Subject No : **MA10001** Subject Name : **MATHEMATICS-I** L-T-P : **3-1-0** Credit : **4**

1) **Differential Calculus (Functions of one Variable):** -

Rolle's theorem, Cauchy's mean value theorem (Lagrange's mean value theorem as a special case)

Taylor's and Maclaurin's theorems with remainders, indeterminate forms ,concavity and convexity of a curve, points of inflexion, asymptotes and curvature. **(8L)**

Differential Calculus (Functions of several variables):-

Limit, continuity and differentiability of functions of several variables, partial derivatives and their geometrical interpretation, differentials, derivatives of composite and implicit functions, derivatives of higher order and their commutativity, Euler' s theorem on homogeneous functions, harmonic functions, Taylor' s expansion of functions of several variables, maxima and minima of functions of several variables - Lagrange s method of multipliers. **(11 L)**

*NP 1:- 4.1-4.6, 5.9-5.10, 6.1-6.5, 8.1-8.7, 8.10-8.12, 8.16- 8.18 ; SN1:- 11.8-11.10 **OR**

SN 1: - 8.1-8.3, 8.5-8.6 ,10.1-10.6, 13.1-13.2, 14.1-14.3, 15.1-15.2,11.2-11.11, 9.6-9.7

2) **Ordinary Differential Equations:-**

First order differential equations - exact, linear and Bernoulli' s form, second order differential equations with constant coefficients, method of variation of parameters, general linear differential equations with constant coefficients, Euler' s equations, system of differential equations. **(9 L)**

* SN 2 :- 15.4-15.5, 15.9-15.10 , 18.1-18.11 + NP 2 :- 1.23 , 1.29 – 1.30 **OR**

NP 2:- 1.7-1.10, 1.20-1.23, 1.29-1.30 ; SN2 :- 11.8-11.10 , 18.10

3. **Sequences and Series :-**

A brief discussion on Sequences and their limits, convergence of series, 'comparison test, Ratio test, Root test' , Absolute and conditional convergence, alternating series **(2 L)**

(*EK-1 :- 15.1-15.2,15.3 , 15.4)

3) Complex Variables:-

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, Residue theorem. **(12 L)**

(*EK-1 : - 13.1-13.4 , 14.1-14.4 , 16.1-16.4)

Text Books Recommended:-

1. N. Piskunov :-Differential Calculus (NP 1) , Integral Calculus (NP 2)
2. Shanti Narayan , Edition (2005):Differential Calculus (SN 1),Integral Calculus (SN 2)
3. E. Kreyszig , 9th Edition :- Advanced Engineering Mathematics (E K- 1)

Note: We follow strictly the books shown by *. Other books are for extra reading.

July , 2015

(Prof. P.D. Srivastava)

Course coordinator