Dr.M.G.R
Educational and Research Institute
UNIVERSITY

(Decl.U/S 3 of the UGC Act 1956)

Maduravoyal, Chennai

Department of Mathematics

B.Sc – Mathematics (Full Time)

Curriculum and Syllabus

2017 Regulation

15-6-17
Prof & Head
Department of Mathematics
Dr. M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
UNIVERSITY
(DECL U/S 3 OF UGC ACT 1956)
MADURAVOYAL

C. B. Palaniveli
REGISTRAR
Dr. M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
(Deemed to be University)
Periyar E.V.R. High Road,
Maduravoyal, Chennai 600 095

Dr. M.G.R. Educational And Research Institute
Registrar Office
Periyar E.V.R.
High Road
Maduravoyal
Chennai-95
Deemed to be University

APPROVED BY XXVII ACADEMIC COUNCIL MEETING HELD ON 21.06.2017

JOINT REGISTRAR

Prof. Dr. S. DINAKARAN
JOINT REGISTRAR
Dr. M.G.R.
Educational and Research Institute
University
(Decl. u/s.3 of UGC Act, 1956)
Periyar E.V.R. High Road
Maduravoyal, Chennai-600 095.

S.No	S
1	
2	
3	
4	
5	
6	
TOTAL	

S.No	
1	
2	
3	
4	
5	
6	
TOTAL	

V SEMESTER						
S.No	Sub. Code	Title of Subject	L	T	P	C
1	HBMA17013	Real Analysis II	3	1	0	4
2	HBMA17014	Mechanics	3	1	0	4
3	HBMA17015	Operational Research I	3	1	0	4
4	HBMA17016	Financial Mathematics	3	1	0	4
5		Elective I	3	0	0	3
6		Elective II	3	0	0	3
TOTAL			18	4	0	22

VI SEMESTER						
S.No	Sub. Code	Title of Subject	L	T	P	C
1	HBMA17017	Complex Analysis	3	1	0	4
2	HBMA17018	Operational Research II	3	1	0	4
3	HBMA17019	Fuzzy set theory	3	1	0	4
4	HBMA17L01	Project	0	0	10	10
TOTAL			9	3	10	22

List of Electives						
S.No	Sub. Code	Title of Subject	L	T	P	C
1	HBMA17E01	Fluid Dynamics	3	0	0	3
2	HBMA17E02	Mathematical Modeling	3	0	0	3
3	HBMA17E03	Applications of P.D.E. and Special Functions	3	0	0	3
4	HBMA17E04	Introduction to Mathematica	2	0	1	3
5	HBMA17E05	Graph Theory	3	0	0	3
6	HBMA17E06	Astronomy	3	0	0	3

Total No. Of Credits: 130

G. Johnson
(Head/Math.)
15.6.17

Dr.M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
UNIVERSITY
(Decl. U/S 3 of the UGC Act 1956)
DEPARTMENT OF MATHEMATICS

HBMA17E01 **FLUID DYNAMICS** **3 0 0 3**

OBJECTIVES:

- To understand the basic concepts in Kinematics.
- To understand the basic concepts in Two Dimensional Flows.
- To understand the basic concepts Three Dimensional flows.

UNIT I KINEMATICS OF FLUIDS IN MOTION

Real fluids and ideal fluids – velocity of a fluid at a point – stream lines and path lines; steady and unsteady flows – the velocity potential – the vorticity vector – local and particle rates of change – the Equations of continuity – worked examples – Acceleration of fluid – Conditions at a rigid boundary – general analysis of fluid motion.

UNIT II EQUATIONS OF MOTIONS OF A FLUID

Pressure at a point in a fluid at rest – Pressure at a point in moving fluid – Conditions at a boundary of two inviscid immiscible fluids – Euler's equation of motion - Bernoulli's equation – worked examples.

UNIT III STEADY MOTION &VORTEX MOTION

Discussion of the case of steady motion under conservative body forces – some flows involving axial symmetry – some special two dimensional flows – Impulsive motion – some further aspects of Vortex motion.

UNIT IV TWO DIMENSIONAL FLOWS

Meaning of Two dimensional flow – use of cylindrical polar coordinates – stream function – the complex potential for two dimensional, irrotational, incompressible flow – the complex velocity potentials for standard two dimensional flows – some worked examples – Two dimensional image systems – Milne Thompson circle Theorem – The Theorem of Blasius.

UNIT V THREE DIMENSIONAL FLOWS

Introduction – Sources, sinks and doublets – Images in a rigid infinite plane – Images in solid spheres – Axisymmetric flows - Stoke's stream function.

Total no. of hrs: 60

TEXT BOOKS:

1) Chorlton, F (2004) *Text book of Fluid Dynamics*, CBS Publishers.

REFERENCE BOOKS:

1) Walther Kaufmann (1963) *Fluid Dynamics*, Tata McGraw-Hill.

R. Athma
(Head/Maths)
15-6-17

Dr.M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
UNIVERSITY
(Decl. U/S 3 of the UGC Act 1956)
DEPARTMENT OF MATHEMATICS

HBMA17E02 **MATHEMATICAL MODELING** **3 0 0 3**

OBJECTIVES:

- To understand the basic concepts in Mathematical Modeling through Ordinary Differential Equations.
- To understand the basic concepts in Mathematical Modeling through Difference Equations.
- To understand the basic concepts in Mathematical Modeling through Graphs.

UNIT I MATHEMATICAL MODELING THROUGH ODE OF FIRST ORDER

Linear Growth and Decay Models – Non-Linear Growth and Decay Models – Compartment Models – Dynamic problems – Geometrical problems.

UNIT II MATHEMATICAL MODELING THROUGH SYSTEMS OF ODE OF FIRST ORDER

Population Dynamics – Epidemics – Compartment Models –Economics – Medicine, Arms Race, Battles and International Trade – Dynamics.

UNIT III MATHEMATICAL MODELING THROUGH ODE OF SECOND ORDER

Planetary Motions – Circular Motion and Motion of Satellites –Mathematical Modeling through Linear Differential Equations of Second Order –Miscellaneous Mathematical Models.

UNIT IV MATHEMATICAL MODELING THROUGH DIFFERENCE EQUATIONS

Basic Theory of Linear Difference Equations with Constant Coefficients – Economics and Finance – Population Dynamics and Genetics – Probability Theory.

UNIT V MATHEMATICAL MODELING THROUGH GRAPHS

Solutions that can be Modelled Through Graphs – Mathematical Modeling in Terms of Directed Graphs, Signed Graphs, Weighted Digraphs and Unoriented Graphs.

Total no. of hrs: 60

TEXT BOOKS:

1) Kapur, J.N (2015) *Mathematical Modeling*, Wiley Eastern Limited.

REFERENCE BOOKS:

1) Kapur, J.N (2008) *Mathematical Models in biology and Medicine*, EWP.

(Head/Maths)
15-6-17

Dr.M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
UNIVERSITY
(Decl. U/S 3 of the UGC Act 1956)
DEPARTMENT OF MATHEMATICS

HBMA13E03

APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS & SPECIAL FUNCTIONS

3 0 0 3

OBJECTIVES:

- To understand the basic concepts of Partial differential equation
- To understand the basic concepts in Lagrange's equations, Wave & Heat equations.
- To understand the basic concepts in Bessel's functions.

UNIT I ONE DIMENSIONAL HEAT & WAVE EQUATION

Derivation of One Dimensional Wave Equation – Solution of One Dimensional Wave Equation – One Dimensional Heat Flow – Solution of One Dimensional Heat Equation

UNIT II TWO DIMENSIONAL HEAT & WAVE EQUATION

Two Dimensional Heat equation – Cartesian Form – Temperature Distribution in a Rectangular Plate – Temperature Distribution in an Infinite Plate – Temperature Distribution In Rectangular Plate with Insulated Sides

UNIT III POWER SERIES

Power series solution of differential equations - Ordinary point - Solution about singular points - Frobenius method

UNIT IV BESSEL EQUATION

Introduction: Solution of Bessel's equation - Bessel's functions Jn(x) - Recurrence Formulae - Equations reducible to Bessel's equation - Orthogonality of Bessel's Functions - Generating function for Jn(x).

UNIT V LEGENDRE'S EQUATION

Legendre's equation - Legendre's polynomial Pn(x) - General solution of Legendre's equation, - Rodrigue's formula - Legendre polynomials - Generating function of Legendre's polynomial - Orthogonality of Legendre polynomials - Recurrence formulae for Pn(x).

Total no. of hrs: 60

TEXT BOOKS:

1) Arumugam, Thangapandi Isaac, Somasundaram *Engineering Mahematics Volume – III Second Edition*, Scitech Publications (India) Pvt. Ltd.

REFERENCE BOOKS:

1) Gupta, B.D (2009) *Mathematical Physics, Second Revised Edition*, Vikas Publising House Pvt. Ltd.

G. Shan
(Hod/Maths)
15.6.17

Dr.M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
UNIVERSITY
(Decl. U/S 3 of the UGC Act 1956)
DEPARTMENT OF MATHEMATICS

HBMA17E04 **INTRODUCTION TO MATHEMATICA** **2013**

OBJECTIVES:

- To understand the basic concepts in the programming with Mathematica.
- To solve Numerical methods.
- To understand Two and Three dimensional plots.

UNIT I

Simplification of algebraic expression - simplification of expressions involving special functions, built in functions for transformations on trigonometric expressions - Definite and indefinite symbolic integration - Symbolic sums and products - Symbolic solution of ordinary and partial differential equations - Symbolic linear algebra equations solving, calculus, polynomial functions, matrix operations.

UNIT II

Special functions - Inverse error function - Gamma and beta function - hyper-geometric function - Elliptic function, Mathieu function.

UNIT III

Numerical solution of differential equations, numerical solution of initial and boundary value problems - Numerical integration - Numerical differentiation - Matrix manipulations and optimization techniques.

UNIT IV

Two and Three dimensional plots - Parametric plots - Contours, - Typesetting capabilities for labels and text in plots, direct control of final graphics size, resolution etc.

UNIT V

Algebra - Linear algebra – calculus - vector analysis - Laplace and Fourier transforms.

Total no. of hrs: 60

TEXT BOOKS:

1) Stephen Wolfram (2003) *The Mathematica book*, Wolfram Research Inc.

REFERENCE BOOKS:

1) Wellin, Gaylord, Kamin (2005) *An introduction to programming with Mathematica, 3rd ed*, Cambridge.

(HOD/Maths)
15-6-17

Dr.M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
UNIVERSITY
(Deed. U/S 3 of the UGC Act 1956)
DEPARTMENT OF MATHEMATICS

HBMA17E05 **GRAPH THEORY** **3 0 0 3**

OBJECTIVES:

- To understand the basic concepts of Graph theory.
- To understand the basic concepts in Trees.
- To understand the basic concepts in Colorability.

UNIT I INTRODUCTION TO THEORETICAL CONCEPTS

Graphs – Subgraphs - Degree of a vertex - Hand shaking Theorem - Isomorphism of graphs - Operations on Graphs - Independent sets and coverings

UNIT II GRAPHICAL SEQUENCES

Adjacency and incident matrices - Degree sequences and graphic sequences - Walks Trials – Paths - Cycles Shortest path problem

UNIT III CONNECTIVITY

Connectedness and components – Cutpoint - Bridge, block, connectivity Theorems and simple problems

UNIT IV TREES, EULERIAN AND HAMILTANIAN GRAPHS

Trees-simple problems -Euler tours - Hamiltanian Cycles - Chinese Postman problem - Travelling salesman problem.

UNIT-V COLORABILITY AND PLANARITY

Colorability - Chromatic number and index - Four color Theorem - Five color Theorem - Vizing's Theorem - Time Tabling Problem - Planarity - Definitions and properties - Characterisation of planar graphs.

Total no. of hrs: 60

TEXT BOOKS:

1) S.Arumugam, S.Ramachandran (2001) *Invitation To Graph Theory*, SciTech publications, Chennai.

REFERENCE BOOKS:

1) Parthasarathy, K.R (2001) *Basics of Graph theory* , TMH Publishing company Ltd.
2) Bondy, J.A Murthy, U.S.R *Graph theory with Applications* , M.C. Millan Press

R. Ahmy
(HOD/Maths)
15-6-17

HBMA17E06 **ASTRONOMY** **3 0 0 3**

OBJECTIVES:

- To understand the basic concepts about the universe
- To understand the working knowledge about the universe
- To understand the working knowledge about the Eclipses

UNIT I CELESTIAL SPHERE
Celestial Sphere - Diurnal motion - Simple Problems (No derivation)

UNIT II ZONES OF EARTH
Zones of Earth - Terrestrial Latitudes and Longitudes - Rotation of Earth - Dip of the horizon - Simple problems (No derivation).

UNIT III TWILIGHT
Twilight - Simple problems - Astronomical refraction - Simple problems. (No derivation)

UNIT IV KEPLER'S LAWS
Kepler's Laws - simple problems (No derivation)

UNIT V ECLIPSES
Moon - phases of moon - Eclipses - Introduction – umbra and penumbra - lunar eclipse - solar eclipse - condition for the occurrence of lunar and solar eclipses.

Total no. of hrs: 60

TEXT BOOKS:

1) Kumaravelu and Susheela Kumaravelu (2004) *Astronomy*, SKV Publishers.

REFERENCES BOOKS:

1) Thiruvenkatacharya V (1972) *A text book of Astronomy*, SChand & Co. Pvt. Ltd.
2) Kartunen, H (2013) *Fundamental Astronomy*, Content Technologies Publications.

P. Johns
(HOD/Maths)
15-6-17

C. B. Palaniveli

REGISTRAR
Dr. M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
(Deemed to be University)
Periyar E.V.R. High Road,
Maduravoyal, Chennai 600 095