



UNIVERSITY OF JAMMU

NOTIFICATION
(10/April/ ADP/ 10)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation to the approval of the Academic Council, has been pleased to authorize adoption of the revised Syllabi and Courses of Study in the subject of Mathematics M.Sc. Ist semester of Master's Degree Programme for the examination to be held in the years as under:-

Adoption of the Revised Syllabi & %age of Change in each Paper/course Nos.

<u>M. Sc.</u>	<u>Ist Semester</u>	<u>For the year Dec. 2011, 2012& 2013</u>
<u>Course No.</u>	<u>Course Title</u>	<u>%age of change</u>
MDP 403	Differential Equations	60% change

The alternative question papers are required to be set as per the University regulation given as under:-

- If the change in the Syllabi and Courses of Study is less than 25%, no alternative Question paper will be set.
- If the change is 25% and above but below 50% alternative Question Paper be set for one year.
- If the change is 50% and above on whole scheme is changed, alternative Question Paper are set for two years.

Sd/-
REGISTRAR

F.Acd./XV/10/ 4897-4921
Dated: 11-05-2010

DETAILED SYLLABUS

Title: DIFFERENTIAL EQUATIONS

Course No. MDP-403

Credits: 04

Maximum Marks: (a) Semester Examination: 80

(b) Sessional Assessment: 20

Duration of Examination: 2.30 Hours

Syllabus for the examinations to held in Dec. 2011, Dec. 2012 and Dec. 2013.

OBJECTIVES

The subject of Differential Equations is the natural goal of elementary calculus and most important part of mathematics for understanding the physical sciences, engineering and technology. Also, in the deeper questions it generates, it is the source of most of the ideas and theories which constitute higher analysis. It is indispensable for understanding the nature mathematically.

SYLLABUS

UNIT-I

Existence and uniqueness theorem for first order differential equations, Picard's method of successive approximations. Linear differential equations of order n , definition and basic existence theorem, basic theorem on linear homogeneous differential equations, idea of linear independence and linear dependence, Wronskian, method of reduction of order, method of variation of parameters, the Cauchy –Euler equation. Examples, exercises, and applications in electric problems. (14 lectures)

UNIT-II

Power Series Solutions about ordinary points: Definitions and Existence Theorem, Solutions Legendre's differential equation, Legendre Polynomials, Generating functions, Rodrigues formula, and Orthogonality property of Legendre Polynomials.

Power Series Solutions about singular points-the Method of Frobenius : Definitions, Existence Theorem, the method of Frobenius, Solutions of Bessel's equation, Bessel's functions and their properties.

Gauss Hypergeometric differential equation and functions defined by it with some important properties-Chebyshev polynomials and Minimax property, Riemann's equation-the generalized Gauss hypergeometric equation.

Examples and exercises based on the topics of this unit.

(12 Lectures)

UNIT-III

Laplace Transform: Definition, Existence and Basic Properties of Laplace transform, The Inverse Laplace Transform and the Convolution, Applications of Laplace Transform to linear differential equations with constant coefficients.

Sturm-Liouville Boundary Value Problem: Definition and examples, Characteristic Values and Characteristic Functions, and Orthogonality of Characteristic Functions.

Green's Function: Concept of Green's function, Properties of Green's function, Construction of Green's function for various differential operators, and idea of Dirac-delta function.

Examples and exercises based on the topics of this unit.

(12 Lectures)

UNIT IV

Linear Integral Equations: Introduction, Classification-Fredholm and Volterra equations, Conversion of differential equations into integral equations-IVP and BVP, Fredholm equations with degenerate kernels-equations of the first kind and equations of the second kind, Fredholm Equations- method of resolvent kernel, Volterra Equations-resolvent kernels.

Examples and exercises based on the topics of this unit.

(12 Lectures)

NOTE FOR PAPER SETTING:

The question paper will contain four units with two questions in each unit. Candidates will be required to attempt four questions selecting one question from each unit thereby giving internal choice within each unit.

TEXT BOOKS:

1. S.L. Ross: Differential Equations, 3rd Edition, John Wiley and Sons(Asia) Pvt. Ltd. 2004 (for Units I, II, and III).
2. B.P. Prasher : Differential and Integral Equations, CBS Publishers and Distributers, Delhi-1989(for Units III and IV).

REFERENCE BOOKS:

1. G.F. Simmons: Differential Equations with Applications and Historical Notes, Tata McGraw-Hill 2003
2. W.E. Boyce, and
R.C. DiPrima: Elementary Differential Equations and Boundary Value Problems, 3rd Edition, John Wiley and Sons, 1977.
3. E.A. Coddington: An introduction to Ordinary Differential Equations, Prentice Hall of India Private Limited, New Delhi, 2005.
4. R.P. Kanwal: Linear Integral Equations-theory and techniques, Academic Press, New York, 1971
5. F.G. Roach: Green,s Functions, Von Nostrand, 1970.