GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR – 639 005.

(Reaccredited with A Grade status by NAAC)
(Affiliated to Bharathidasan University, Tiruchirappalli.)

PG & RESEARCH DEPARTMENT OF MATHEMATICS

Programme : M. Sc. **Title: Mathematics** **Medium: English**

Programme Learning Objectives

- To have balanced prologue to the primary parts of present day Mathematics that keeps a proper harmony among Theoretical and Applied Mathematics.
- To have preparing and information important to acknowledge and apply Modern Mathematics and to discover compensating vocations in Mathematics related fields, or to seek after research in Mathematics.
- To have a valuation for the idea of formal Mathematical evidence and the capacity to compose basic verification.
- To take an interest effectively in Mathematics related occasions in particular Conferences/Seminars/Workshops and Quiz programs.

Programme Outcomes

Space information: Demonstrate information on essential ideas, standards and uses of the particular science discipline.
Asset Utilization: Develop the abilities to obtain and utilize proper learning assets including library, e-learning assets, ICT apparatuses to upgrade information base and remain side by side of late improvements.
Diagnostic and Technical Skills: Ability to deal with/utilize fitting devices/systems/hardware with a comprehension of the standard working strategies, security perspectives/constraints.
Basic reasoning and Problem fathoming: Identify and fundamentally examine relevant issues in the pertinent control utilizing suitable apparatuses and methods just as ways to deal with come to feasible end results/arrangements.
Task Management: Demonstrate information and logical comprehension to distinguish inquire about issues, structure tests, utilize suitable procedures, examine and decipher information and give arrangements. Display authoritative aptitudes and the capacity to oversee time and assets.
Individual and collaboration: Exhibit the possibility to adequately achieve errands autonomously and as a part or pioneer in various groups, and in multidisciplinary settings.
Compelling Communication: Communicate adequately in spoken and composed structure just as through electronic media with mainstream researchers just as with society on the loose. Exhibit the capacity to compose expositions, reports, make successful introductions and documentation.
Condition and Society: Analyse the effect of logical and mechanical advances on the earth and society and the requirement for feasible improvement.
Morals: Commitment to proficient morals and obligations.
Deep rooted learning: Ability to take part in long lasting learning with regards to the quick improvements in the control.

Programme Specific outcomes

PSO1: Improve the issues fathoming abilities.

PSO2: Work together with the other related regions of science.

PSO3: Improve the hypothetical information on Mathematical ideas.

PSO4: Innovatively applying the information on Mathematics in chose genuine circumstances.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR – 639 005

M.SC. MATHEMATICS COURSE STRUCTURE UNDER CBCS SYSTEM

(For the candidates admitted from the year 2016- 2017 onwards)

SEMESTER	COURSE	SUBJECT TITLE	SUBJECT CODE	INSTR. HOURS WEEK	CREDIT	EXAM HOURS	MARKS		TOTAL
							INT	ESE	
I	Core Course – I	Algebra – I	P16MM1C1	6	5	3	**25**	**75**	100
	Core Course – II	Real Analysis-I	P16MM1C2	6	5	3	**25**	**75**	100
	Core Course – III	Ordinary Differential Equations	P16MM1C3	6	5	3	**25**	**75**	100
	Core Course – IV	Classical Mechanics	P16MM1C4	6	5	3	**25**	**75**	100
	Elective Course - I	Graph Theory	P16MM1E1	6	3	3	**25**	**75**	100
				30	**23**				**500**
II	Core Course – V	Algebra – II	P16MM2C5	6	5	3	**25**	**75**	100
	Core Course – VI	Real Analysis-II	P16MM2C6	6	5	3	**25**	**75**	100
	Core Course – VII	Complex analysis	P16MM2C7	6	5	3	**25**	**75**	100
	Core Course - VIII	Partial Differential Equations	P16MM2C8	6	5	3	**25**	**75**	100
	Elective Course-II	Numerical Methods	P16MM2E2	6	3	3	**25**	**75**	100
				30	**23**				**500**
III	Core Course – IX	Functional Analysis	P16MM3C9	6	5	3	**25**	**75**	100
	Core Course – X	Integral Equations, Calculus of Variation and Fourier Transforms	P16MM3C10	6	5	3	**25**	**75**	100
	Core Course – XI	Topology	P16MM3C11	6	5	3	**25**	**75**	100
	Elective Course - III	Advanced Operations Research	P16MM3E3	6	3	3	**25**	**75**	100
	Elective Course - IV	Probability and Stochastic Process	P16MM3E4	6	3	3	**25**	**75**	100
				30	**21**				**500**
IV	Core Course – XII	Theory of Numbers	P16MM4C12	6	5	3	**25**	**75**	100
	Core Course – XIII	Differential Geometry	P16MM4C13	6	5	3	**25**	**75**	100
	Core Course – XIV	Measure Theory and integration	P16MM4C14	6	5	3	**25**	**75**	100
	Elective Course -V	Fluid Dynamics	P16MM4E5	6	3	3	**25**	**75**	100
	Project Work	Project	P16MM4PW	6	5	3	**	**	100
				30	**23**				**500**
TOTAL				**120**	**90**				**2000**

** Dissertation – 80 Marks and Viva Voce Examinations – 20 Marks

CHAIRMAN
BOARD OF STUDIES IN MATHEMATICS

CONTROLLER OF EXAMINATIONS

Sl. No.: | | **Subject Code:** | **P16MM1C1** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS – I SEMESTER – CORE COURSE - I

(For the candidates admitted from the year 2016 -17 onwards)

ALGEBRA-I

Course Outcomes (Co)

On successful completion of the course, the students will be able to

CO1 Recollect the knowledge of counting principle, normal subgroup, quotient rings, homomorphism , another counting principle and Sylow's thorem

CO2 Understand the ideas in ring theory, homomorphism, ideals, quotient rings and Euclidean rings.

CO3 Attain knowledge in field theory, extension field and transcendence of 'e'.

CO4 Obtain knowledge in finding the roots of polynomial and more about root. Better understanding on elements of Galois theory and solvability of radicals.

UNIT - I A counting principle – Normal subgroups and quotient rings – Homomorphism - Another counting principle – Sylow's theorem. (Ch. 2: § 2.5-2.7, 2.11, 2.12)

UNIT – II Ring Theory – Homomorphism – Ideals and Quotient Ring – More about ideals and Quotient Rings – Euclidean Rings. (Ch. 3: § 3.1-3.7)

UNIT – III Field Theory – Extension field – Transcendence of *e*. (Ch. 5: § 5.1, 5.2)

UNIT – IV Roots of polynomial-More about roots (Ch. 5: § 5.3&5.5)

UNIT – V Elements of Galois theory – Solvability of radicals. (Ch. 5: § 5.6,5.7)

TEXT BOOK:

"Topics in Algebra", I. N. Herstein, 2nd Edition. John Wiley & Sons, 2010.

REFERENCES:

1. **"Abstract Algebra"** by John B. Fraley, Pearson Education 7th Edition, 2007.
2. **"Abstract Algebra"** by P. B. Bhattacharyya, Cambridge University press, 2nd Edition, 2006.
3. **"Algebra"** by Thomas Hungerford,

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Sl. No.: | | **Subject Code:** | **P16MM1C2** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS – I SEMESTER – CORE COURSE - II

(For the candidates admitted from the year 2016 -17 onwards)

REAL ANALYSIS – I

Course Outcomes (Co)

On successful completion of the course, the students will be able to

CO1 Describe the real line as a complete ordered field.

CO2 Determine the continuity, differentiability and integrability of functions defined on subsets of the real line.

CO3 Determine the Riemann integrablility of a bounded function and prove a selection of theorem & concerning integration.

CO4 Illustrate the effect of uniform convergence on the limit function with respect to continuity and integrablity.

UNIT-I **The Real and Complex Number Systems :** Introduction – Ordered sets – Fields – The Real Field – Extended Real Number system – The Complex Field – Euclidean Spaces . (Ch. 1: pg no 01-17)

UNIT-II Basic topology: Finite, countable and uncountable sets – Metric Spaces – Compact sets-Perfect sets-Connected sets. (Ch. 2: pg no 24-46)

UNIT III Numerical Sequences and series: Convergent Sequences – Sub sequences – Cauchy Sequences – Upper and lower limits – Some special Sequences – Series – Series of Non negative terms. (Ch. 3: pg no 47-62)

UNIT IV **Series:** The Number e – The root and ratio test – Power series – Summation by parts – Absolute Convergence- Addition and Multiplication of series - Rearrangements. (Ch. 3: pg no 63 - 82)

UNIT V Continuity: Limits and continuous functions- continuity and compactness - continuity and connectedness - Discontinuity, Monotonic functions- Infinite Limits and Limits at Infinity. (Ch. 4: pg no 89-102)

TEXT BOOK:

"Principles of mathematical Analysis" by Walter Rudin (3rd Edn), Tata McGraw-Hill

REFERENCES:

1. Tom. M. Apostol, **"Mathematical Analysis"**, Narosa publishing House, New Delhi-1997.
2. R. G. Bartle, D. R. Sherbert, **"Introduction to Real Analysis"**, John Wiley and sons, New York-1982.
3. Kenneth A. Ross, **"Elementary Analysis: The theory of calculus"**, Springer New York-2004.
4. N. L. Carothers, **"Real Analysis"**, Cambridge university press, UK, 2000.
5. S. C. Malik, **"Mathematical Analysis"**, Willey Eastern Ltd, New Delhi-1985.
6. K. R. Stromberg , **"An Introduction to classical Real Analysis"** Wadsworth, 1981

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Sl. No.: | | **Subject Code:** | **P16MM1C3** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS - I SEMESTER – CORE COURSE - III

(For the candidates admitted from the year 2016 -17 onwards)

ORDINARY DIFFERENTIAL EQUATION

Course Outcomes (Co)

On completion of this course, the students will be able to:

CO1 Understand the concept of Linear differential equation, Wronkian and properties.

CO2 Solve differential equations using power series method.

CO3 Understand linear system, fundamental matrix and its properties.

CO4 Analyze existence, uniqueness, other properties of a solution of Non- linear equations and critical points.

UNIT - I The general solution of the homogeneous equation – The use of one known solution to find another – The method of variation of parameters – Power series solutions – A review of power series – Series solution of a first order equations – Second order linear equations: Ordinary points.
(Ch. 3: § 15, 16, 19 and Ch 5: § 26 -28)

UNIT - II Regular singular points – Legendre polynomials– Properties of Legendre polynomials – Bessel functions – Properties of Bessel functions.
(Ch. 5: § 29 and Ch 8: § 44 - 47)

UNIT-III Linear systems of First order equations – Homogeneous equations with constant coefficients –The method of solutions of successive approximations and Picard's theorem. (Ch. 10: § 55,56 & Ch 13: § 68, 69)

UNIT -IV Qualitative properties of solutions – Oscilation theory and Sturm separation theorem- Sturm comparison theorem – Eigen values, Eigen functions and the Vibrating string. (Ch. 4: § 24, 25&Ch.7:40)

UNIT -V Types of critical points: Stability – Critical points and stability for linear systems – Stability by Liapunov's direct method. (Ch. 11: § 59- 61)

TEXT BOOK:

G.F. Simmons, **"Differential Equations with Applications and Historical notes"** T.M.H., New Delhi, 2003

REFERENCE BOOKS:

1. W.T.Reid, **"Ordinary Differential Equations"**, John Wiley & Sons, New York, 1971.
2. E.A.Coddington and Levinson, **"Theory of Ordinary Differential Equations"**, McGraw Hill Publishing Company, New York 1955.

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Sl. No.: | **Subject Code:** P16MM1C4

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS - I SEMESTER – CORE COURSE - IV

(For the candidates admitted from the year 2016 -17 onwards)

CLASSICAL MECHANICS

Course Outcomes (CO)

On successful completion of the course, the students will be able to

CO1 demonstrate their understanding of Mechanics of a system of particles

CO2 analyzeLagrange's equations from Hamilton's principle

CO3 understand the formation of differentialequations which will help to study the dynamics of mechanical systems

CO4 Illustrate the mathematical aspects that provide the skills and problem techniques in kinematics of point and Kepler problem.

UNIT - I Mechanics of a particle, Mechanics of a system of particles, Constraints. (Ch. 1: § 1.1-1.3)

UNIT - II D'Alembert's principle and Lagrange's equations, Velocity-dependent potentials and the dissipation function, Hamilton's principle, Some techniques of the calculus of variations – Simple applications of Lagrangian formulation. (Ch. 1: § 1.4-1.6 & Ch 2: § 2.1-2.2)

UNIT - III Derivation of Lagrange's equations from Hamilton's principle, Extension of Hamilton's principle to non holonomic systems, Advantage of a variational principle formulation, conservation theorems and symmetry properties. (Ch. 2: § 2.3-2.6)

UNIT - IV Reduction to the equivalent one-body problem, The equations of motion and first integrals, The equivalent one-dimensional problem and classification of orbits, The Virial theorem. (Ch. 3: § 3.1-3.4)

UNIT - V The differential equation for the orbit and integrable power-law potentials, Conditions for closed orbits (Bertrand's theorem), The Kepler problem: Inverse square law of force, The motion in time in the Kepler problem, The Laplace-Runge-Lenz vector. (Ch. 3: § 3.5-3.9)

TEXT BOOK:

"Classical Mechanics" by H. Goldstein, Second edition, Addison Wesley, New York, 1980

REFERENCE:

"Classical Dynamics" Donald T. Greenwood PHI Pvt. Ltd., New Delhi 1985.

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Sl. No.: | **Subject Code:** P16MM1E1

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS – I SEMESTER – ELECTIVE COURSE – I

(For the candidates admitted from the year 2016-17 onwards)

GRAPH THEORY

Course Outcomes (CO)

On successful completion of the course, the students will be able to

CO1 give examples and counter examples
CO2 know the proof techniques
CO3 understand the problem solving methods
CO4 apply the methods in real life applications

UNIT- I Graphs, subgraphs and Trees; Graphs and Simple graphs – Graph Isomorphism – The Incidence and Adjacency matrices – Subgraphs – Vertex degrees – Paths and Connection – Cycles – Trees – Cut Edges and Bonds – Cut Vertices. (Ch. 1: § 1.1-1.7, and Ch. 2: § 2.1-2.3)

UNIT- II Connectivity, Euler tours and Hamilton cycles: Connectivity – Block – Euler tours – Hamilton cycles. Ch. 3: § 3.1 and Ch. 4: § 4.1-4.2)

UNIT- III Matching, Edge colouring: Matching – Matching and coverings in Bipartite graphs – Edge Chromatic number – Vizing's theorem. (Ch. 5: § 5.1-5.2, and Ch. 6: § 6.1-6.2)

UNIT- IV Independent sets and cliques, vertex colouring: Independent sets – Ramsey's theorem – Chromatic number – Brook's theorem. (Ch. 7: § 7.1-7.2 and Ch. 8: § 8.1-8.2, 8.4)

UNIT - V Planer Graphs: Plane and planar graphs – Dual graphs – Euler's formula – Five colour theorem and the four colour conjecture. (Ch. 9: § 9.1-9.3, 9.6)

TEXT BOOK:

J.A. Bondy and U.S.A. Murthy, **"Graph Theory and Applications"**, Macmillan, London 1976.

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Sl. No.: | | **Subject Code:** | **P16MM2C5** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS - II SEMESTER – CORE COURSE -V

(For the candidates admitted from the year 2016-17 onwards)

ALGEBRA – II

Course Outcomes (Co)

On successful completion of the course, the students will be able to

CO1 Attain basic knowledge about linear transformation ,characteristic roots and matrices.

CO2 Understand the basics of canonical form, triangular form, nilpotent linear transformation and Jordan form.

CO3 Gain knowledge on rational canonical form and determinants, Hermition , Unitary and normal transformation and real quadratic forms.

CO4 Understand about finite field and on finite division ring.

UNIT 1: Linear transformation – Characteristic roots – Matrices.

(Ch. 6: § 6.1-6.3)

UNIT 2: Canonical form – Triangular form – Nilpotent linear transformation – Decomposition of V – Jordan form.

(Ch. 6: § 6.4-6.6)

UNIT 3: Rational canonical form – Trace and Transpose –Determinants.

(Ch. 6: 6.7-6.9)

UNIT 4: Hermitian, Unitary and Normal Transformation – Real Quadratic forms.

(Ch. 6: § 6.10-6.11)

UNIT 5: Finite field – Wedderburn theorem on finite division ring.

(Ch. 7 § 7.1-7.2)

TEXT BOOK:

I.N.Herstein, **"Topics in Algebra"**, 2nd Edition. John Wiley & Sons, 2010

REFERENCE BOOKS:

1. John B. Fraley, **"Abstract Algebra"**, Pearson Education, 7th Edition 2007.
2. P. B . Bhattacharyya, **"Abstract Algebra"**, Cambridge University Press, 2nd Edition 2006.
3. Thomas Hungerford, **"Algebra"**.

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Sl. No.: | | **Subject Code:** | **P15MM2C6** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS - II SEMESTER – CORE COURSE - VI

(For the candidates admitted from the year 2016-17 onwards)

REAL ANALYSIS – II

Course Outcomes (Co)

On successful completion of the course, the students will be able to

CO1 Describe the real line as a complete ordered field.

CO2 Determine the continuity, differentiability and integrability of functions defined on subsets of the real line.

CO3 Determine the Riemann integrablility of a bounded function and prove a selection of theorem & concerning integration.

CO4 Illustrate the effect of uniform convergence on the limit function with respect to continuity and integrablity.

UNIT-I **Differentiation:** Derivative of Real Function- Mean value Theorems - The continuity of Derivatives – L' Hospital's Rule - Taylor's Theorem - Differentiation of Vector valued functions. (Ch. 5: pg no 103-119)

UNIT-II **The Riemann Steltjes Integral:** Definition and Existence of Integral Properties of Integral – Integration and Differentiation – Rectifiable Curves. (Ch. 6: pg no 120-142)

UNIT-III **Sequence and series of functions:** Sequence of functions – Discussion of main problem – Uniform Convergence and Continuity – Uniform convergence and Integration – Uniform Convergence and Differentiation. (Ch. 7: pg no 143-152)

UNIT IV Equicontinuous families of functions – The Stone – Weierstrass theorem – Some special Functions - Power Series – The Exponential and Logarithmic Functions. (Ch. 7: pg no 154-165& Ch.8: 172 - 181)

UNIT-V Special Functions – The Trigonometric Functions - The Algebraic Completeness of the Complex Field - Fourier Series – The Gamma Function. (Ch. 8: pg no 182 - 196)

TEXT BOOK:

"Principles of mathematical Analysis" by Walter Rudin (3rd Edn), Tata McGraw-Hill

REFERENCES:

1. Tom. M. Apostol, **"Mathematical Analysis"**, Narosa publishing House, New Delhi-1997.
2. R. G. Bartle, D. R. Sherbert, **"Introduction to Real Analysis"**, John Wiley and sons, New York-1982.
3. Kenneth A. Ross, **"Elementary Analysis: The theory of calculus"**, Springer New York-2004.
4. N. L. Carothers, **"Real Analysis"**, Cambridge university press, UK, 2000.
5. S. C. Malik, **"Mathematical Analysis"**, Willey Eastern Ltd, New Delhi-1985.
6. K. R. Stromberg , **"An Introduction to classical Real Analysis"** Wadsworth, 1981

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Sl. No.: | | **Subject Code:** | **P16MM2C7** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS - II SEMESTER – CORE COURSE – VII

(For the candidates admitted from the year 2016 -17 onwards)

COMPLEX ANALYSIS

Course Outcomes (CO)

On successful completion of the course, the students will be able to

CO1 use Cauchy's integral theorem or formula to compute complex line integrals

CO2 compute the Taylor's theorem, to determine the nature of the removablesingularities

CO3 explain the convergence of power series and develop analytical capabilitiesin Taylor or Laurent series in a given domain

CO4 determine the concept of conformal mapping of polygons, to find Schwarz – Christoffel formula

UNIT - I Analytical Functions: Cauchy-Riemann Equation, Analyticity, Harmonic functions, Bilinear transformations and Mappings: Basic Mappings, Linear Fractional transformations. (Ch. 5:§5.1-5.3, Ch. 3: §3.1,3.2)

UNIT- II Power Series: Sequences revisited, Uniform Convergence, Maclaurin and Taylor Series, Operations on Power Series, Conformal Mappings.
(Ch. 6: §6.1-6.4, Ch. 11: §11.1)

UNIT - III Complex Integration and Cauchy's Theorem: Curves, Parameterizations, Line Integrals, Cauchy's Theorem. (Ch. 7: §7.1-7.4)

UNIT- IV Applications of Cauchy's Theorem: Cauchy's Integral Formula, Cauchy's Inequality and Applications, Maximum Modules Theorem. (Ch. 8: §8.1-8.3)

UNIT - V Laurent's Series and The Residue Theorem: Laurent's Series, Classification of Singularities, Evaluation of Real Integrals, Argument Principle .
(Ch. 9: §9.1-9.4)

TEXT BOOK: S.Ponnusamy and Herb Silverman, **"Complex Variables with Applications",** Birkhauser, Boston, 2006

REFERENCE BOOKS:

1. S. Ponnusamy, **Foundations of complex analysis**, 2nd edition, Narosa Publishing House, 2005.
2. H. A. Priestley – **Introduction to Complex Analysis**, 2nd edition, Oxford University Press. 2006.
3. Serge Lang, **Complex Analysis**, Addison Wesley, 1977.
4. V. Karunakaran, "**Complex Analysis**", Narosa Publishing House, New Delhi, 2002.
5. R. V. Churchill, J. W. Brown, "**Complex Variables & Applications"**, Mc. Graw Hill, 1990.
6. John B. Conway, "**Functions of One Complex Variable"**. Narosa Publishing House, 2005.
7. Tristan Needham, **Visual Complex Analysis**, Oxford University Press. 1997.
8. Lars. V. Ahlfors, **Complex Analysis**, Third Edition, McGraw- Hill Book Company, Tokya, 1979.

CHAIRMAN – BOS **COE**

Sl. No.: | | **Subject Code:** | **P16MM2C8** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS - II SEMESTER – CORE COURSE - VIII

(For the candidates admitted from the year 2016-17 onwards)

PARTIAL DIFFERENTIAL EQUATIONS

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO1 Recollect the first order and second order partial differential equations and their solution.

CO2 Understand the linear partial differential equations with constant and variable coefficients, Boundary value problems.

CO3 Gain knowledge in applying Charpit's and Jacobi's methods, method of separation of variables and the method of integral transform obtain solution of partial differential equations.

CO4 Demonstrate on the canonical forms of second order PDEs and bounded value problems by Dirichlet and Neumann.

UNIT - I First order PDE – Curves and Surfaces – Genesis of First order PDE – Classification of Integrals - Linear Equations of the First order. (Ch. 1: § 1.1-1.4)

UNIT - II Pfaffian Differential Equations – Compatible Systems – Charpit's Method – Jacobi's Method. (Ch. 1: § 1.5-1.8)

UNIT - III Second order PDE: Classification of second order PDE: One-dimensional Wave equation – Vibrations of an Infinite string –Vibrations of a string of finite Length (Method of separation of variables). (Ch. 2: § 2.2,2.3 & 2.3.1,2.3.3)

UNIT - IV Laplace's Equation: Boundary Value Problems – Maximum and Minimum principles – The Cauchy Problem – The Dirichlet Problem for the Upper Half Plane – The Neumann Problem for the Upper Half Plane (Ch. 2: § 2.4,2.4.1-2.4.5)

UNIT - V Heat Conduction Problem – Heat Conduction – Infinite Rod Case – Heat Conduction Finite Rod Case – Duhamel's Principle –Wave Equation – Heat Conduction Equation. (Ch. 2: § 2.5,2.5.1,2.5.2,2.6,2.6.1,2.6.2)

TEXT BOOK:

"An Elementary Course in Partial Differential Equations" by T. Amarnath , Narosa Publishing House, 2003.

REFERENCE BOOKS:

1. I.C. Evans, **Partial Differential Equations**, Graduate Studies in Mathematics Vol. 19 AMS, 1998.
2. Ian. Snedden, **Elements of Partial Differential Equations**,McGraw - Hill book company, 1985.
3. F. John, P. Prasad, **Partial Differential Equations**.

CHAIRMAN – BOS **COE**

Sl. No.: | | **Subject Code:** | **P16MM2E2** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS - II SEMESTER – ELECTIVE COURSE- II

(For the candidates admitted from the year 2016-17 onwards)

NUMERICAL METHODS

Course Outcomes (Co)

On successful completion of the course, the students will be able to

CO1 Find the curve fiting for the first and second degree equations using method of Moments and method of least squares.

CO2 Estimate the solutions of Algebraic and Transcendental equations, using various methods numerically.

CO3 find the numerical solutions for differentiation and integration.

CO4 analyze the concept of classification of partial differential equations and the numerical solution of PDE

UNIT – I: Empirical relations and curve fitting: Equations reducible to linear form- Methods of moments-Method of Least squares-Fitting a straight line –Method of Least squares –Fitting a second degree parabola-Value of the sum of squares of Residuals- Conclusions. (Ch.2: § 2.1-2.6)

UNIT - II: Numerical solution of Algebraic and Transcendental Equation: Homer's Method –Muller Method- Chebyshev Method – Bairstow Method- Birge – Vieta Method – Solution of simultaneous non-linear Equation in two unknowns – Newton –Raphson Method. (Ch. § 3-3.2; 3.7,3.8,3.10-3.12)

UNIT - III: Solution of simultaneous Linear Algebraic Equations and Eigen value problems: Gauss –Jordan Elimination Method – Crout's Reduction Method - Power Method - Jacobi's Method - Given's Method.

(Ch: § 4-4.3,4.5,4.10-4.12)

UNIT - IV: Numerical Differentiation and Integration : Numerical Integration- Newton-cote's Quadrature Formula – Romberg's Method- Gauss's Quadrature Formula - Gauss – Legendre Integration Method .

(Ch:8 § 8.8,8.9,8.10,8.11,8.12)

UNIT - V: Numerical solution of Partial Differential Equation: Classification of Partial Differential Equations of the second order – Difference Equation corresponding to Laplace Equation -Liebmann's Iteration Process - Bender – Schmidt Difference Equation corresponding to the parabolic Equation.

(Ch:11: § 11.1-11.4)

TEXT BOOK:

"**Numerical Methods with programming in C**" Prof.T.Veerarajan and Dr.T.Ramachandran.

REFERENCE BOOK

1.Elementary Numerical Analysis – Samuel D.Conte Cal De Boor.

2.**Numerical Methods**-Dr.P.Kandasamy, Dr.K.Thilagavathy, Dr.K.Gunavathi.

3.R.L.Burden ,J.Douglas Faires,"**Numerical Analysis**",Thompson Books,USA,2005.

4.S.S.Sastry,"**Introductory Methods of Numerical Analysis**",Prentice Hall of India Private Limited,New Delhi-2001.(**Note**:Scientific calculator is allowed).

CHAIRMAN – BOS **COE**

Sl. No. | **Subject Code:** P16MM3C9

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS - III SEMESTER – CORE COURSE - IX

(For the candidates admitted from the year 2016-17 onwards)

FUNCTIONAL ANALYSIS

Course Outcomes (CO)

On successful completion of the course, the students will be able to

CO1 examples and counter examples in Banach space, Hilbert space and spectral operator theory

CO2 proof techniques in Banach space, Hilbert space and spectral operator theory

CO3 problem solving in Banach space, Hilbert space and spectral operator theory

CO4 applications of Banach space, Hilbert space and spectral operator theory

UNIT – I Banach Space: Definition and some Examples – continuous linear transformations – The Hahn Banach theorem – The natural imbedding of N in N* - The open mapping theorem – The conjugate of an operator. (Ch. 9: § 46-51)

UNIT – II Hilbert Space: Definition and some properties – Orthogonal complements – orthonormal sets – the conjugate space H* - the adjoint of an operator – self adjoint operators – normal and unitary operators. (Ch. 10: § 52-58)

UNIT – III Finite Dimensional Spectral Theory: Matrices – Determinants and the spectrum of an operator – the spectral theorem – A survey of the situation. (Ch. 11: § 60-63)

UNIT – IV General preliminaries of Banach Algebras: Definition and some Examples – Regular and singular elements – Topological divisors of zero – the spectrum – the formula for spectral radius – the radical and semi-simplicity. (Ch. 12: § 64-69)

UNIT – V The structure of Commutative Banach Algebra: The Gel'fand mapping – the application of the formula $r(x) = \lim ||x^n||^{1/n}$ – involution in Banach algebras – The Gel'fand Neumark theorem. (Ch. 13: § 70-73)

TEXT BOOK:

1. **"An introduction to Topology and Modern Analysis"**, G. F. Simmons, McGraw Hill Company.

REFERENCE BOOKS:

1. **"Functional Analysis"**,V.K.Krishnan .
2. **"Functional Analysis"**, M.Thamban Nair.
3. **"Functional Analysis",** B. V. Limaye, Wiley Eastern Ltd, Bombay.
4. **"Functional Analysis"**, K. Yasodha, Springer Verlag, 1974.

CHAIRMAN – BOS **COE**

Sl. No. | **Subject Code:** P16MM3C10

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS – III SEMESTER – CORE COURSE - X

(For the candidates admitted from the year 2016-17onwards)

INTEGRAL EQUATIONS, CALCULUS OF VARIATION AND FOURIER TRANSFORMS

Course Outcomes (CO)

On successful completion of the course, the students will be able to

CO1 Recognize the difference between Volterra&Fredholm integral equations, First kind & second kind, homogeneous and inhomogeneous etc

CO2 They will have a much better understanding of the fundamental concepts related to the space of admissible variations and concepts of a weak and a strong relative minimum of an integral

CO3 the skill to expose Fourier and Hankel transforms of special functions.

CO4 the skill to expose different techniques of finding solution of differential equations and integral equations by using transforms

UNIT-I Calculus of variation –maxima and minima-The simplest case - Natural boundary and Transition condition – Variational notation – More general case – Constraints and Lagrange's multiples – Variable end points – Strum – Liouville problems.

(Ch. 2: § 2.1-2.9[2])

UNIT-II Fourier Transform – Fourier Sine and Cosine Transforms – Properties of Convolution – Solving integral equations –Fourier integral theorem – Parseval's Identity. Ch. 7[3])

UNIT-III Hankel Transforms(finite case only) – Definition – Inverse formula – Some important results for Bessel functions - Linearity Property – Hankel transform of differential operators – Parseval's Theorem. (Ch. 9[3])

UNIT : IV Linear Integral equations – Definition - Regularity conditions – Special kind of Kernals – Eigen values and Eigen functions – Convolution Integral – The inner (or) Scalar product of two functions. (Ch. 1)

UNIT-V Reduction to a Algebraic Equations – Examples – Fedholm alternative – Examples – An Approximate method. (Ch 2[1])

Text Book:

1. Ram P. Kanwal – **Linear Integral Equations** , Theory and Practice, Academic Press 1971.
2. F. B. Hildebrand – **Methods of Applied Mathematics**, second Edition PHI, New Delhi 1972.
3. A. R. Vasistha , R. K. Gupta - **Integral transforms** , Krishna Prakasan Mandiar Pvt. Ltd.

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Sl. No.: | | **Subject Code:** | **P16MM3C11** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS – III SEMESTER – CORE COURSE - XI

(For the candidates admitted from the year 2016-17 onwards)

TOPOLOGY

Course Outcomes (Co)

On successful completion of the course, the students will be able to

CO1 Understand terms, definitions and theorems related to topology

CO2 Demonstrate knowledge and understanding of concepts such as open and closed sets, interior, closure and boundary

CO3 Use continuous functions and homeomorphism to understand structure topological spaces.

CO4 Apply theoretical concepts in topology to understand real world applications.

UNIT- I Topological spaces : Topological spaces - Basis for a topology - The order Topology-The Product Topology and X×Y. (Ch. 2: § 12-15)

UNIT II The subspace Topology – Closed set and limit Points continuous functions - The Product Topology. (Ch. 2: § 16-19)

UNIT- III The metric topology – Connected spaces – Connected subspaces of the real line – Components and Local connectedness. (Ch. 2: § 20, 21 and Ch. 3: § 23-25)

UNIT- IV Compact spaces – Compact subspaces of the real line – Limit point compactness – Local compactness. (Ch. 3: § 26-29)

UNIT- V Countability axioms – The separation axioms – Normal spaces – (The Urysohn lemma,The Urysohn metrization theorem,Tietze Extension Theorem) Statement only. (Ch. 4: § 30-35)

TEXT BOOK:

1. James. R. Munkres, **"Topology"**, second Edition, Prentice Hall of India Pvt., Ltd., New Delhi 2005.

REFERENCE BOOKS:

1. George F.Simmons, **"Introduction to topology and modern analysis"**, McGraw Hill Book Co., 1963.
2. J.Dugundji, **"Topology"** Prentice hall of India, New Delhi 1975.
3. J.L. Kelly, **"General topology"**, Van Nostrand Reinhold Co., New York.

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Sl. No.: | | **Subject Code:** | **P16MM3E3** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS - III SEMESTER – ELECTIVE COURSE - III

(For the candidates admitted from the year 2016-17 onwards)

ADVANCED OPERATIONS RESEARCH

Course Outcomes (Co)

On successful completion of the course, the students will be able to

CO1 To introduce some widely used advanced operational research models

CO2 Identify and develop operational research models from the verbal description of the real systems

CO3 Use the mathematical software to solve the proposed models

CO4 Understand the role of uncertainty in decision making

UNIT : I Integer Programming Problems Pure and Mixed I.P.P – Construction of Gemory's constraints, Fractional cut method – All I.P.P – Fractional cut method – Mixed L.P.P Branch and bound method, Application of integer programming. (Ch.11:§ 11.1-11.4)

UNIT : II Dynamic programming – Bellman's Principle of Optimality - Characteristics of a dynamic programming –Solutions of discrete D.P.P - Solution of L.P.P using Dynamic Programming approach. (Ch.12: § 12.1,12.3,12.5,12.6)

UNIT : III Queuing system – Elements and Characteristic of queuing system – Pure birth process and pure death process – Classification of queuing models – Single server models (M/M/1: ∞ - FIFO), (M/M/1: N/EIEO) birth and death process . (Ch.17: §17.1-17.8)

UNIT : IV Inventory control – Types of Inventories – Objectives of Inventory control – Costs associated with inventories – Factors affecting inventory control – Concept of EOQ – Deterministic models with no shortage – Deterministic models with shortage – Problems of EOQ with price break. (Ch.18: § 18.1-18.7)

UNIT : V Network Scheduling by CPM/PERT – Network basic components – Rules of Network construction – CPM – Types of Floats – Critical path – Cost slop– Probability consideration in PERT – Distinction between PERT and CPM. (Ch.21: § 21.1-21.8)

Text Book:

Kanti Swarup, P.K. Gupta & Man Mohan – **Operations Research**, Sultan chand & sons, 13th Edition.

Reference Books:

1. H.A. Taha – "**Operations Research: An Introduction**", 6th Edition, Macmillan.
2. F.S. Hiller & G.J. Lieberman, "**Introduction to Mathematical Programming"**, McGraw – Hill International Edition.

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Sl. No.: | | **Subject Code:** | **P16MM3E4** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS - III SEMESTER – ELECTIVE COURSE - IV

(For the candidates admitted from the year 2016-17 onwards)

PROBABILITY AND STOCHASTIC PROCESSES

Course Outcomes (Co)

On successful completion of the course, the students will be able to

CO1 Attain the knowledge about probability set function, conditional probability, transformation of one and two dimensional random variable and convergence in distribution.

CO2 Understand the basic concept of stochastic processes, higher transition probabilities and Bernoulli trails .

CO3 Analyze stability of a Markov chains and Markov chain with continuous state space.

CO4 Able to know about Poisson process, birth and death processes and Markov processes with discrete state space.

UNIT : I The probability set function – Conditional probability and Independence – Random variable of discrete type and continuous type – Transformations – Expectation of random variable – Some special expectations – Important inequalities. (Ch. 1: §1.3 to 1.10[1])

UNIT: II Distribution of two random variables – Transformations: Bivariate Random variables - Conditional distribution and expectation – Correlation coefficient – Independent random variables - Expectation of functions – Convergence in probability – Convergence in Distribution – Central Limit Theorem. (Ch. 2: § 2.1 to 2.5, Ch. 4: § 4.1 to 4.4[1])

UNIT: III Stochastic processes – An Introduction – Specification of Stochastic processes – Markov Chains: Definitions and Examples – Higher Transition probabilities – Generalization of Indipendent Bernoulli Trails: Sequence of Chain – Dependent Trails. (Ch. 1: § 1.5, Ch. 2: § 2.1 to 2.3[2])

UNIT : IV Markov Chains: Classification of States and Chains – Determination of Higher Transition probabilities – Stability of a Markov Chains - Markov Chain with Denumerable number of states - Reducible Chains - Markov Chain with Continuous state space. (Ch. 2: § 2.4 to 2.6, § 2.8, 2.9, 2.11[2])

UNIT : V Markov processes with Discrete state space : Poisson process – Poisson process and related distributions – Generalization of Poisson process –Birth and Death process - Markov processes with Discrete state space (Continuous time Markov Chains). (Ch. 3: §3.1 to 3.5[2])

TEXT BOOKS:

1. Robert V. Hogg, Allen Craig and Joseph W. Mckean., **"Introduction to Mathematical Statistics"** – 6th edition, Peearson Prentice Hall Publications.
2. J. Medhi **"Stochastic Processes" –** 3rd edition, New Age International Publishers

REFERENCES:

1. Paul G. Hoel, **"Introduction to mathematical statistics"**, John Wiley and sons Inc.

2. S.C Gupta and V.K. Kapoor., **"Fundamentals of Mathematical statistics"**, S. Chand Company.

3. Samuel Karlin, Howard M. Taylor, **"A first course in Stochastic processes"**, 2nd Edition, Academic Press, 1975.

4. Narayan Bhat, **"Elements of Applied Stochastic Process"**, 2nd edition, John Wiley, 1984.

5. S. K. Srinivasan and K. Mehata, **"Stochastic Processes"**, Tata McGraw Hill, 1976.

6. N. U. Prabhu, **"Stochastic Processes"**. Macmillan, 1965.

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Sl. No. | | **Subject Code:** | **P16MM4C12** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS – IV SEMESTER – CORE COURSE - XII

(For the candidates admitted from the year 2016-17 onwards)

THEORY OF NUMBERS

Course Outcomes (CO)

On successful completion of the course, the students will be able to

CO1 examples and counter examplesin Divisibility relation and Congruence relation

CO2 proof techniques in Divisibility relation and Congruence relation

CO3 problem solving in Divisibility relation and Congruence relation

CO4 applications of Divisibility relation and Congruence relation

UNIT-I Introduction – Divisibility- Primes-The Binomial theorem- Congruences- Euler's totient- Fermat's , Euler's and Wilson's theorems- Solution of Congruences- The Chinese Remainder theorem. (Ch.1& Ch.2: § 2.1-2.3)

UNIT-II Techniques of Numerical calculations- Public key cryptography- Prime power moduli- primitive roots and power residues- Congruences of degree two. (Ch.2: § 2.4-2.6,2.8,2.9)

UNIT-III Number theory from an algebraic view point- Groups, Rings and Fields- Quadratic Residues- The Legendre symbol (a/r) where r is an odd prime- Quadratic reciprocity. (Ch.2: § 2.10,2.11& Ch.3: §3.1-3.2)

UNIT-IV The Jacobi symbol (p/q) where q is an odd positive integer, Binary Quadratic forms- Equivalence and reduction of Binary Quadratic forms- Sums of two squares – Positive definite binary quadratic forms. (Ch.3: § 3.3-3.7)

UNIT-V Greatest integer function- Arithmetic functions- The Mobius inversion formula- Recurrences functions- Combinatorial number theory. (Ch.4:4.1 – 4.5)

TEXT BOOK:

Ivan Niven, Herbert.S, Zukerman and Hughl, Montgomery, **"An Introduction to the Theory of Numbers"**, Fifth Edition John Wiley and Sons, Inc, 2004.

REFERENCE BOOKS:

1. David M. Burton, **"Elementary number theory"**, W. M. C. Brown publishers, Dubuque, Lawa, 1989.
2. George Andrews, **"Theory of Numbers"**.
3. **"Fundamentals of Number Theor"y**, William .J. Leveque, Addition-Wesley publishing company, Phillipines, 1977.

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Sl. No. | | **Subject Code:** | **P16MM4C13** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS – IV SEMESTER – CORE COURSE - XIII

(For the candidates admitted from the year 2016-17 onwards)

DIFFERENTIAL GEOMETRY

Course Outcomes (Co)

On successful completion of the course, the students will be able to

CO1 Recollect the knowledge about space curve, arc length ,curvature and torsion, involutes and evolutes, Intrinsic equations and Helics.

CO2 understand about surface, helicoids, direction coefficient s and isometric correspondence.

CO3 Attain basic knowledge about Geodesics, geodesic parallels, Gauss-Bonnet theorem.

CO4 Analyze second fundamental form , principle of curvature , developables , minimal surfaces and ruled surfaces.
Understand the concept of compact surfaces , Hilbert's lemma, Gaussian mean curvature and conjugate points on geodesics.

UNIT – I **Space Curves:** Definition of a space curve – Arc length – Tangent – Normal and Binormal – Curvature and Torsion – Contact between curves and surfaces – Tangent surface – Involutes and Evolutes - Intrinsic equations – Fundamental Existence theorem for space curves - Helics. (Ch. 1: § 1-9)

UNIT – II Intrinsic properties of a surface: Definition of a surface- curves of surfaces- surface of revolution – Helicoids – Metric- Direction coefficients – Families of curves – Isometric correspondence - Intrinsic properties. (Ch. 2: § 1-9)

UNIT – III Geodesics: Geodesics – Canonical Geodesics equations – Normal property of Geodesics - Existence theorem – Geodesics Parallels – Geodesics curvature – Gauss – Bonnet theorem – Gaussian curvature - surface of constant curvature. (Ch. 2: §10-18)

UNIT – IV **Local non - Intrinsic properties of a surface:** The second fundamental form – Principle curvatures – Lines of curvature – Developables – Developables associated with space curves- Developables associated with curves on surface – Minimal surfaces – Ruled surfaces. (Ch. 3: § 1-8)

UNIT – V Differential Geometry of surfaces: Introduction- Compact surfaces whose points are umblics – Hilbert's lemma - Compact surface of constant Guassian or Mean curvature – complete surface –characterization of Complete Surfaces - Hilbert's theorem – Conjugate points on geodesics. (Ch. 4: § 1-8)

TEXT BOOK:

D. Somasundaram, **"Differential Geometry"**,Narosa Publishing House, 2014.

REFERENCE BOOK:

1. Struik. D. T, **"Lectures on Classical Differential Geometry"**, Addison - Welsley Mass – 1950
2. Kobayashi S. And Nomizu. K.**"Foundations of Differential Geometry"**, Interscience Publishers – 1963.
3. Wilhelm Klingenberg: **"A Course in Differential Geometry"**, Graduate Textsin.
4. J. A. Thorpe. **"Elementary topics in Differential Geometry"**, Under – Graduate Texts in Mathematics. Springer Verlag 1979.
5. T. J. Wilmore, **"An Introduction to Differential Geometry"**, Oxford University Press, (17th impression) New Delhi – 2002 (Indian print)

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Sl. No. | **Subject Code:** P16MM4C14

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS – IV SEMESTER – CORE COURSE - XIV

(For the candidates admitted from the year 2016-17 onwards)

MEASURE THEORY AND INTEGRATION

Course Outcomes (Co)

On successful completion of the course, the students will be able to

CO1 Computation of lebesgue measure.

CO2 Establishing measurability or non-measurablility of sets and functions.

CO3 Computation of lebesgue integrals, applications of volume calculations and fourier analysis.

CO4 Deciding under which conditions the fundamental theorem of calculus is applicable in the context of lebesgue measure.

UNIT – I **Measure on Real line:** Lebesgue outer measure – Measurable sets – Regularity – Measurable function – Boral and Lebesgue measurability. (Ch. 2: § 2.1-2.5[1])

UNIT – II **Integration of Non-negative functions:** The general integral – Integration of series – Riemann and Lebesgue integrals. (Ch. 3: § 3.1-3.4[1])

UNIT – III Abstract measure spaces: Measures and outer measures – Completion of Measures – Measure spaces – Integration with respect to measure. (Ch. 5: § 5.1,5.4-5.6[1])

UNIT – IV Convergence in measure: Almost uniform convergence – Signed measure and the Hahn decomposition – The Jordan decomposition – Radon-Nikodym Theorem. (Ch. 7: § 7.1 – 7.2 & Ch. 8: § 8.1 – 8.3[1])

UNIT – V The Classical Banach spaces: L^P spaces – Minkowski and Holder's inequality – Completeness – Approximation in L^P spaces. (Ch. 6: [2])

TEXT BOOKS:

1. G. de. Barra. **"Measure theory and integration"**, New Age International(P) Ltd.
2. H. L. Royden, **"Real Analysis"**, 3rd Edition, PHI Ltd.

REFERENCE BOOKS:

1. **"Measure and Integration"** 2nd Edition by M. E. Munroe, Addison – Wesley Publishing Company – 1971
2. **"Lebesgue Measure and Integration"**, P. K . Jain , V. P. Gupta , New Age International(P) Ltd, New Delhi - 1986 (Reprint - 2000)
3. Measure and Integral: **"An Introduction to Real Analysis"**, Richard L. Wheeden and Antoni Zygmund, Marcel Dekker Inc. 1977.
4. **"An Introduction to Measure and Integration"** , Inder K. Rana, Narosa Publishing House, New Delhi – 1997.

CHAIRMAN – BOS **COE**

Sl. No. | | **Subject Code:** | **P16MM4E5** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS – IV SEMESTER – ELECTIVE COURSE - V

(For the candidates admitted from the year 2016-17 onwards)

FLUID DYNAMICS

Course Outcomes (CO)

On successful completion of the course, the students will be able to

CO1 Identify and obtain the values of fluid properties and relationship between them.

CO2 understand the principles of continuity, momentum, and energy as applied to fluid motions.

CO3 Recognize these principles written in form of mathematical equations.

CO4 Apply dimensional analysis to predict physical parameters that influence the flow in fluid dynamics.

UNIT I **Kinematics of fluids in motion:** Real fluids and ideal fluids-Velocity of a fluid at a point, streamlines-path lines-steady and unsteady flows, velocity potential-the vorticity vector-local and particle rates of changes-equations of continuity-examples. (Ch 2: 2.1-2.8)

UNIT II **Equations of motion of a fluid:** Pressure at a point in a fluid at rest-Pressure at a point in a moving fluid-Condition at a boundary of two inviscid immiscible fluids, Euler's equation of motion-Discussion of the case of steady motion under conservative body forces. (Ch 3: 3.1-3.4 & 3.7)

UNIT III Some three & Two dimensional flows: Introduction-Sources-Sinks and doublets-Images in a rigid infinite plane-Axis symmetric flows-Stoke's stream function - Two-dimensional flows-Meaning of two-dimensional flow-Use of cylindrical polar co-ordinates-The stream function.

(Ch 4: 4.1-4.3,4.5& Ch:5 5.1 – 5.3)

UNIT IV Viscous flows: Viscous flows-Stress components in a real fluid-Relation between Cartesian components of stress-Translation motion of fluid elements - The rate of strain quadric and principle stresses- Further properties of the rate of strain quadric. (Ch 8: 8.1-8.5)

UNIT V Stress analysis in fluid motion-Relation between stress and rate of strain-The co-efficients of viscosity and laminar flow-The Navier-Stoke's equations of motion of a viscous fluid. (Ch 8: 8.6-8.9)

TEXT BOOK: F.Chorlton, "**Fluid Dynamics"**, CBS publications, New Delhi,1985.

REFERENCE BOOKS:

1.G.K.Batchaclor, **An introduction to fluid mechanics** ,foundation books.

2.S.W.Yuan, **Foundation of fluid mechanics**, Prentice Hall of India Pvt.Ltd

3.R.K.Rathy, **An introduction to fluid dynamics**, IBH publishing company.

CHAIRMAN – BOS **COE**

Sl. No.: | | **Subject Code:** | **P16MM4PW** |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

M. Sc., MATHEMATICS – IV- SEMESTER –PROJECT WORK

(For the candidates admitted from 2016-17 onwards)

Course Outcomes (CO)

On successful completion of the course, the students will be able to

CO1 Use online resources (e.g. MathSciNet) for literature survey.

CO2 Identify key research area in Mathematics which will further lead to do Ph.D. work.

CO3 Learn in an autonomous manner and know how to tackle various problems in research.

CO4 Develop oral and written presentation skills.

PROJECT WORK

SL.	Area of Work	Maximum Marks
1.	**PROJECT WORK:**	
	(i) Plan of the Project	**20**
	(ii) Execution of the plan / Collection of data / Organization of materials/ Fabrication Experimental study / Hypothesis, Testing etc., and Presentation of the report.	**45**
	(iii) Individual Initiative	**15**
2.	**VIVA VOCE EXAMINATION**	**20**
	TOTAL	**100**

PASSING MINIMUM – 50 MARKS

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