**Syllabus: Mathematics – I**

**Total Lectures: 37**

**Functions of one variable (5 Lectures)**

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.

Convergence of sequence and series of real numbers, power series, radius of convergence. Taylor’s series, Laurent’s series, zeros and singularities, residue theorem.( **E. Kreyszig, sections: 13.3, 13.4, 14.1, 14.2, 14.3, 14.4, 15.2, 15.3, 15.4, 16.1, 16.2, 16.3)**

***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:***

1. N. Piskunov: Differential Calculus and Integral Calculus – I
2. N. Piskunov: Differential Calculus, Integral Calculus – II
3. S. Narayan: Integral Calculus

**Additional Information for Teachers only:**

Autumn Break 5-9, Oct 2019

Mid- Autumn Examinations: 16 – 24 Sep. 2019

End-Autumn Examinations: 18 – 27 Nov. 2019

Last Date for Grade submission: 6 December 2018

**List of Holidays:**

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| --- | --- |
| 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 |