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**List of Allied Courses**

**Group I (Any one)**
1. Physics
2. Mathematical Statistics
3. Financial Accounting

**Group II (Any one)**
1. Chemistry
2. Computer Science
3. Management Accounting
Language Part – I - 4
English Part –II - 4
Core Paper - 14
Core Practical - 1
Allied Paper - 4
Allied Practical - 2
Non-Major Elective - 2
Skill Based Elective - 3
Major Based Elective - 3
Environmental Studies - 1
Value Education - 1
Soft Skill Development - 1
Gender Studies - 1
Extension Activities - 1 (Credit only)

* for those who studied Tamil upto 10\textsuperscript{th} +2 (Regular Stream)

+ Syllabus for other Languages should be on par with Tamil at degree level

# those who studied Tamil upto 10\textsuperscript{th} +2 but opt for other languages in degree level under Part I should study special Tamil in Part IV

** Extension Activities shall be out side instruction hours

Non Major Elective I & II – for those who studied Tamil under Part I

a) Basic Tamil I & II for other language students
b) Special Tamil I & II for those who studied Tamil upto 10\textsuperscript{th} or +2 but opt for other languages in degree programme

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**FOR THEORY**

The passing minimum for CIA shall be 40\% out of 25 marks [i.e. 10 marks]
The passing minimum for University Examinations shall be 40\% out of 75 marks [i.e. 30 marks]

**FOR PRACTICAL**

The passing minimum for CIA shall be 40\% out of 40 marks [i.e. 16 marks]
The passing minimum for University Examinations shall be 40\% out of 60 marks [i.e. 24 marks]

*****
CORE COURSE I

DIFFERENTIAL CALCULUS AND TRIGONOMETRY

Objectives

1. To inculcate the basics of differentiation and their applications.
2. To introduce the notion of curvatures, Evolutes & Involutes and polar co-ordinates.
3. To understand the basic concepts of Trigonometry

UNIT I

Methods of Successive Differentiation – Leibnitz’s Theorem and its applications-
Increasing & Decreasing functions – Maxima and Minima of function of two variables.

UNIT II

Curvature – Radius of curvature in Cartesian and in Polar Coordinates – Centre of
curvature–Evolutes & Involutes

UNIT III

Expansions of \( \sin (nx), \cos (nx), \tan (nx) \) – Expansions of \( \sin^n x, \cos^n x \) – Expansions of
\( \sin(x), \cos(x), \tan(x) \) in powers of \( x \).

UNIT IV

Hyperbolic functions – Relation between hyperbolic & Circular functions- Inverse
hyperbolic functions.

UNIT V

Logarithm of a complex number – Summation of Trigonometric series – Difference
method- Angles in arithmetic progression method – Gregory’s series

TEXT BOOKS:

1. S.Narayanan and T.K.Manicavachagom Pillai, Calculus Volume I, S.Viswanathan
2. S.Arumugam & others, Trigonometry and Fourier series, New Gamma
Publications -1999

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<th>Sections 1.1 to 2.2 &amp; Chapter IV Section 2.1, 2.2 and Chapter V 1.1 to 1.4 of [1]</th>
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<td>UNIT – II</td>
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<td>Chapter 1</td>
<td>Sections 1.2 to 1.4 of [2]</td>
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<td>Chapter 2</td>
<td>Sections 2.1 &amp; 2.2 of [2]</td>
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<td>UNIT – V</td>
<td>Chapter 3 &amp; Chapter 4 Sections 4.1,4.2 &amp; 4.4 of [2]</td>
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</tr>
</tbody>
</table>

REFERENCE(S)

2. S. Narayanan, T.K. Manichavasagam Pillai, Trigonometry, S. Viswanathan Pvt

*****
OBJECTIVES

1. To inculcate the basics of integration and their applications.
2. To study some applications of definite integrals.
3. To understand the concepts of Beta, Gamma functions

UNIT I
Revision of all integral models – simple problems –

UNIT II
Definite integrals - Integration by parts & reduction formula

UNIT III
Geometric Application of Integration - Area under plane curves: Cartesian co-ordinates - Area of a closed curve - Examples - Areas in polar co-ordinates.

UNIT IV
Double integrals – changing the order of Integration – Triple Integrals.

UNIT V
Beta & Gamma functions and the relation between them – Integration using Beta & Gamma functions

TEXT BOOK(S)


UNIT I : Chapter 1 section 1 to 10
UNIT II : Chapter 1 section 11, 12 & 13
UNIT III : Chapter 2 section 1.1, 1.2, 1.3 & 1.4
UNIT IV : Chapter 5 section 2.1, 2.2 & 4
UNIT V : Chapter 7 section 2.1 to 2.5

REFERENCE(S)

CORE COURSE III
DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

OBJECTIVES:
1. To know the order and degree of the ODE’s
2. To identify some specific methods and solve them
3. To make difference between ODE and PDE
4. To solve some standard methods
5. To know the concept of Laplace transforms and its inverse with applications

UNIT I
First order, higher degree differential equations solvable for x, solvable for y, solvable for dy/dx, Clairauts form – Conditions of integrability of M dx + N dy = 0 – simple problems.

UNIT II
Particular integrals of second order differential equations with constant coefficients - Linear equations with variable coefficients – Method of Variation of Parameters (Omit third & higher order equations).

UNIT III

UNIT IV
PDE of second order homogeneous equation with Constant coefficients – Particular integrals of the forms e^{ax+by}, Sin(ax+by), Cos(ax+by), x^r y^s and e^{ax+by}.f(x,y).

UNIT V
Laplace Transforms – Standard formulae – Basic theorems & simple applications – Inverse Laplace Transforms – Use of Laplace Transforms in solving ODE with constant coefficients.

TEXT BOOK
Unit : 1 Chapter IV – Sections 1,2 & 3, Chapter II – Section 6 [1]
Unit : 2 Chapter V – Sections 1,2,3,4 & 5, Chapter VIII – Section 4 [1]
Unit : 3 Chapter XII – Sections 1 – 6 [1]
Unit : 4 Chapter V [2]
Unit : 5 Chapter IX – Sections 1 – 8 [1]

Reference book:
1. M.D.Raisinghania, Ordinary and Partial Differential Equations, S.Chand & Co

*****
CORE COURSE IV
ANALYTICAL GEOMETRY 3D

OBJECTIVES :
1. To study 3 dimensional Cartesian Co-ordinates system
2. To enable the students to develop their skill in 3 dimensions

UNIT I
Coordinates in space-Direction consines of a line in space-angle between lines in space – equation of a plane in normal form. Angle between planes – Distance of a plane from a point.

UNIT II
Straight lines in space – line of intersection of planes – plane containing a line. Coplanar lines – skew lines and shortest distance between skew lines- length of the perpendicular from point to line.

UNIT III
General equation of a sphere-Section of sphere by plane-tangent planes –condition of tangency-system of spheres generated by two spheres - System of spheres generated by a sphere and plane.

UNIT IV
The equation of surface – cone – intersection of straight line and quadric cone – tangent plane and normal

UNIT V
Condition for plane to touch the quadric cone - angle between the lines in which the plane cuts the cone. Condition that the cone has three mutually perpendicular generators- Central quadrics – intersection of a line and quadric – tangents and tangent planes – condition for the plane to touch the conicoid

Books for Study
   Unit I : Chapter I, Sec 1.5 to 1.9, Chapter II Sec 2.1 to 2.3, Pages : 10-31,
   Chapter II Sec 2.4 to 2.8 pages : 32-47 of [1]
   Unit II : chapter III section 3.1-3.7, pages 55-89 of [1]
   Unit III : Chapter VI Sec. 6.1 to 6.6 pages : 121-143 of [1]
   Unit IV : Chapter V Sec.43 to 47 pages : 103-113 of [2]
   Unit V: Chapter V Sec.49 to 53, Pages:115-125 of [2]

Book for Reference

*****
CORE COURSE V
SEQUENCES AND SERIES

OBJECTIVES:
1. To lay a good foundation for classical analysis
2. To study the behavior of sequences and series.

Unit I
Sequences – Bounded Sequences – Monotonic Sequences – Convergent Sequence – Divergent Sequences – Oscillating sequences

Unit II
Algebra of Limits – Behavior of Monotonic functions

Unit III
Some theorems on limits – subsequences – limit points: Cauchy sequences

Unit IV
Series – infinite series – Cauchy’s general principal of convergence – Comparison – test theorem and test of convergence using comparison test (comparison test statement only, no proof)

Unit V
Test of convergence using D Alembert’s ratio test – Cauchy’s root test – Alternating Series – Absolute Convergence (Statement only for all tests)

Book for Study
Unit I : Chapter 3 : Sec. 3.0 – 3.5 Page No : 39-55
Unit II : Chapter 3 : Sec. 3.6, 3.7 Page No:56 – 82
Unit III : Chapter 3 : Sec. 3.8-3.11, Page No:82-102
Unit IV : Chapter 4 : Sec. (4.1 & 4.2) Page No : 112-128.
Unit V : Relevant part of Chapter 4 and Chapter 5: Sec. 5.1 & 5.2 Page No:157-167.

Book for Reference
1. Algebra – Prof. S.Surya Narayan Iyer
2. Algebra – Prof. M.I.Francis Raj

*****
CORE COURSE VI
CLASSICAL ALGEBRA AND THEORY OF NUMBERS

Objectives

1. To lay a good foundation for the study of Theory of Equations.
2. To train the students in operative algebra.

Unit I

Relation between roots & coefficients of Polynomial Equations – Symmetric functions – Sum of the rth Powers of the Roots

Unit II

Newton's theorem on the sum of the power of the roots - Transformations of Equations - Diminishing, Increasing & Multiplying the roots by a constant - Reciprocal equations - To increase or decrease the roots of the equation by a given quantity.

Unit III

Form of the quotient and remainder – Removal of terms – To form of an equation whose roots are any power – Transformation in general – Descart’s rule of sign

Unit IV


Unit V


Text Book(s)


Unit I : Chapter 6 Section 11 to 13 of (1)
Unit II : Chapter 6 Section 14 to 17 of (1)
Unit III : Chapter 6 Section 18- 21 & 24 of (1)
Unit IV : Chapter 4 of (2)
Unit V : Chapter 5 of (2)

References:


*****
NON-MAJOR ELECTIVE I

QUANTITATIVE APTITUDE I

Objectives:

1. To learn the problems solving techniques for aptitude problems
2. To enable to students prepare themselves for various competitive examinations

Unit I

Numbers – HCF – LCM – Problems on numbers

Unit II

Decimal Fractions and Simplification

Unit III

Surds and Indices – Percentage – Profit and Loss

Unit IV

Ratio and Proportion – Partnership – Allegation or Mixture

Unit V

Average – Problems on Age

Text Book:

Scope and treatment as in “Quantitative Aptitude” by R.S.Aggarwal, S.Chand & Company Ltd., Ram Nagar, New Delhi (2007)

Unit 1: (Chapters 1, 2 & 7)
Unit 2: (Chapter 3 & 4)
Unit 3: (Chapters 9, 10 & 11)
Unit 4: (Chapters 12, 13 & 20)
Unit 5: (Chapters 6 & 8)

*****
CORE COURSE VII
VECTOR CALCULUS AND FOURIER SERIES

Objectives:

To provide the basic knowledge of vector differentiation & vector integration.
To solve vector differentiation & integration problems.

UNIT I


UNIT II


UNIT III

Gauss Divergence Theorem – Stoke’s Theorem- Green’s Theorem – Simple problems & Verification of the theorems for simple problems.

UNIT IV

Fourier series- definition - Fourier Series expansion of periodic functions with Period $2\pi$ and period $2a$ – Use of odd & even functions in Fourier Series.

UNIT V

Half-range Fourier Series – definition- Development in Cosine series & in Sine series Change of interval – Combination of series

TEXT BOOK(S)


UNIT – I - Chapter 1 Section 1 & Chapter 2 Sections 2.3 to 2.6, 3, 4, 5, 7 of [1]
UNIT – II - Chapter 3 Sections 1, 2, 4 of [1]
UNIT – III - Chapter 3 Sections 5 & 6 of [2]
UNIT – IV - Chapter 6 Section 1, 2, 3 of [2]
UNIT – V - Chapter 6 Section 4, 5.1, 5.2, 6, 7 of [2]

Reference:

2. Dr. S.Arumugam and prof. A.Thangapandi Issac, Fourier series, New Gamma publishing house (Nov 12)

*****
CORE COURSE VIII
LINEAR ALGEBRA

Objectives
1. To facilitate a better understanding of vector space
2. To solve problems in linear algebra

Unit I Vector spaces:

Unit II Basis and Dimension:
Linear Independence – Basis and Dimension –Rank and Nullity.

Unit III Matrix and Inner product space:

Unit IV Theory of Matrices:

Unit V Characteristic equation and bilinear forms:
Characteristic equation and Cayley -Hamilton theorem – Eigen values and Eigen vectors

Textbook

Unit1: Chapter 5, Sec 5.1 to 5.4
Unit2: Chapter 5, Sec 5.5 to 5.7
Unit3: Chapter 5,Sec 5.8, Chapter 6, Sec 6.1 to 6.3
Unit4: Chapter 7 Sec 7.1 to 7.5
Unit5: Chapter 7, Sec 7.7, 7.8

References

*****
NON- MAJOR ELECTIVE II

QUANTITATIVE APTITUDE II

Objectives :
1. To learn the problems solving techniques for aptitude problems
2. To enable to students prepare themselves for various competitive examinations

Unit I

Chain Rule – Time and Work – Pipes and Cisterns

Unit II

Time and Distance – Problems on Trains – Boats and Streams

Unit III

Simple Interest – Compound Interest - Stocks and Shares.

Unit IV

Clocks – Area – Volume and Surface Area.

Unit V

Permutations and Combinations.

Text Book:

Scope and treatment as in “Quantitative Aptitude “by R.S.Aggarwal, S.Chand & company limited, Ram Nagar, New Delhi – 2015

Unit1: (Chapters 14, 15 & 16)
Unit 2: (Chapters 21, 22 & 29)
Unit 3: (Chapters 17, 18 & 19)
Unit 4: (Chapters 24, 25 & 28)
Unit 5: (Chapters 30 & 31)

*****
CORE COURSE IX
NUMERICAL METHODS WITH MATLAB PROGRAMMING

Objectives:
1. To introduce the exciting world of programming to the students through numerical methods.
2. To introduce the techniques of MATLAB programming.
3. To solve numerical problems using MATLAB programming.

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

Books for Study
1. Delores M.Etter, David C.Kuncicky, Holly Moore. Introduction to MATLAB, Published by Dorling Kindersley (india) Pvt. Ltd., licenses of Pearson Education in South Asia.
   Unit 1 : Chapter 2 & 3
   Unit 2 : Chapter 4 & 5
   Unit 3 : Chapter 8.
   Unit 4 : Chapter 2 section 1.7-1.8, Chapter 3, section 2, 4 and 5, Chapter 4, section 2, 6 of (2).
   Unit 5 : Chapter 6, sec 3, 4. Chapter 8, sec 4, Chapter 9, sec 8, 10, Chapter 11, sec 10, 16.

*****
CORE COURSE X
REAL ANALYSIS

Objectives: To enable the students to
1. Understand the real number system and countable concepts in real number system
2. Provide a Comprehensive idea about the real number system.
3. Understand the concepts of Continuity, Differentiation and Riemann Integrals
4. Learn Rolle’s Theorem and apply the Rolle’s theorem concepts.

UNIT I
Real Number system – Field axioms –Order relation in R. Absolute value of a real number & its properties –Supremum & Infimum of a set – Order completeness property – Countable & uncountable sets.

UNIT II

UNIT III

UNIT IV
Rolle’s Theorem – Mean Value Theorems on derivatives– Taylor’s Theorem with remainder- Power series expansion.

UNIT V

TEXT BOOK(S)
2. Shanthi Narayan, A Course of Mathematical Analysis, S. Chand & Co., 1995

UNIT – I - Chapter 1 of [1]
UNIT – II - Chapter 5 of [1]
UNIT – III - Chapter 6 – Sec 1 to 5 of [1]
UNIT – IV - Chapter 8 – Sec 1 to 6 of [1]
UNIT – V - Chapter 6 – Sec 6.2, 6.3, 6.5, 6.7, 6.9 of [2]

REFERENCE(S)

*****
CORE COURSE XI

STATICS

OBJECTIVE:

1. To provide the basic knowledge of equilibrium of a particle.
2. To develop a working knowledge to handle practical problems.

UNIT I

Introduction – Forces acting at a point: Triangle of forces – Resolution of force – Condition of equilibrium.

UNIT II

Parallel forces and Moments: Resultant of parallel forces – Theorems on Moments – Moment about an axis – couples.

UNIT III

Equilibrium of three forces acting on a rigid body: Conditions of equilibrium – Trigonometrical theorems and problems - Coplanar forces: Reduction of Coplanar forces – Equation of Line of action of the resultant – Conditions of equilibrium

UNIT IV


UNIT V

Equilibrium of strings: Equation of the Common Catenary -Parabolic Catenary.

TEXT BOOK:


UNIT I -Chapter1, Chapter2.
UNIT II -Chapter 3, Chapter 4.
UNIT III -Chapter 5 (Section 1-6), Chapter 6 (Section 1-12).
UNIT IV -Chapter 7 (Section 1-13) Pages: 206 – 238.
UNIT V -Chapter 9 (Section 1- 8)

REFERENCE(S)


*****

16
CORE PRACTICAL I

NUMERICAL METHODS WITH MATLAB PROGRAMMING (P)

Objectives:

1. To introduce the exciting world of programming to the students through numerical methods.
2. To introduce the techniques of MATLAB programming.
3. To solve numerical problems using MATLAB programming.

LIST OF PRACTICALS

1. Linear Interpolation
2. Linear Regression
3. Curve Fitting
4. Trapezoidal rule of integration
5. Simpson’s 1/3 rule of integration
7. Gauss – elimination method of solving simultaneous equations
8. Gauss – Seidal method of solving simultaneous equations
9. R-K fourth order method of solving differential equations
10. Lagrange’s method of interpolation.

*****
MAJOR BASED ELECTIVE I (A)
OPERATIONS RESEARCH

Objectives:
1. To introduce the various techniques of Operations Research.
2. To make the students solve real life problems in Business and Management

UNIT I
Linear programming problem - Mathematical formulation – Illustrations on Mathematical formulation on Linear Programming Problems – Graphical solution method - some exceptional cases - Canonical and standard forms of Linear Programming Problem - Simplex method.

UNIT II
Use of Artificial Variables (Big M method - Two phase method) – Duality in Linear Programming - General primal-dual pair - Formulating a Dual problem - Primal-dual pair in matrix form -Dual simplex method.

UNIT III

UNIT IV
Queuing theory - Queuing system - Classification of Queuing models - Poisson Queuing systems Model I (M/M/1)(∞/FIFO) only - Games and Strategies – Two person zero sum - Some basic terms - the maximin-minimax principle -Games without saddle points-Mixed strategies - graphic solution 2xn and mx2 games.

UNIT V
PERT and CPM – Basic components – logical sequencing - Rules of network construction- Critical path analysis - Probability considerations in PERT.

Book for Study:

Unit 1: Chapter 2 Sec 2.1 to 2.4, Chapter 3 Sec 3.1 to 3.5, Chapter 4 Sec 4.1 , 4.3
Unit 2: Chapter 4 Sec 4.4, Chapter 5 Sec 5.1 to 5.4, 5.9
Unit 3: Chapter 10 Sec 10.1, 10.2, 10.8, 10.9, 10.12, 10.13, Chapter 11 Sec 11.1 to 11.4
Unit 4: Chapter 21 Sec 21.1, 21.2, 21.7 to 21.9, Chapter 17 Sec 17.1 to 17.6
Unit 5: Chapter 25 Sec 25.1 to 25.4, 25.6, 25.7

Book for Reference:

*****
MAJOR BASED ELECTIVE I (B)

STOCHASTIC PROCESSES

OBJECTIVES

1. To know probability and distribution function
2. To understand the concept Stochastic Process
3. To identify Markov chains, Poisson Process and Birth and death Process
4. To know the concept of queuing theory with some examples

UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V

Stochastic Process in queuing and reliability – queuing systems – M/M/1 models – Birth and death process in queuing theory – Multi channel models – Bulk Queues.

TEXT BOOK

J. Medhi, Stochastic Processes, Chapters 1, 2, 3 (Omitting 3.6, 3.7, 3.8), Chapter 4 (Omitting 4.5 and 4.6) and Chapter 10 (Omitting 10.6, 10.7).
Unit 1: Chapter 1 – Sec 1.1, 1.2, 1.3, Appendix A 1, 2, 3, 4.
Unit 2: Chapter 2 – Sec 2.1, 2.2, 2.3 & Chapter 3 – Sec 3.1, 3.2.
Unit 3: Chapter 3 – Sec 3.4, 3.5, 3.6.
Unit 4: Chapter 4 – Sec 4.1, 4.2, 4.3, 4.4
Unit 5: Chapter 10 – Sec 10.1, 10.2, 10.3, 10.4, 10.5

REFERENCES


*****
CORE COURSE XII

ABSTRACT ALGEBRA

Objectives

1. To introduce the concept of Algebra from the basic set theory and Functions, etc.
2. To introduce the concept of Group theory and Rings.

UNIT I


UNIT II

Subgroups - Cyclic Groups-Order of an Element – Cosets and Lagrange’s Theorem.

UNIT III

Normal Subgroups and Quotient Groups - Isomorphism –Homomorphism

UNIT IV

Rings: Definitions and Examples - Elementary properties of rings -Isomorphism -Types of rings.-Characteristic of a ring – subrings – Ideals - Quotient rings

UNIT V

Maximal and Prime Ideals.-Homomorphism of rings – Field of quotient of an integral domain – unique factorization domain-Euclidean domain

Textbook


Unit 1: Chapter 3 Sections 3.1-3.4
Unit 2: Chapter 3 Sections3.5-3.8
Unit 3: Chapter 3 Sections 3.9-3.11
Unit 4: Chapter 4 Sections 4.1-4.8
Unit 5: Chapter 4 Sections 4.9- 4.11, 4.13-14

References

CORE COURSE XIII
COMPLEX ANALYSIS

Objectives: To enable the students to

1. Understand the functions of complex variables, continuity and differentiation of complex variable functions, C – R equations of analytic functions.
2. Learn about elementary transformation concepts in complex variable.
3. Know about complex Integral functions with Cauchy’s Theorem, power series expansions of Taylor’s and Laurant’s series.
4. Understand the singularity concepts and residues, solving definite integrals using the residue concepts.

UNIT I

UNIT II
Elementary transformations - Bilinear transformations – Cross ratio – fixed points of Bilinear Transformation – Some special bilinear transformations.

UNIT III
Complex integration - definite integral – Cauchy’s Theorem –Cauchy’s integral formula –Higher derivatives - .

UNIT IV

UNIT V
Residues – Cauchy’s Residue Theorem –Evaluation of definite integrals.

TEXT BOOK(S)
UNIT – I -Chapter 2 section 2.1 to 2.8 of Text Book
UNIT – II -Chapter 3 Sections 3.1 to 3.5 of Text Book
UNIT – III -Chapter 6 sections 6.1 to6.4 of Text Book
UNIT –IV -Chapter 7 Sections 7.1 to 7.4 of Text Book
UNIT – V -Chapter 8 Sections 8.1 to 8.3 of Text Book

REFERENCE(S)

*****
CORE COURSE XIV

DYNAMICS

OBJECTIVE:

1. To provide a basic knowledge of the behavior of objects in motion.
2. To develop a working knowledge to handle practical problems.

UNIT I

Introduction-Kinematics: Velocity-Relative Velocity-Angular Velocity-Acceleration-Relative Acceleration-Motion in a straight line under uniform acceleration.

UNIT II

Projectile: Projectile-Path of a projectile-Characteristics-Horizontal projection-Projectile up/down an inclined plane-Enveloping parabola.

UNIT III


UNIT IV

Simple Harmonic Motion: Introduction-S.H.M. in straight line-Compositions of simple harmonic motions of the same period.

UNIT V

Motion Under The action Of Central Forces: Velocity and acceleration in polar coordinates-Equiangular spiral-Differential Equation of central orbits-Pedal Equation of the central orbit-Two-fold problems in central orbits.

TEXT BOOK:


   UNIT I - Chapter2, Chapter 3, Section 3.1-3.22
   UNIT II - Chapter6, Sections 6.1-6.17
   UNIT III - Chapter8, Sections 8.1-8.11
   UNIT IV - Chapter 10, Sections 10.1-10.13
   UNIT V - Chapter 11, Sections 11.1-11.13

REFERENCE(S)


*****
MAJOR BASED ELECTIVE II (A)

GRAPH THEORY

Objectives

1. To introduce the notion of graph theory and its applications.
2. To learn the techniques of combinatorics in Graph Theory.

UNIT I

Introduction - The Konigsberg Bridge Problem - Graphs and subgraphs: Definition and Examples - Degrees - Subgraphs - Isomorphism. –independent sets and coverings.

UNIT II

Matrices - Operations on Graphs - Walks, Trails and Paths – Connectedness and Components - Eulerian Graphs.

UNIT III

Hamiltonian Graphs (Omit Chavatal Theorem) - Characterization of Trees - Centre of a Tree.

UNIT IV


UNIT V


Textbook


UNIT-I Chapter-1 Sec 1.0, 1.1 and Chapter -2 Sec 2.0, 2.1, 2.2, 2.3, 2.4.2.6
UNIT-II Chapter-2 Sec 2.8,2.9 ,Chapter-4 Sec 4.1,4.2 and Chapter-5 Sec 5.0,5.1
UNIT-III Chapter-5 Sec 5.2, Chapter-6 Sec 6.0, 6.1, 6.2.
UNIT-IV Chapter-8 Sec 8.0, 8.1, 8.2. 
UNIT-V Chapter-10 Sec 10.0, 10.1 Chapter-11 Sec 11.0, 11.1, 11.2

References

1. Narasimh Deo, Graph Theory with applications to Engineering and Computer Science, Prentice Hall of India, 2004.

*****
MAJOR BASED ELECTIVE II (B)
MATHEMATICAL MODELLING

OBJECTIVES

1. To study the mathematical models through ode and difference equations
2. To train the students to develop mathematical models in real life problems

UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V

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

TEXT BOOK(S)

   Unit 1: Chap 2, Sec 2.1 – 2.6
   Unit 2: Chap 3, Sec 3.1 – 3.6
   Unit 3: Chap 4, Sec 4.1 – 4.4
   Unit 4: Chap 5, Sec 5.1 – 5.5
   Unit 5: Chap 7, Sec 7.1 – 7.5

REFERENCE(S)

MAJOR BASED ELECTIVE III (A)

ASTRONOMY

Objectives:
1. To introduce the exciting world of astronomy to the students.
2. To help the students to study spherical trigonometry in the field of astronomy.
3. To understand the movements of the celestial objects.

UNIT I

Relevant properties of sphere and formulae in spherical trigonometry (no proof, no problems) - Celestial sphere and diurnal motion - Celestial coordinates - Sidereal time.

UNIT II

Morning and evening stars - Circumpolar stars - Diagram of the celestial sphere - Zones of earth - Perpetual day - Dip of horizon - Twilight.

UNIT III

Refraction - Laws of refraction - Tangent formula - Cassini’s formula - Horizontal refraction - Geocentric parallax - Horizontal parallax.

UNIT IV

Kepler’s laws - Verification of 1st and 2nd laws in the case of earth - Anomalies - Kepler’s equation - Seasons - Causes - Kinds of years.

UNIT V

Moon - Sidereal and Synodic months - Elongation - Phase of moon - Eclipses - Umbra and Penumbra - Lunar and Solar eclipses - Ecliptic limits - Maximum and minimum number of eclipses near a node and in a year - Saros.

Book for Study:

   Unit 1: Sec: 39-79
   Unit 2: Sec: 80-90, 106-116
   Unit 3: Sec: 117-144
   Unit 4: Sec: 146-162, 173-178
   Unit 5: Sec: 229-241, 256-275

Book for Reference:

*****
MAJOR BASED ELECTIVE III (B)

NUMBER THEORY

OBJECTIVES:

1. To highlight the niceties and nuances in the world of numbers.
2. To prepare the students for coding through congruences.

Unit I

Euclid’s Division Lemma – Divisibility – The Linear Diophantine Equation – The Fundamental Theorem of Arithmetic

Unit II

Permutations and Combinations – Fermat’s Little Theorem – Wilson’s Theorem – Generating Functions

Unit III


Unit IV

The Chinese Remainder Theorem – Polynomial Congruences – Combinational Study of \( F(n) \).

Unit V

Formulae for \( d(n) \) and \( s(n) \) – Multiplicative Arithmetic Function – The Mobius Inversion Formula.

Books for Study


   Unit I : Chapter - 2 Sec. 2.1 – 2.4 pages 12-29
   Unit II : Chapter – 3 Sec. 3.1, 3.4 pages 30-44
   Unit III : Chapter – 4Sec. 4.1 – 4.2 Pages 49 – 55, Sec. 5.1- 5.2 Pages 58-65
   Unit IV : Chapter – 4 Sec. 5.3 – 5.4 pages 66-74, Sec. 6.1 Pages 75-81
   Unit V : Chapter – 5 Sec. 6.2 – 6.3 Pages 82-92

Books for Reference


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