



SOURASHTRA COLLEGE, MADURAI- 625004
(An Autonomous Institution Re-accredited with 'B' grade by NAAC)
M.Sc., MATHEMATICS- SYLLABUS
(Under CBCS w.e.f. 2017 – 2018 onwards)

424

I SEMESTER

Sl. No.	Subject Code	Nature of Subject	Subject Title	Hours / Week	Duration of exams	CA	SE	Tot	Credits
1	17 PMS C11	Core1	Algebra 1	6	3	25	75	100	4
2	17 PMS C12	Core2	Analysis – I	6	3	25	75	100	4
3	17 PMS C13	Core3	Discrete Mathematics	6	3	25	75	100	4
4	17 PMS C14	Core4	Topology	6	3	25	75	100	4
5	17 PMS E11	Elective1*	Graph theory	6	3	25	75	100	4
6	17 PMS E12	Elective2*	Differential Geometry	6	3	25	75	100	4
			Total	30					20

Note: One Elective subject be selected from Sl. No. 5, 6



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425

PART - III CORE	Title : ALGEBRA - I	Subject Code : 17 PMS C11
Semester : I	HOURS : 6 hours / Week	CREDITS : 4

Objectives:

To enable the students to acquire the knowledge of groups and rings. To understand the concepts of finite abelian groups, Euclidean rings and polynomial over rings.

Unit – 1

Another Counting Principle, Sylow's Theorem (Sections 2.11, 2.12)

Unit – 2

Direct Products, Finite Abelian Groups (Sections 2.13, 2.14)

Unit – 3

Ideals and Quotient Rings, More Ideals and Quotient Rings, The Field of Quotients of an Integral Domain (Sections 3.4, 3.5, 3.6)

Unit – 4

Euclidean Rings, A particular Euclidean Rings, (Sections 3.7, 3.8)

Unit – 5

Polynomials over Commutative Rings (sec 3.11)

Text Book:

Topics in Algebra by I.N.Herstein, Second Edition, John Wiley and Sons, 1999

From Textbook 1

Chapter 2 (Sections 2.11, 2.12, 2.13, 2.4)

Chapter 3 (Sections 3.4, 3.5, 3.6, 3.7, 3.8 and 3.11)



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426

PART - III CORE	Title : ANALYSIS – I	Subject Code : 17 PMS C12
Semester : I	HOURS : 6 hours / Week	CREDITS : 4

Objectives:

To make the students gain knowledge in analysis -1. To make the students to understand various concepts and its applications in real analysis.

REVIEW:

Finite, Countable and Uncountable Sets, Metric Spaces (NOT FOR EXAMINATION)

Unit – 1

Compact Sets, Perfect Sets, Connected Sets (Sections 2.31 to 2.47)

Unit – 2

Convergent sequences, subsequence, Cauchy sequences, upper and lower limits, some special sequences, series, series of Non negative terms, the number e (Section 3.1 to 3.32).

Unit – 3

The Root and Ratio Tests, Power Series, Summation By Parts, Absolute Convergence, Addition and Multiplication of Series, Rearrangements (Sections 3.33 to 3.55).

Unit – 4

Limits of Functions, Continuous Functions, Continuity and Connectedness, Discontinuities, monotonic Functions, Infinite Limits and Limits at Infinity (Sections 4.1 to 4.34).

Unit – 5

The Derivative of a Real Function, Mean Value Theorems, The Continuity Derivatives, 'Hospital's Rule, Derivatives of Higher Order, Taylor's theorem Differentiation of Vector-Valued Functions (Sections 5.1 to 5.19)

TEXT BOOK:

Principles of Mathematical Analysis by Walter Rudin, Third Edition McGraw Hill, International Student Edition, 1976.

Chapter 2, Chapter 3, Chapter 4, Chapter 5



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PART - III CORE	Title : DISCRETE MATHEMATICS	Subject Code : 17 PMS C13
Semester : I	HOURS : 6 hours / Week	CREDITS : 4

Objectives:

To enable the students to acquire the knowledge of discrete mathematics. To understand the concepts of automata theory and lattices theory.

Unit 1 :

Statement and notations – connectives- negation, conjunction, disjunction – statement formulae – truth tables – conditional and biconditional – well formed formulae – tautologies – equivalence of formulae. (page no. 1 to 26)

Unit II :

Duality law – tautological implications – normal forms – conjunctive normal form – principal disjunctive normal forms - rules of inference (page no. 32 to 72)

Unit III :

Grammar and languages – polish expressions and complications (page no. 294 to 317)

Unit IV :

Lattices – definition and properties of lattices – lattices algebraic system – sublattices – direct product and homomorphisms (Page no. 378 to 392)

Unit V :

Some special lattices – Boolean algebra – definition and examples - Boolean functions – values of Boolean expressions and Boolean functions (Page No. 392 to 417)

TEXT BOOK :

Discrete Mathematical Structures with applications to Computer Science by J.P. Tremblay and R. Manohar McGraw Hill International editions .



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PART - III CORE	Title : TOPOLOGY	Subject Code : 17 PMS C14
Semester : I	HOURS : 6 hours / Week	CREDITS : 4

Objectives:

To enable the students to acquire the knowledge of topology. To understand the concepts of metric topology, product topology and its applications .

Unit 1: Topological spaces – basis for a topology – the order topology – the product topology on $X \times Y$ – the subspace topology – closed sets and limit points. Chap2 (12-17).

Unit 2: continuous functions – the product topology – the metric topology.
Chap 2 (18, 19, and 20)

Unit 3: connected spaces – connected subspaces of the real line -
Compact spaces – compact subspaces of the real line.
Chap 3 (23, 24, 26, and 27)

Unit 4: The countability axioms – the separation axioms.
Chap 4 (30, 31)

Unit 5: Normal spaces, the Urysohn lemma, the Urysohn metrization
Theorem. Chap 4 (32, 33, and 34)

TEXT BOOK:

Topology (Second Edition), James R.Munkress, Prentice – Hall pf India Private Ltd. New Delhi.

Chapter 2 : Sections 12 to 20

Chapter 3 : Sections 23, 24, 26, 27

Chapter 4 : Sections 30, 31, 32, 33, 34



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PART - III ELECTIVE	Title : GRAPH THEORY	Subject Code : 17 PMS E11
Semester : I	HOURS : 6 hours / Week	CREDITS : 4

(All units are from the text-book)

Objectives:

To enable the students to acquire the knowledge of graph theory. To understand the concepts of directed graph, Eulerian graph, matching, and coloring

Unit – 1

Graphs and simple graphs, Graph isomorphism, The incidence and adjacency matrices, Sub graphs, Vertex degrees, Paths and connection, cycles, The shortest path problem, Sperner's lemma (Chapter 1)

Unit – 2

Trees, Cut edges and Bonds, Cut vertices, Cayley's formulam The connector problem, Connectivity, Blocks, Construction of Reliable communications Network. (Chapter 2 and 3)

Unit – 3

Euler tours, Hamiltonian cycles, The Chinese postman problem, The traveling salesman problem (Chapter 4)

Unit – 4

Matchings, Matchings and coverings in Bipartite graphs, Perfect matching, The personnel assignment problem (Chapter 5)

Unit – 5

Edge Chromatic number, Vizing's theorem (Chapter 6).

TEXT BOOK:

Graph Theory with Applications, J.A. Bondy and U.S.R. Murty

Chapters: 1, 2, 3, 4, 5 and 6



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430

PART - III ELECTIVE	Title : DIFFERENTIAL GEOMETRY	Subject Code : 17 PMS E12
Semester : I	HOURS : 6 hours / Week	CREDITS : 4

Objectives:

To enable the students to acquire the knowledge of differential geometry. To understand the concepts of radius, curvature, geodesics curvature and its properties .

Unit 1:

Introductory remarks about space curves-definitions-arc length-tangent, normal and binormal-curvature and torsion of a curve given as the intersection of two surfaces-contact between curves and surfaces – tangent surfaces, involutes and evolutes.

Chap:1(section:1to 7)

Unit 2:

Intrinsic equations, fundamental existence theorem for space curves-helices (chap:1:sec:8-9) definition of a surface ,surfaces of revolution, helicoids(chap:2 sec:1to 4).

Unit 3:

Metric direction coefficients, families of curves isometric correspondence, intrinsic properties, geodesics, canonical geodesics equations,normal properties of geodesics (chap2:sec:5to12).

Unit4:

Existence theorems, geodesic curvature, Gauss –Bonnet theorem, Gaussian curvature(chap:2:sec :13,15,16,17).

Unit 5:

The second fundamental form, principal curvatures –lines of curvature, developables , developables associated with a space curves- developables associated with curves on surfaces-minimal surfaces-ruled surfaces(chap3:sec:1to 8)

TEXT BOOK:

An introduction to differential geometry by T.J.Willmore ,oxford university press.



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II SEMESTER

Sl. No.	Subject Code	Nature of Subject	Subject Title	Hours / Week	Durati on of exams	CA	SE	Tot	Cred its
1	17PMSC21	Core5	Algebra - II	6	3	25	75	100	4
2	17PMSC22	Core6	Analysis – II	6	3	25	75	100	4
3	17PMSC23	Core7	Differential Equations	6	3	25	75	100	4
4	17PMSC24	Core8	Numerical Analysis	6	3	25	75	100	4
5	17PMSE21	Elective3*	Mechanics	6	3	25	75	100	4
6	17PMSE22	Elective4*	Fuzzy Sets and Logics	6	3	25	75	100	4
7	17PMSE23	Elective5T*	Visual Basic	4	3	25	75	100	3
8	17PMSEP1	Elective5P*	Visual Basic	2	3	25	75	100	1
			Total	30					20

Note: One Elective subject be selected from Sl. No. 5, 6, (or) 7 and 8



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432

PART - III CORE	Title : ALGEBRA - II	Subject Code : 17 PMS C21
Semester : II	HOURS : 6 hours / Week	CREDITS : 4

All Units are from the text book)

Objectives:

To enable the students to acquire the knowledge of linear algebra. To understand the concepts of inner product space, linear transformation, matrices and determinants.

Unit – I

Dual spaces, Inner product spaces (Chapter 4: Sections 4.3,4.4)

Unit – II

The algebra of linear transformations, characteristic roots, (Chapter 6: Sections 6.1, 6.2)

Unit – III

Canonical forms, Triangular form, Nilpotent transformations, (Chapter 6: Sections 6.4, 6.5)

Unit – IV

Canonical forms : Rational canonical form, Trace and Transpose
(Chapter 6: Sections 6.7, 6.8)

Unit – V

Hermitian, Unitary and Normal Transformations (Chapter 6 ; Sections 6.10)

TEXT BOOK:

Topics in Algebra by I.N. Herstein, Second Edition, John Wiley and Sons, 1999

Chapter 4: Sections 4.3, 4.4 Chapter 6: Sections 6.1 to 6.10 (except 6.3, 6.6, 6.9)



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PART - III CORE	Title : ANALYSIS - II	Subject Code : 17 PMS C22
Semester : II	HOURS : 6 hours / Week	CREDITS : 4

(All Units are from the text book)

Objectives:

To enable the students to acquire the knowledge of analysis-II. To understand the concepts of rectifiable curves, Riemann stieltje's integrable functions.

Unit – I

Definitions and existence of the integral, Properties of the integral(Statement only), Integration and Differentiation, Integration (Chapter 6: Sections 6.1 to 6.17)

Unit-II

Change of variables Intergration and Differentiation,- Integration of vector valued functions – Rectifiable carves (Chapter 6,Sections 6.19 - 6.27)

Unit – III

Uniform convergence, Uniform convergence and continuity uniform convergence and integration, uniform convergence and Differentiation, (Chapter 7:Sections 7.7 to 7.18)

Unit – IV

Equicontinuous families of functions – The stone Weierstars theorem (chapter 7, Sections 7.19 – 7.33)

Unit -V

Power series, The exponential and Logarithmic functions, The trigonometric Functions – The algebra completeness of the Complex field, Fourier series, The Gamma Functions (Chapter7: Sections 8.1 to 8.20)

TEXT BOOK

Principles of mathematical Analysis by Walter Rudin Third Edition, International Student edition 1976, Chapter 6,7, and 8.



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PART - III CORE	Title : DIFFERENTIAL EQUATIONS	Subject Code : 17 PMS C23
Semester : II	HOURS : 6 hours / Week	CREDITS : 4

(Units 1,2,3 are from text-book 1 and Unit 4 and 5 from the text-book 2)

Objectives:

To enable the students to acquire the knowledge of differential equations . To understand the concepts of IVP, Legendre equation , Euler equations and Charpit's equations.

Unit 1: Introduction – IVP for homogeneous equation – solutions of the homogeneous equation – Wronskian and Linear independence – Reduction of the order of a homogeneous equation – the non – Homogeneous equation – Homogenous equations with analytical coefficient – Legendre equation Chapter 3 (Section 1 to 8) Textbook 1

Unit 2: Introduction – The Euler equation – 2nd order equation with regular singular points – an example - 2nd order equations with regular singular points – the general case (results only) – Exceptional cases (Results only, theorem statements only) –Bessel equation –Bessel equation (continued) Chapter 4 (1, 2, 3, 7, 8) Textbook 1

Unit 3: Introduction – equations with variables separated - exact equations – the method of successive approximation – The Lipschitz condition Chapter 5 (Section 1 to 5) Text book1.

Unit 4: Partial Differential equation – origins of 1st order Partial Differential equations – Linear equations of the 1st order– Integral surfaces passing through a given curve.
Chapter 2(2.4, 2.5) Textbook 2

Unit:5 : Nonlinear partial differential equations of the 1st order- Compatible systems of first order charpit's method – Special types of 1st order equations. Chapter 2 (2.7, 2.9, 2.10)

TEXT BOOKS

1. An introduction to ordinary differential equations by E.A. Coddington, Prentice Hall of India, 1987.
2. Elements of Partial Differential equations by I.N. Sneddon, Tata McGraw Hill Book Company, 1986

From Textbook 1

Chapter 3:Sections 1 to 8, Chapter 4: Sections 1 to 8, Chapter 5: Sections 1 to 8

From Textbook 2

Chapter 2: Sections 2.1 to 2.11

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PART - III CORE	Title : NUMERICAL ANALYSIS	Subject Code : 17 PMS C24
Semester : II	HOURS : 6 hours / Week	CREDITS : 4

Objectives:

To enable the students to acquire the knowledge of numerical analysis . To understand the concepts of various iteration methods, interpolation and difference equation.

Unit – I

Iteration methods based on first degree equation, Iteration methods based on second degree equation except multi-point iteration method- Rate of convergence- general iteration methods before acceleration of convergence (Chapter 2: Sections 2.3to 2.5 and 2.6)

Unit – II

Introduction-Iteration methods, Eigen values and eigen vectors, Bounds on Eigen values (Chapter 3:Sections 3.1, 3.4 to 3.6)

Unit – III

Introduction, Lagrange interpolations-Hermite interpolation, Piecewise and spline interpolation (Chapter 4:Sections 4.1,4.2 (Lagrange method) 4.5, 4.6 (only linear and quadratic interpolation)

Unit – IV

Introduction, Numerical Differentiation-Partial Differentiation, Numerical integration, Methods based on interpolation, Composite integration methods, Romberg method (Chapter 5:Section 5.1, 5.2, 5.5 to 5.7 and 5.9, 5.10)

Unit – V

Introduction, Difference equation, Numerical methods, (Euler's method only) (Chapter 6; Sections 6.1 to 6.3) (Euler's method only).

TEXT BOOK:

Numerical Methods for Scientific and Engineering Computation by M.K. Jain, S.R.K. Iyengar and R.K.Jain, Fifth Edition, New Age International Publishers, 2008

(Note: Section B of the Question paper for the end semester examination will contain only numerical problems, Scientific Calculator is allowed)

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PART - III ELECTIVE	Title : MECHANICS	Subject Code : 17 PMS E21
Semester : II	HOURS : 6 hours / Week	CREDITS : 4

(All units are from the text-book)

Objectives:

To enable the students to acquire the knowledge of mechanics . To understand the concepts of Hamilton's principles, classification of orbits and kepler's problems.

Unit 1:

Mechanics of a particle, Mechanics of a system of particles, Constraints (Chapter 1: Sections 1.1 to 1.3)

Unit 2:

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 (Chapter 1: Sections 1.4,1.5 and Chapter 2: Sections 2.1,2.2)

Unit 3:

Deviation of Lagrange's equations from Hamilton's principle, Extension of Hamilton's principle to nonholonomic systems (Chapter 2: Sections 2.3, 2.4)

Unit 4:

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 (Chapter 3: Sections 3.1 to 3.4)

Unit 5:

The differential equation for the orbit and integrable power-law potentials, The Kepler problem, Inverse square law of force, The motion in time in the Kepler problem, The Laplace-Runge-Lenz vector (Chapter 3: Sections 3.5, 3.7 to 3.9)

TEXT BOOK:

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



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PART - III ELECTIVE	Title : FUZZY SETS AND LOGICS	Subject Code : 17 PMS E22
Semester : II	HOURS : 6 hours / Week	CREDITS : 4

(All units are from the text books)

Objectives:

To enable the students to acquire the knowledge of fuzzy logic . To understand the concepts of fuzzy numbers , fuzzy relations and fuzzy applications in science and engineering.

Unit 1: Fuzzy sets – Basic types – Fuzzy sets – Basic concepts – Additional properties of α – cuts – Representation of fuzzy sets – Extension principle for fuzzy sets – Types of operations – fuzzy complements (Chapter 1 Section 1.2 to 1.4; Chapter Sections 2.1 to 2.3; Chapter 3 Sections 3.1 to 3.2)

Unit 2: Fuzzy numbers – Linguistic variables – arithmetic operations on intervals – arithmetic operation on fuzzy number (Chapter 4 : Sections 4.1 to 4.4)

Unit 3: Crisp versus fuzzy relations – projections and cylindric extensions – Binary fuzzy relations on a single set – Fuzzy equivalence relations – Fuzzy compatibility relations – Fuzzy ordering relations (Chapter 5 Sections 5.1 to 5.7)

Unit 4: Classical logic – An over view - multivalued logic – Fuzzy propositions – Fuzzy quantifiers – Linguistic Hedges – Inference from conditional fuzzy propositions – inference from conditional and quantified propositions – Inference from quantified propositions (Chapter 8 full)

Unit 5: Introduction – Civil Engineering – Computer Engineering- Reliability theory – Robotics – Medicine – Economics – Fuzzy Regressions – Interpersonal Communications. (Chapter 16; Sections 16.1, 16.2, 16.5 to 16.7; Chapter 17 Sections 17.1 to 17.3 and Sections 17.5 , 17.6)

TEXT BOOK

Fuzzy sets and Fuzzy logic – Theory and applications – Second edition, by George J. Klir and B.Yuan . Publisher – Prentic Hall; US ed edition – 1995

Unit 1: Chapter 1 Section 1.2 to 1.4; Chapter Sections 2.1 to 2.3; Chapter 3 Sections 3.1 to 3.2

Unit 2: Chapter 4 : Sections 4.1 to 4.4

Unit 3: Chapter 5 Sections 5.1 to 5.7

Unit 4: Chapter 8 full

Unit 5: Chapter 16 ; Sections 16.1, 16.2, 16.5 to 16.7; Chapter 17 Sections 17.1 to 17.3 and Sections 17.5 , 17.6

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Signature of Chairman/HOD



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PART - III ELECTIVE	Title : VISUAL BASIC	Subject Code : 17 PMS E23
Semester : II	HOURS : 4 hours / Week	CREDITS : 3

Objectives:

To enable the students to acquire the knowledge of Visual Basic. To understand the concepts of various visual basic tools and graphics.

Unit 1: Customizing a form and writing simple programs: Starting a new project – the properties window-common form properties-scale properties-color properties-making a form responsive. First steps in building the user interface: The tool box-creating controls-the name property- properties of command buttons-simple event procedures for command buttons-access keys-image controls-textboxes-labels-navigating between controls-message boxes. First steps in programming: Variables-setting properties with code-data types-constants-input boxes.

Unit 2: Displaying information: Displaying information on a form-the format function –picture boxes-rich text boxes –the printer object.Controlling program flow: Determine loops- indeterminate loops-making decision-select case -nested if-then’s –the goto.Built-in functions:String functions-numeric functions-date and time functions.Writing your own functions and procedures: Function procedures-sub procedures.

Unit 3: Organizing information via code: Lists: one dimensional arrays-fixed versus dynamic arrays-static arrays –the erase statement –organizing information via controls: control arrays – list and combo boxes – the flex grid control (general properties, properties of selected cells, sorting a grid, events and methods for grid control)-finishing the interface: the toolbox revisited: frames –timers-option buttons-check boxes-scroll bars-common dialog boxes-the Microsoft windows common controls-menus –MDI forms.

Unit 4: An introduction to graphics:fundamentals of graphics-screen scales-the line and shape controls-graphics via code-line and boxes-circles-ellipse and pie chart monitoring mouse activity:the mouse event procedures-dragging and dropping operations for controls.basic file handling:file commands-sequential file –random access files- binary files- sharing files.file system controls and file system objects-: file system controls.

Unit 5: Communicating with other windows applications: overview of COM/OLE using the OLE client control at design time-OLE automation-OLE drag and drop.Survey of database development using visual basic:using the data control-SQL base-database objects-useful method and events for the data control.

Text book:

- Gary cornell(2010),visual basic 6 from ground up, Tata Mc Graw-hill .
 Unit 1: 3(pg:63-84),4(pg:97-128),5(pg:151-164,187-191)
 Unit 2: 6(pg:194-218),7(pg:220-254),8(pg:255-270,285-291),9(pg:301-326).
 Unit 3: 10(pg:338-346),11(pg:384-419),14(pg:497-551)
 Unit 4: 16(pg:589-635),17(pg:647-659),18(pg:675-700,702-716),19(pg:725-731)
 Unit 5: 20(pg:757-766,769-770),22(pg:811-837)

Reference book:

1. Evangelos petroutoas(2011),mastering visual basic6,wiley India publications.
2. NET 3.5 programming black book (2011),kogent learning solutions Inc.,dreamtech press.



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PART - III ELECTIVE	Title : VISUAL BASIC LAB	Subject Code : 17 PMS EP1
Semester : II	HOURS : 2 hours / Week	CREDITS : 1

LIST OF PROGRAMS

Areas of program:

1. Simple programs using text box, label and command button.
2. Implementation of string and data function
3. Programs using input box, message box
4. Design of a calculator
5. Design of font style
6. Creation of paint brush.
7. Interactive games, number puzzle and picture puzzle.
8. Design of text editor
9. Animation using timer control
10. Screen saver program
11. Pop up menu creation
12. Dynamic loading of controls
13. Program using OLE
14. Programs using data control.



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III SEMESTER

Sl. No	Sub. Code	Nature	Subject Title	Hrs / Week	Duration of exams (hrs)	CA	SE	Total	Credits
1	17PMSC31	Core 9	Algebra III	6	3	25	75	100	5
2	17PMSC32	Core10	Analysis III	6	3	25	75	100	5
3	17PMS C33	Core11	Functional Analysis I	6	3	25	75	100	5
4	17PMSC34	Core12	Statistics I	6	3	25	75	100	5
5	17PMSN31	NME	Business Statistics	6	3	25	75	100	5
6	17PMSN32	NME	Mathematics for Competitive Examinations	6	3	25	75	100	5
			TOTAL	30					25

Note: One of the subjects from S.No 5 and 6 to be selected as Non Major Elective Paper.



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PART - III CORE	Title : ALGEBRA - III	Subject Code : 17 PMS C31
Semester : III	HOURS : 6 hours / Week	CREDITS : 5

Objectives:

To make the students to understand the advance concepts in fields and polynomials.

Unit – I:

Extension fields, the transcendence of e

Unit – II:

Root of polynomials, more about roots

Unit – III:

The elements of Galois Theory

Unit – IV:

Solvability by radicals, Galois groups over the rationals

Unit – V:

Finite fields

Text Book:-

Topics in Algebra by I.N.HERSTEIN, Second edition John Wiley and sons, 2009

Chapter 5 – Sections 5.1 to 5.8(except 5.4)

Chapter 7 – Sections 7.1



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PART - III CORE	Title : ANALYSIS - III	Subject Code : 17 PMS C32
Semester : III	HOURS : 6 hours / Week	CREDITS : 5

Objectives:

To make the students to understand the concepts in linear transformations and measurable functions.

UNIT I:

Linear Transformations – The Contraction Principle – The inverse function theorem.

UNIT II:

The implicit function theorem – The rank theorem – Determinants – Derivations of higher orders – Differentiation of integrals.

UNIT III:

Lebesgue outer measure – Measurable set.

UNIT IV:

Regularity – Measurable function.

UNIT V:

Integration of non-negative function – The general integral (Theorems only) – Integration of series.

Text book -1: Principles of mathematical analysis by Walter Rudin. (3rd edition)

Text book -2: Measure theory and integration by G.de Barra. (2nd edition)

UNIT 1: Chap 9 9.1 to 9.25 from Text book -1

UNIT 2: Chap 9, 9.26 to 9.37 from Text book -1

UNIT 3: Chap 2 -2.1, 2.2 from Text book -2

UNIT 4: Chap 2 – 2.3, 2.4 from Text book -2

UNIT 5: Chap 3 – 3.1, 3.2,(Theorems only) 3.3 from Text book -2



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PART - III CORE	Title : FUNCTIONAL ANALYSIS – I	Subject Code : 17 PMS C33
Semester : III	HOURS : 6 hours / Week	CREDITS : 5

Objectives:

To provide the students a comprehensive idea about the principle of analysis.

Unit I:

The definition and some examples – Continuous Linear Transformations – The Hahn – Banach Theorem.

Unit II:

The Open mapping Theorem – The conjugate of an operator.

Unit III:

The definition and some simple properties – orthogonal complements.

Unit IV:

Orthogonal sets – The adjoint of an operator.

Unit V:

Self-adjoint operators – Normal and Unitary operators – Projections.

Text Book:

Introduction to Topology and Modern Analysis by G.F. Simmons – Tata Mc Graw Hill – 2004.

Unit – 1: Chapter 9 – Sections 46, 47, 48

Unit – 2: Chapter 9 – Sections 50, 51

Unit – 3: Chapter 10 – Sections 52, 53

Unit – 4: Chapter 10 – Sections 54, 56

Unit – 5: Chapter 10 – Sections 57, 58, 59



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PART - III CORE	Title : STATISTICS - I	Subject Code : 17 PMS C34
Semester : III	HOURS : 6 hours / Week	CREDITS : 5

Objectives:

To enable the students to acquire the knowledge in probability and distributions.

UNIT I:

Introduction, Set theory, The probability set function, Conditional probability and Independence, Random variables of the discrete type, Random variables of the continuous type, properties of the distribution function, Expectation of a random variable, Some special expectations. Chebyshev's inequality.

UNIT II:

Distributions of two random variables, conditional distributions and expectations, the correlation coefficient, Independent random variables, Extension to several random variables.

UNIT III:

The binomial and related distributions, The Poisson distribution, The Gamma and Chi-square distributions. The normal distributions, The Bivariate normal distributions.

UNIT IV:

Sampling theory, Transformations of variables of the discrete type, Transformations of variables of the continuous type. The Beta, t, F distributions.

UNIT V:

Extensions of the change-of-variable technique, The moment generating function technique, The distributions of X -, and nS^2 / σ^2 , Expectations of functions of random variables-Central limit theorem.

Text Book:

Introduction to Mathematical Statistics, V Edition by R.V.Hogg and A.T.Craig, Pearson Education, Asia, 2002.

Unit 1: Chapter 1: Sections 1.1 to 1.10

Unit 2: Chapter 2: Sections 2.1 to 2.5

Unit 3: Chapter 3: Sections 3.1 to 3.5

Unit 4: Chapter 4: Sections 4.1 to 4.4

Unit 5: Chapter 4, 5: Sections 4.5 to 4.9 and 5.3.



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PART - IV NME	Title : BUSINESS STATISTICS	Subject Code : 17 PMS N31
Semester : III	HOURS : 6 hours / Week	CREDITS : 5

Objectives:

To acquire the knowledge in statistics for non-mathematics students.

UNIT – I:

Measure of central tendency – Definition – Mean – Median – Mode – Their merits and demerits – Weighted Arithmetic mean.

UNIT – II:

Measures of dispersion and skewness – Range – Quartile deviation – Standard Deviation.

UNIT – III:

Coefficient of variation – Pearson and Bowley coefficient of skewness.

UNIT – IV:

Scatter diagram – Pearson's coefficient of correlation – Rank correlation.

UNIT – V:

Index numbers – Meaning and uses – Methods of construction – Laspeyer's Method, Paasche method, Fisher's ideal index.

TEXT BOOK:

ELEMENTS OF STATISTICAL METHODS by S.P.GUPTA, Publishers: Sultan chand & sons, 16th edition (2005)

UNIT – I: Chapter 7, pages 158 - 198

UNIT – II & UNIT III: Chapter 8 and 9, pages 249 – 277, 315 - 326

UNIT – IV: Chapter 10: pages 371 - 425

UNIT – V: Chapter 12: pages 460 - 475



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PART - IV NME	Title : MATHEMATICS FOR COMPETITIVE EXAMINATIONS	Subject Code : 17 PMS N32
Semester : III	HOURS : 6 hours / Week	CREDITS : 5

Objectives:

To enable the students to acquire the knowledge of mathematics of competitive exams. To make the students to understand the basic concepts in arithmetic for real world problems.

UNIT I:

H.C.F and L.C.M of numbers – Decimal – Fractions – simplifications – Average .

UNIT II:

Percentage on Numbers – Problems and ages. Percentage –Profit and loss –Ratio and Proportion.

UNIT III:

Simple Interest – Compound Interest – Allegation of mixture.

UNIT IV:

. Time and Work – Time and distance – Problems on trains.

UNIT V:

Calendar – Odd man out and series.

Text Books:

1. Quantitative Aptitude by R.S.Agarwal, Publishers: S.Chand & Co., Reprint 2011.

Unit 1:: pages 30-33,46- 49, 67 – 73 & 139 -141

Unit 2:: pages 161 -163, 182-183, 208 -214, & 294 – 296.

Unit 3:: pages 445-447, 466-470 & 435-437.

Unit 4:: pages 341-344, 384-386,&405-407.

Unit 5:: pages : 593-596,& 649-657.



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IV SEMESTER

Sl. No.	Sub. Code	Nature	Subject Title	Hours / Week	Durati on (hrs)	CA	SE	Total	Cred its
1	17PMSC41	Core13	Complex Analysis	6	3	25	75	100	5
2	17PMSC42	Core14	Number Theory	6	3	25	75	100	5
3	17PMSC43	Core15	Operations Research	6	3	25	75	100	5
4	17PMSC44	Core16	Statistics II	6	3	25	75	100	5
5	17PMSE41	Elective	Advanced Topology	6	3	25	75	100	5
6	17PMSE42	Elective	Functional analysis II	6	3	25	75	100	5
			Total	30					25

NOTE: One of the subjects from S.No. 5 and 6 to be selected as elective subject.



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PART - III CORE	Title : COMPLEX ANALYSIS	Subject Code : 17 PMS C41
Semester : IV	HOURS : 6 hours / Week	CREDITS : 5

Objectives:

To make the students to understand the concept in analytic function and cauchy's theorems

UNIT I:

The algebra of complex numbers, the geometrical representation of complex numbers.

UNIT II:

Introduction to the concept of analytic functions – elementary theory of power series, the exponential and trigonometric series.

UNIT III:

Conformality, linear transformations, elementary conformal mappings.

UNIT IV:

Fundamental theorems, Cauchy's integral formula, local properties of analytic functions.

UNIT V:

The general form of Cauchy's theorem. The calculus of residues.

Text Book:

COMPLEX ANALYSIS by L.V.Ahlfors III edition Mcgraw Hill, ISE, 1981

Unit – 1: Chapter 1 (sections: 1 and 2)

Unit – 2: Chapter 2 (sections: 1, 2, and 3)

Unit – 3: Chapter 3 (section: 2 (2.3), sec: 3 (3.1 and 3.2) sec: 4(4.1 and 4.2))

Unit – 4: Chapter 4 (sections: 1, 2, 3 (3.1 and 3.2))

Unit – 5: Chapter 4 (section 4 (4.3 and 4.4) sec: 5 (5.1 and 5.3))



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PART - III CORE	Title : NUMBER THEORY	Subject Code : 17 PMS C42
Semester : IV	HOURS : 6 hours / Week	CREDITS : 5

Objectives:

To study some important techniques in number theory and its applications.

UNIT I:

Introduction – Divisibility – G.C.D , Prime number – The fundamental theorem of arithmetic – The series of reciprocals of the prime – The Euclidean algorithm – G.C.D of more than 2 numbers – The Mobius function – Euler Totient, connecting relation Product formula – The Dirichlet product of arithmetic function, Dirichlet inverse and the Mobius inversion formula.

UNIT II:

The Mangold function, the multiplicative function and Dirichlet multiplication, the inverse of a completely multiplicative functions. Liouville's function – The divisor function, Generalized convolutions, formula power series, The bell series of an arithmetic function, bell series and Dirichlet multiplication, derivatives of arithmetic functions, the selberg identity Big on notation – Euler's summation formula.

UNIT III:

Definition and basic properties of congruences – residue classes and complete residue system – linear congruences reduced residues system and Euler Fermat's theorem – polynomial congruence modulo p – Lagrange's theorem – application of Lagrange's theorem.

UNIT IV:

Simultaneous linear congruence – Chinese remainder theorem, Application of Chinese remainder theorem – polynomial congruence with, prime power moduli – The principal of cross classification – decomposition property of reduced residue system, quadratic residue, Legendre's symbols and its properties – Evaluation of $(-1/p)$ and $(2/p)$ – Gauss lemma.

UNIT V:

The quadratic reciprocity law, application of reciprocity laws – Jacobi symbol, gauss sums and quadratic reciprocity law.

TEXT BOOK

Introduction to Analytic number Theory – T.M. Apostol (III Edition) Chapters 1,2,3,5 and 9. (Narosa publications 1991).



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PART - III CORE	Title : OPERATIONS RESEARCH	Subject Code : 17 PMS C43
Semester : IV	HOURS : 6 hours / Week	CREDITS : 5

Objectives:

To make the students to understand the concepts of PERT , CPM and Non LPP problems.

UNIT I:

Scope of Network applications – Definitions – minimal spanning tree algorithms – Shortest route problems using cyclic and acyclic algorithms – Maximal flow model (Algorithm only).

UNIT II:

CPM and PERT Network representation – critical path computations – Determination of floats – Total float and free float – PERT Networks.

UNIT III:

Why study queues?- Elements of a queueing model – Role of exponential distribution – Pure birth and death models – Generalized Poisson queueing model – steady state measures of performance – specialized Poisson Queue - $(M / M / 1) : (GD / \infty / \infty)$ - $(M / M / 1) : (GD / N / \infty)$

UNIT IV:

Classical optimization theory – Unconstrained problems – Necessary and Sufficient condition – Newton Raphson Method – Constrained problems – Equality constraints by Jacobian method – Lagrangean method and Kharush Kuhn Tucker (KKT) conditions. (Simple problem only)

UNIT V:

Non-linear programming – Unconstrained algorithms – Direct search method – Gradient method – Constrained algorithms – Geometric programming – Quadratic Programming model.

TEXT BOOK:

OPERATIONS RESEARCH, AN INTRODUCTION-6th edition by H.A.TAHA.

UNIT: 1 Chap 6- Section 6.1 to 6.3, 6.3.2 &6.4

UNIT: 2 Chap 6-Section 6.6, 6, 6.1,6.6.2&6.6.5

UNIT: 3 Chap 17-Sections 17.1 to 17.5

UNIT: 4 Chap 20-Section 20.1,20.2

UNIT: 5 Chap-21- Section-21.1, 21.1.1, 21.1.2, 21.2, 21.2.1 &21.2.2



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PART - III CORE	Title : STATISTICS- II	Subject Code : 17 PMS C44
Semester : IV	HOURS : 6 hours / Week	CREDITS : 5

Objectives:

To enable the students to acquire the knowledge in sampling theory and analysis of variance.

UNIT I:

Point estimation, confidence intervals for means, confidence intervals for Differences of means, Tests of Statistical Hypotheses, Chi-squared tests.

UNIT II:

Measures of quality of estimators, A sufficient statistic for a parameter, Properties of a sufficient statistic, completeness and uniqueness. The exponential class of Probability density functions.

UNIT III:

Fisher information and the Rao-Cramer inequality, Limiting Distribution of maximum likelihood estimators.

UNIT IV:

Certain best tests, uniformly most powerful tests, Likelihood ratio tests, the sequential probability ratio test.

UNIT V:

Distributions of certain quadratic Forms, A test of the equality of several means, Noncentral chi-square and noncentral F.

TEXT BOOK

Introduction to Mathematical Statistics, V Edition, by R.V.Hogg and A.T.Craig, Pearson Education, Asia, 2002.

UNIT I	: (Relevant sections in chapter 6).
UNIT II	: (Relevant sections in chapter 7)
UNIT III	: (Relevant sections in chapter 8)
UNIT IV	: (Relevant sections in chapter 9)
UNIT V	: (Relevant sections in chapter 10)



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PART - III ELECTIVE	Title : ADVANCED TOPOLOGY	Subject Code : 17 PMS E41
Semester : IV	HOURS : 6 hours / Week	CREDITS : 5

Objectives:

To enable the students to understand the advance concepts in topology.

UNIT – I

The Tychnoff Theorem – The Stone – Cech Compactification – Local finiteness.

UNIT – II

The Nagata – Smirnov theorem – Para compactness – The Smirnov metrization theorem.

UNIT – III

Complete metric spaces – A space filling curve.

UNIT – IV

Compactness in metric spaces – point wise and compact convergences – Ascoli's theorem

UNIT – V

Baire spaces – A nowhere differentiable function

Text book:

Topology by J.R.Munkres (second edition) – June 2002.

Unit – 1: chapter 5 – section 37, 38 & 6 – section 39

Unit – 2: chapter 6, section 40, 41, 42

Unit – 3: chapter – 7, section 43, 44

Unit – 4: chapter – 7, section 45, 46 & 47

Unit – 5: chapter – 8, section 48, 49



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PART - III ELECTIVE	Title : FUNCTIONAL ANALYSIS - II	Subject Code : 17 PMS E42
Semester : IV	HOURS : 6 hours / Week	CREDITS : 5

Objectives:

To make the students to understand the advance concepts in functional analysis.

Unit I:

Matrices – Determinants and spectrum of an operator – The spectral Theorem.

Unit II:

The definition and some examples – Regular and singular elements – Topological divisors of zero.

Unit III:

The spectrum – The formula for the spectral radius.

Unit IV:

The Gelfand mapping – applications of the formula $r(x) = \lim ||x^n||^{1/n}$.

Unit V:

Involution in Banach Algebras – The Gelfand Neuman theorem.

Text Book:

Introduction to Topology and Modern Analysis by G.F. Simmons – Tata Mc Graw Hill – 2004.

- Unit – 1: Chapter 11 – Sections 60,61,62
- Unit – 2: Chapter 12 – Sections 64,65,66
- Unit – 3: Chapter 12 – Sections 67,68
- Unit – 4: Chapter 13 – Sections 70,71
- Unit – 5: Chapter 10 – Sections 72,73