2019	
Mahatma Gandhi's Birthday	02.10.2019	
Diwali (Deepavali)	27.10.2019	
Prophet Mohammad' Birthday (Id-E-Milad)	10.11.2019	
Guru Nanak's Birthday	12.11.2019	