YEAR - III		**Sub Code**
SEMESTER - V	**ABSTRACT ALGEBRA**	**Hrs / Week: 6**
CORE PAPER - 8		**Credit: 5**

OBJECTIVE:
To learn from basic algebra concepts to higher algebra Concepts

UNIT - I

GROUPS
Definition of a Group - Examples - Subgroups - simple problems.

UNIT - II

GROUP [CONTD]
Counting Principle - Normal Subgroups - Homomorphism - simple problems.

UNIT - III

GROUP [CONTD]
Automorphisms - Cayley's Theorem - Permutation Groups - simple problems.

UNIT - IV

RINGS
Definition and Examples - Integral Domain - Homomorphism of Rings - Ideals and Quotient Rings - simple problems.

UNIT - V

RINGS [CONTD]
Prime Ideal and Maximal Ideal - The field of quotients of an Integral domain - Euclidean rings - simple problems.

Text book:
I.N.Herstein.[1989], "Topics in Algebra",[2nd ed] Wiley Eastern Ltd. New Delhi.
Chapter:2 (Sec: 2.1 - 2.10 [Omit Applications 1 and 2 of 2.7]),
Chapter : 3 (Sec: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7)

Reference books:

1. S.Arumugam[2004], "Modern Algebra", SciTech Publications, Chennai.
2. J.B.Fraleigh [1987], "A First Course in Algebra", [3rd edition] Addison Wesley, Mass. [Indian Print]
3. Lloyd R.Jaisingh and Frank Ayres,Jr. [2005], "Abstract Algebra", [2nd edition], Tat McGraw Hill, New Delhi.
4. M.L.Santiago[2002], "Modern Algebra", Tat McGraw Hill, New Delhi
5. SurjeetSingh and Qazi Zameeruddin[1982], "Modern algebra", Vikas Publishing House Pvt.Ltd. New Delhi.

Course outcome:

At the end of the course

CO1: Students able to identify groups and subgroups.
CO2: Students able to understand homomorphism and isomorphism.
CO3: Students able to do the problems in permutation.
CO4: Students able to study the basics of rings, ideals and integral domain.
CO5: Students able to apply Euclidean rings in theorems**.**

PAPER - 9

REAL ANALYSIS I

Objectives

To understand various limiting behavior of sequences and series

To explore the various limiting processes viz.continuity, uniform continuity, differentiability and integrability and to enhance the mathematical maturity and to work comfortably with concepts.

UNIT - I

FUNCTIONS & SEQUENCES

Functions - real valued functions - equivalence - countability and real numbers - least upper bound - definition of sequence and subsequence - limit of a sequence - convergent sequence - Simple problems.

Ch. 1.4 to 1.7, 2.1 to 2.3.

UNIT - II

SEQUENCES [CONTD...]

Divergent sequences - Bounded sequences - Monotone sequence - Operations on convergent sequences - Operations on divergent sequences - Limit superior and Limit inferior - Cauchy sequences - Simple problems.

Ch. 2.4 to 2.10.

UNIT - III

SERIES OF REAL NUMBERS

Convergence and Divergence - Series with non negative terms - Alternating series - conditional convergence and Absolute convergence - Test for Absolute convergence - Simple problems.

Ch. 3.1 to 3.4 and 3.6.

UNIT - IV

SERIES OF REAL NUMBERS [CONTD...]

Test for Absolute convergence - The class ℓ^2 - Limit of a function on the real line - Metric spaces - Limits in Metric spaces - Simple problems.

Ch. 3.7, 3.10, 4.1 to 4.3.

UNIT - V

CONTINUOUS FUNCTIONS ON METRIC SPACES

Functions Continuous at a point on the real line - Reformulation - Functions Continuous on a Metric Spaces - Open Sets - Closed Sets - simple problems.

Ch. 5.1 to 5.5.

Recommended Text

R.Goldberg [2000] Methods of Real Analysis. Oxford & IBH Publishing Co., New Delhi.

Reference Books

1. Tom M.Apostol [1974] Mathematical Analysis, 2nd Edition, Addison-Wesley New York.
2. Bartle, R.G. and Shebert [1976] Real Analysis, John Wiley and Sons Inc., New York.
3. Malik, S.C. and SavitaArora [1991] Mathematical Analysis, Wiley Eastern Limited, New Delhi.
4. Sanjay Arora and BansiLal [1991], Introduction to Real Analysis, SatyaPrakashan, New Delhi.

Course Outcomes

At the end of the course the student should be able to

1. know the concept countability
2. identify convergent, divergent sequences
3. solve conditional convergence and absolute convergence problems
4. evaluate limit of a function
5. know the concepts of open, closed sets.

PAPER - 10

COMPLEX ANALYSIS - I

Objectives

This course provides

(i) a modern treatment of concepts and techniques of complex function theory

(ii) To gain knowledge about the complex number system, the complex function and complex integration.

UNIT - I

COMPLEX NUMBERS, MAPPINGS AND LIMITS.

Complex Numbers - Complex number system - Algebraic properties - Geometric Interpretation - Properties of Moduli - Polar form - Regions in the complex plane - Mappings - Limits - Theorems on Limits - simple problems.

UNIT - II

ANALYTIC FUNCTIONS

Continuity - Derivatives and Differentiation formulas - Cauchy-Riemann equations - Sufficient conditions - Cauchy - Riemann equations in polar form - properties of Analytic functions - Necessary and sufficient conditions for Analytic functions - problems.

UNIT - III

CONFORMAL MAPPINGS

Harmonic functions - Determination of Harmonic conjugate - Conformal mapping - Isogonal mapping - Further properties and examples - transformations of Harmonic functions - simple problems.

UNIT - IV

MAPPING BY ELEMENTARY FUNCTIONS

The transformations $w = z + d,\ w = \frac{1}{z},\ w = z^2,\ w = \sqrt{z},\ w = e^z,\ w = \sin z$ - Bilinear Transformation and special Bilinear Transformation - problems.

UNIT - V

INTEGRALS

Contours - Line Integrals - Cauchy-Goursat's Theorem (without proof) - Cauchy's Integral Formula - Derivatives of Analytic Functions - problems.

Recommended Text

R.V.Churchill and J.W.Brown, (1984) *Complex Variables and Applications*. McGraw Hill International Book Co., Singapore. (Fourth Edition)

UNIT 1	Chapter 1	Section 1 to 5, 8
	Chapter 2	Section 10, 11, 12
UNIT 2	Chapter 2	Section 13 to 19
UNIT 3	Chapter 2	Section 20
	Chapter 8	Section 74, 75, 76, 77
UNIT 4	Chapter 7	Section 63 to 68, 70, 71
UNIT 5	Chapter 4	Section 29 to 33, 38, 39

Reference Books:

1. P. Duraipandian and LaxmiDuraipandian Complex Analysis: Emerald Publishers, Chennai. 1976.
2. S. Ponnusamy. Foundations of Complex Analysis, Narosa Publishing House, New Delhi. 2000.
3. Tyagi B.S. Functions of Complex Variable, 17th Edition, PragatiPrakasham Publishing Company Ltd., Meerut, 1992 - 93.

Course Outcomes

At the end of the course

(i) The students can gain knowledge about Complex functions and its nature, limits and Analytic functions.

(ii) The students can gain knowledge about elementary transformations.

(iii) The students can gain knowledge about line integrals and techniques for solving problems.

PAPER - 11

A. PROGRAMMING IN C LANGUAGE

Objectives

To develop programming skill in the Computer Language C

UNIT - I

C Constants, variables, Data-type, Declaration of variables, assigning values to variables.
Chapter 2: Sections: 2.1 - 2.10

UNIT - II

OPERATORS, EXPRESSION AND INPUT OUTPUT OPERATIONS
Arithmetic, Relational, Logical, Assignment, Increment and decrement, Conditional, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic operators, Formatted input and output.
Chapter 3: Sections: 3.1 - 3.7, 3.10 - 3.12 and Chapter 4: Sections: 4.1 - 4.5

UNIT - III

DECISION MAKING: BRANCHING AND LOOPING
If, simple if, If else, Nesting of if - else, Else - If ladder, Switch statement, the?: operator, Go to statement. Decision making with looping: While, Do, for statement, Jumps in loops.
Chapter 5: Sections: 5.1 - 5.9, 6.1 - 6.5

UNIT - IV

ARRAYS
One - dimensional array, two - dimensional array, Multi - dimensional arrays.
Chapter 7: Sections: 7.1 - 7.7

UNIT - V

USER-DEFINED FUNCTION
Need for User-defined function, Multi-function program, the form of C-Function, Return Value and their types, Recursion.
Chapter 9: Sections: 9.1 - 9.6, 9.16

POINTERS:
Declaration, initialization of Pointer variables, Pointer expressions**.**
Chapter 11: Sections: 11.4 - 11.5, 11.8

Recommended Text

E.Balagurusamy. *Programming in* ANSI *C*. Fifth Edition Tata McGraw Hill, New Delhi

Reference Books

1. V.Rajaraman. (1995) *Computer Programming in C*. Prentice Hall, New Delhi.
2. AnanthiSheshasaayee and J.G.Sheshasaayee. *(2005)Programming Language C with Practicals*, Margham Publications.
3. H. Schildt, Obsborne. (1994) *Teach Yourself C* McGraw Hill. New York.
4. Mullish Cooper. *The Spirit of C- An Introduction to Modern Programming.*Jaico Publishing House. Delhi. 1998.
5. Yashavantkanetkar, let us C, 16TH edition BPB publication.
6. Dr.P.Rizwan Ahmed, Programming in C, Margham Publications, 2016.

PRACTICAL - 1

A. PRACTICAL IN C LANGUAGE

Objectives

This computer practice course aims to provide strong logical thinking and error-free syntax codes writing, to master the debugging techniques and to present the results in neat form in C Language for numerical methods. Students will be able to solve problems numerically whenever theoretical methods are not available.

The following exercises shall be performed as minimum mandatory requirements (for eligibility to take the practical examination) and a RECORD of the code-listing and outputs shall be maintained by each student.

1. Square of numbers: Using For loop, While loop, Do-While loop, Goto statement.
2. Solution of a quadratic equation.
3. Characters between two given characters.
4. Counting the number of vowels and consonants in a sentence.
5. 3x3 matrix addition and multiplication.
6. Prime numbers between two give numbers.
7. Simple interest and Compound Interest.
8. Fibonacci series developing and finding the nth tem of Fibonacci series.
9. Factorial numbers- Binomial Coefficient using function recursion.
10. Pascal's triangle development using recursion.
11. Power of a value - use a function in the name power.
12. Print an array of integers in reverse order using pointer.
13. Interchange sort in ascending or descending.

Note: Mathematics faculty should be appointed as an Examiner.

Reference Books

1. AnanthiSheshasaayee and J.G.Sheshasaayee. *(2005)Programming Language C with Practicals*, Margham Publications.
2. The spirit of C, Mullish Cooper, Indian Edition by Jaico Publishers, 1987.
3. Teach yourself C, Herbert Schildt, ObsbomeMegrawhill, 2nd Edition 1994.

Programming in C, Schaum Series.

ELECTIVE

PAPER - 1
(to choose 1 out of the given 2)

A. LINEAR PROGRAMMING

OBJECTIVES

The course aim is to introduce various techniques of Operations Research, linear programming, transportation methods, assignment models, and, game theory.

UNIT - I

Linear programming problem - Mathematical formulation of the problem - Graphical solution method - Simplex method - The Big-M method -Duality - Dual simplex method (Simple Problems).

UNIT - II

Definitions of the transportation model - Formulation and solution of transportation models - Finding an initial basic feasible solution (NWCM - LCM -VAM) - Degeneracy in Transportation Problem - Transportation Algorithm (MODI Method)

UNIT - III

Definition of Assignment models - Mathematical representation of assignment models - Comparison with the transportation models - Solution of the assignment model - The Hungarian methods for solution of the assignment models - variation of the assignment problem .Travelling salesman problem.

UNIT - IV

Games and Strategies - Two person zero sum - Some basic terms - the maximin-minimax principle - saddle points - Games without saddle points-Mixed strategies - graphic solution 2xn and mx2 games.

UNIT - V

Simulation - application - advantages and disadvantages - Monte Carlo method - simple problems.

Recommended Text

Gupta P.K.and Hira D.S., (2000) Problems in Operations Research, S.Chand & Co. Delhi

Reference Books

1. J.K.Sharma, (2001) Operations Research: Theory and Applications, Macmillan, Delhi
2. KantiSwaroop, Gupta P.K. and Manmohan, (1999) *Problems in Operations Research,* Sultan Chand & Sons., Delhi.
3. V.K.Kapoor [1989] *Operations Research,* sultan Chand & sons.
4. Ravindran A., Philips D.T. and Solberg J.J., (1987) *Operations research*, John Wiley & Sons, New York.
5. Taha H.A. (2003) *Operations Research,* Macmillan Publishing Company, New York.
6. S.J.Venkatesan, *Operations Research,* J.S. Publishers, Cheyyar-604 407.

Course Outcomes

At the end of the course the student should be able to

1. formulate any real world problem as LPP
2. understand various techniques of simplex method.
3. understand analogies between transportation problem and assignment models
4. interpret the solutions in game theory.
5. know the concept of simulation.

B. SPECIAL FUNCTIONS

Objectives

To develop computational skill in certain special functions which are frequently occurring in higher mathematics and mathematical physics.

UNIT - I

Properties of Linear Operators - Simultaneous Linear Differential Equations -

UNIT - II

Special Solvable Types of Nonlinear Equations. Numerical Solutions Using Taylor Series

UNIT - III

Adams and Modified Adams Method - Extrapolation with Differences Properties of Power Series - Examples

UNIT - IV

Singular Points of Linear Second Order Differential Equations - Method of Frobenius.

UNIT - V

Bessel Functions - Properties - Legendre Functions.

Recommended Text

F.B.Hildebrand. (1977) *Advanced Calculus for Applications.*Prentice Hall. New Jersey.

Reference Books

1. J.N.Sharma and R.K.Gupta (1998) *Special Functions*, Krishna PrakashanMandir, Meerut.
2. SatyaPrakash. (2004)*Mathematical Physics.* Sultan & Sons. New Delhi.
3. B.D.Gupta (1978) Mathematical Physics, Vikas Publishing House.

SKILL BASED SUBJECT

PAPER - 3

MATHEMATICS FOR COMPETETIVE EXAMINATIONS - III

UNIT - I

Simple Interest.

UNIT - II

Compound Interest

UNIT - III

Logarithms - Races and Games of Skill.

UNIT - IV

Area

UNIT - V

Volume and surface areas.

Text Book:-

Quantitative Aptitude for competitive Examination, R.S.Aggarwal. S.Chand and company Ltd, 152, Anna salai, Chennai. 2001

YEAR - III		**Sub Code**
SEMESTER - VI	**LINEAR ALGEBRA**	**Hrs / Week: 6**
CORE PAPER – 12		**Credit: 5**

Objectives:
Continue to learn Abstract Algebra and we study about Vector Spaces and its linear equations.

UNIT - I

VECTOR SPACES
Linear dependence and independence - Bases – Dimension - Definition and examples.

UNIT - II

VECTOR SPACES [CONTD]
Dual space - Annihilator of a Subspace - inner product spaces - Schwarz Inequality - Orthonormal Vectors - Orthogonal Complement

UNIT - III

LINEAR TRANSFORMATIONS
Algebra of linear transformations - Sub Algebra - Minimal Polynomial - Invertible - characteristics roots - Characteristic Vectors.

UNIT - IV

LINEAR TRANSFORMATIONS [CONTD]
Matrices - Matrix of a Linear Transformation and its Properties- canonical forms - triangular forms - Invariant Transformation - Triangular Matrix of 'T'

UNIT - V

LINEAR TRANSFORMATIONS [CONTD]
Trace and Transpose: Definition and Properties-Jacobson Lemma- Symmetric, Skew Symmetric and Adjoint of a matrix - Determinants: Definition and Properties- Solving system of Linear Equation-Secular Equation.

Text book:
I.N.Herstein [1989], "Topics in Algebra", Wiley Eastern Ltd. New Delhi.
Chapters - 4 & 6(Sec: 4.1, 4.2, 4.3, 4.4 & 6.1, 6.2, 6.3, 6.4, 6.8, 6.9).

Reference books:
1. S.Arumugam.[2004], "Modern Algebra", Scitech Publications, Chennai.
2.J.B.Fraleigh [1987], "A First Course in Algebra", [3rd edition] Addison Wesley, Mass. [Indian Print]
3. Lloyd R.Jaisingh and Frank Ayres,Jr. [2005], "Abstract Algebra", [2nd edition], Tata McGraw Hill, New Delhi.

4. M.L.Santiago[2002], “Modern Algebra”, Tata McGraw Hill, New Delhi
5. Surjeet Singh and Qazi Zameeruddin[1982], “Modern algebra”, Vikas Publishing House Pvt.Ltd. New Delhi.

Course Outcomes:

This paper will make the students to learn to convert Vector Spaces to Algebraic equations.
CO1: Beginning with Linear Dependence and Linear Independence on Vector Space
CO2: Knowing about Dual spaces and Inner product spaces on Vector space
CO3: Learning to study about Algebra of Linear transformations and its characteristic roots
CO4: Converting Linear equations of Vector space to Matrices its canonical and triangular forms
CO5: Deriving Trace and Transpose of Matrices.

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REAL ANALYSIS II

Objectives

To understand Integration process of Riemann
To develop the understanding of point wise and uniform convergence of sequence and series of functions.
To enhance the mathematical maturity and to work comfortably with concepts.

UNIT - I

CONNECTEDNESS, COMPLETENESS
Open Sets - Connected Sets - Bounded Sets and Totally Bounded Sets - Complete Metric Spaces - simple problems. Ch. 6.1 to 6.4 of Goldberg

UNIT - II

COMPACTNESS
Compact Metric Space - Continuous Functions on Compact Metric Spaces - Continuity of Inverse Functions - Uniform Continuity - simple problems.
Ch. 6.5 to 6.8 of Goldberg

UNIT - III

RIEMANN INTEGRATION
Sets of measure zero - Definition Riemann Integral - Properties of Riemann Integral - Derivatives - simple problems.
Ch. 7.1, 7.2 7.4, 7.5 of Goldberg.

UNIT - IV

RIEMANN INTEGRATION [CONTD...]
Rolle's Theorem - The law of mean - Fundamental theorems of calculus - Taylor's theorem - simple problems.
Ch. 7.6 to 7.8 and 8.5 of Goldberg.

UNIT - V

SEQUENCES AND SERIES OF FUNCTIONS
Pointwise convergence of sequences of functions - Uniform convergence of sequences of functions - consequences of uniform convergence - Convergence and uniform convergence of series of functions - simple problems.
Ch. 9.1 to 9.4 of Goldberg.

Recommended Text

R.Goldberg Methods of Real Analysis Oxford & IBH Publishing Co., New Delhi.

Reference Books

1. Tom M.Apostol [1974] Mathematical Analysis, 2nd Edition, Addison-Wesley Publishing Company Inc. New York.
2. Bartle, R.G. and Shebert [1976] Real Analysis, John Wiley and Sons Inc., New York,
3. Malik, S.C. and Savita Arora [1991] Mathematical Analysis, Wiley Eastern Limited, New Delhi.
4. Sanjay Arora and Bansi Lal [1991] Introduction to Real Analysis, Satya Prakashan, New Delhi.

Course Outcomes

At the end of the course the student should be able to

[1] understand the concept of complete metric space
[2] know the difference between continuity and uniform continuity
[3] know Riemann integration and its properties
[4] solve problems related to Rolle's theorem , law of mean
[5] know the convergence of sequences of functions.

PAPER - 14

COMPLEX ANALYSIS II

Objectives:

(1) To gain knowledge about complex Integration and series.

(2) This course provides methods to solve problems in pure as well as in applied mathematics.

UNIT - I

INTEGRALS

Morera's theorem - Maximum Moduli of functions - The fundamental theorem of Algebra - Liouville's theorem and the Fundamental Theorem on Algebra - convergence of sequences and series.

UNIT - II

POWER SERIES

Taylor's and Laurent's theorem - Examples - Integration and differentiation of power series - problems.

UNIT - III

SINGULARITIES AND RESIDUES

Singularities and classifications - Isolated singularties- Removable singularity, Pole and essential singularity - Residues - Cauchy's Residue theorem - problems.

UNIT - IV

CONTOUR INTEGRATION

Evaluation of Improper Real Integrals - Improper integrals involving Trigonometric functions - simple problems.

UNIT - V

ANALYTIC CONTINUATION

Zeros of Analytic functions - Poles and zeros - Essential singular points -Number of zeros and poles - The Argument principle - Rouchestheorem -simple problems.

Recommended Text

R.V.Churchill and J.W.Brown, (1984) *Complex Variables and Applications*. McGraw Hill International Book Co., Singapore. (Fourth Edition)

Unit 1	Chapter 4	Section 40 to 42
	Chapter 5	Section 43
Unit 2	Chapter 5	Section 44, 45, 46, 49
Unit 3	Chapter 6	Section 54 to 57
Unit 4	Chapter 6	Section 59, 60, 61
Unit 5	Chapter 5	Section 53
	Chapter 12	Section 106, 107, 108, 109

Reference Books

1. P. Duraipandian and Laxmi Duraipandian. Complex Analysis: Emerald Publishers, Chennai. 1976.
2. S. Ponnusamy. Foundations of Complex Analysis, Narosa Publishing House, New Delhi. 2000.
3. Tyagi B.S. Functions of Complex Variable, 17^{th} Edition, Pragati Prakasham Publishing Company Ltd., Meerut, 1992 - 93.

Course Outcomes

1. The students can gain knowledge about Contour integration and problem solving techniques.
2. The students can learn about singularities and Residues.
3. The students can gain knowledge about power series expansions of analytic functions.

COMPULSORY PROJECT

A Project in under graduate level should be submitted by the students with the guidance of allotted guide.

ELECTIVE
(to choose 1 out of the given 2)

PAPER - 2

A. GRAPH THEORY

Objectives

To study and develop the concepts of graphs, subgraphs, connectivity, Eulerian and Hamiltonian graphs, Ramsey numbers and trees.

UNIT - I

Graphs - subgraphs - Degree of a vertex - Isomorphism of graphs -Ramsey numbers - independent sets and coverings.

UNIT - II

Intersection graphs - Adjacency and incidence of matrices - Operations on graphs - Simple problems.

UNIT - III

Walks, trails and paths - Connectedness and components - cut points - bridges - blocks.

UNIT - IV

Connectivity theorems and simple problems –Trees - Theorems and simple problems.

UNIT - V

Eulerian graphs and Hamiltonian graphs - Necessary and sufficient conditions - Theorems and simple problems.

Recommended Text

S.Arumugam and S.Ramachandran, "Invitation to Graph Theory", SCITECH Publications India Pvt. Ltd., T.Nagar, Chennai - 17. 2001.

Unit 1	Chapter 2	Section 2.1 to 2.6
Unit 2	Chapter 2	Section 2.7 to 2.9
Unit 3	Chapter 4	Section 4.1 to 4.3
Unit 4	Chapter 4	Section 4.4
	Chapter 6	Section 6.1, 6.2
Unit 5	Chapter 5	Section 5.1, 5.2

Reference Books

1. S.Kumaravelu, SusheelaKumaravelu, Graph Theory, Publishers, Nagercoil-629 002.

2. S.A.Choudham, A First Course in Graph Theory, Macmillan India Ltd.

3. Robin J.Wilson, Introduction to Graph Theory, Longman Group Ltd.

Course Outcomes

(i) After studying this course the students know about the basic foundations of graphs, subgraphs and trees.

(ii) The students can learn about connected graphs, Eulerian graphs and Hamiltonian graphs.

B. DISCRETE MATHEMATICS

Objectives

This course aims to develop mathematical maturity and ability to deal with abstraction and to develop construction and verification of formal logical manipulation.

UNIT - I

RECURRENCE RELATIONS AND GENERATING FUNCTIONS
Recurrence - Polynomials and their Evaluations - Recurrence Relations - Solution of Finite OrderHomogeneous [linear] Relations - Solutions of Non-homogeneous Relations.

UNIT - II

MATHEMATICAL LOGIC
TF Statements - Connectives - Atomic and Compound Statements - Well-formed [Statement Formulae] - Parsing - Truth Table of a Formula - Tautology - Tautological Implications and Equivalence of Formulae.

UNIT - III

MATHEMATICAL LOGIC [CONTD..]
Replacement process - Functionally complete sets of connectives and Duality law - Normal Forms - Principal Normal Forms.

UNIT - IV

LATTICES
Lattices [omit example 15 Pp No.10.6) - Some properties of Lattices - New Lattices (omit remarkPp 10.14) - Modular and Distributive Lattices (omit theorem 10 and 17, Example 4 - Pp 10.23,Example 11 - Pp 10.24)

UNIT - V

BOOLEAN ALGEBRA
Boolean Algebra (omit theorem 25) - Boolean Polynomials - Karnaugh Maps (omit K-map for 5and 6 variables)

Recommended Text
M.K.Venkataraman, N.Sridharan and N.Chandrasekaran, [2003] Discrete Mathematics, The National Publishing Company, Chennai.

Reference Books
1. R.Johnsonbaugh [2001] Discrete Mathematics [5th Edn.] Pearson Education, Asia.,
2. C.L.Liu, [1985] elements of Discrete Mathematics, McGraw Hill, New York,
3. J.Truss. [2000] Discrete Mathematics for Computer Scientists [2nd Edn.] Pearson Education, Asia.
4. M.K.Sen and B.C.Chakraborthy [2002] Discrete Mathematics [2nd Edition,] Books and allied private Ltd., Kolkata.

ELECTIVE
(to choose 1 out of the given 2)

PAPER - 3 (THEORY)

A.FUZZY MATHEMATICS

Objectives

1. To know the fundamentals of fuzzy Algebra.
2. To know the basic definitions of fuzzy theory
3. To know the applications of fuzzy Technology.

UNIT - I

Introduction- Fuzzy subsets-Lattices and Boolean Algebras- L fuzzy sets-operations on fuzzy -α level sets - properties of fuzzy subsets of a set.
Sections 1.1-1.10

UNIT - II

Algebraic product and sum of two fuzzy subsets-properties satisfied by Addition and product-Cartesian product of fuzzy subsets.
Sections 1.11-1.13.

UNIT - III

Introduction- Algebra of fuzzy relations-logic-connectives.
Sections 2.1-2.4

UNIT - IV

Some more connectives-Introduction-fuzzy subgroup-homomorphic image and Pre-image of subgroupoid.
Sections 2.5,3.1-3.3

UNIT - V

Fuzzy invariant subgroups-fuzzy subrings.
Section 3.4 and 3.5.

Recommended Text

S.Nanda and N.R.Das “Fuzzy Mathematical concepts, Narosa Publishing House, New Delhi.

B. R Programming (Practical)

Objectives:

After taking the course, students will be able to

• Use R for statistical programming, computation, graphics, and modeling,

• Write functions and use R in an efficient way,

• fit some basic types of statistical models

• use R in their own research,

• be able to expand their knowledge of R on their own.

List of exercise:

Using R Programming develop the programmes in the following topics:

1. Arithmetic and matrix operations.
2. Simple functions
3. Plotting Bar chart and scatter plot
4. Plotting histogram and pie chart
5. Graphics for grouped data
6. Graphical display of distributions
7. Measures of central tendency -Mean, median, mode
8. Measures of Dispersion- std. deviation, mean deviation
9. Regression and correlation. Linear models.
10. Large sample tests
11. Small sample test t- tests
12. Small sample test F-tests
13. Small sample test Chi-square tests
14. ANOVA(one way)
15. ANOVA (Two way)

Textbooks and References:

1. Alain F. Zuur, Elena N. Ieno, Erik H.W.G. Meesters Beginner's Guide to R - Springer, 2009.
2. Allerhand M. Tiny Handbook of R - SpringerBriefs in Statistics, 2011
3. Baayen R. Analyzing Linguistic Data - A Practical Introduction to Statistics using R , 2008.
4. Gardener M. Beginning R - The Statistical Programming Language , 2012.
5. Jim Albert, Maria Rizzo R by Example, 2012.
6. Matloff N. Art of R Programming - A Tour of Statistical Software Design , 2011.

SKILL BASED SUBJECT

PAPER - 4

OPERATIONS RESEARCH

Objectives

To develop computational skill and logical thinking in formulating industry oriented problems as a mathematical problem and obtaining optimal solutions to the problems.

UNIT - I

Network logic-Numbering the events-construction of network diagram-Critical path method (CPM) - Three floats

UNIT - II

Three time estimates-Network scheduling by PERT Method- Cost consideration in PERT and CPM -Crashing

UNIT - III

Inventory models - EOQ model (a) Uniform demand rate infinite production rate with no shortages (b) Uniform demand rate infinite production rate with shortages allowed (c) Uniform demand rate finite production rate with no shortages (d) Uniform demand rate finite production rate with shortages allowed - Inventory control with Price Breaks.

UNIT - IV

Sequencing problem - n jobs through 2 machines, n jobs through 3 machines - two jobs through m machines - n jobs through m machines.

UNIT - V

Queuing Theory - Basic concepts - Steady state analysis of M/M/1 and M/M/N systems with finite and infinite capacities - Multi-channel queuing model (M/M/C)/FCFS/∞/∞) .

Recommended Text: Gupta P.K. and Hira D.S. (2000) *Problems in Operations Research*, S.Chand & Co. Delhi

Reference Books

1. J.K.Sharma, (2001) Operations Research: Theory and Applications, Macmillan, Delhi
2. KantiSwaroop, Gupta P.K. and Manmohan, (1999) *Problems in Operations Research*, Sultan Chand & Sons., Delhi.
3. V.K.Kapoor [1989] *Operations Research*, sultan Chand & sons.
4. Ravindran A., Philips D.T. and Solberg J.J., (1987) *Operations research*, John Wiley & Sons, New York.
5. Taha H.A. (2003) *Operations Research,* Macmillan Publishing Company, New York
6. S.J.Venkatesan, *Operations Research,* J.S. Publishers, Cheyyar-604 407.

Course Out Comes:

1. Interpret the solutions in network analysis
2. Knowledge about optimal use of resources
3. Understand to sequence the machines to do the job effectively
4. Analyze the system given and interpret the solutions

To choose any two out of the following Four Allied subjects as Allied I and Allied II. Each Allied subject consists of two papers as paper I and Paper II and one Practical paper.

1. Mathematical Statistics (Paper I and II)
2. Numerical Methods (Paper I and II)
3. Physics (Paper I and II)
4. Chemistry (Paper I and II)

ALLIED

MATHEMATICAL STATISTICS - I

Objective

To apply Statistics Methods for Mathematical Problems.

UNIT - I

Concept of Sample Space - Events - Definition of Probability (Classical, Statistical and Axiomatic) - Addition and Multiplication laws of Probability - Independence of Events - Conditional Probability - Baye's Theorem - Simple Problems.

UNIT - II

Random Variables (Discrete and Continuous) - Distribution Function - Expectation and Moments - Moment Generating Function - Probability Generating Function - Cumulant Generating Function - Simple Problems.

UNIT - III

Characteristic Function - Properties - Uniqueness and Inversion Theorem (Statement only) Chebychev's Inequality - Simple Problems

UNIT - IV

Concept of Bivariate Distribution - Correlation - Karl Pearson's Coefficient of Correlation - Rank Correlation - Linear Regression.

UNIT - V

Standard distributions: Discrete distributions - Binomial, Poisson, Hyper Geometric and Negative Binomial Distributions - Continuous Distributions Normal, Uniform, Exponential.

Recommanded text book:

S.C. Gupta & V.K. Kapoor : Fundamentals of Mathematical Statistics, Sultan & sons

Books for Reference

1. Hogg, R.V. &Craig.A.T.(1998) : Introduction to Mathematical Statistics, Macmillan
2. Mood. A.M. Graybill. F.A.&Boes.D.G.(1974) : Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967) : Statistical Methods, Oxford and IBH
4. Hoel, P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. Wilks S.S. Elementary Statistical Analysis, Oxford and IBH

ALLIED

MATHEMATICAL STATISTICS II

Objective

To apply Statistics for Mathematical problems

UNIT - I

Statistical Population Census and Sampling Survey - Parameter and Statistics - Sampling and Sampling Distribution and Standard Error. Sampling distributions - students 't', chi - square and F distributions.

UNIT - II

Test of significance - Large sample test for proportion, mean and standard deviation - Exact test based on 't', Chi - square and F distribution with respect to population mean, variance and correlation coefficient - Tests of independence of attributes - goodness of fit tests.

UNIT - III

Point estimation - Concept of unbiasedness, consistency, efficiency and sufficiency - Cramer- Rao Inequality - Methods of Estimation - Maximum Likelihood Estimation - Method of Moments.

UNIT - IV

Test of Hypothesis: Null and Alternate Hypothesis - Type I and Type II error - Power of the test - Neymann Pearson lemma - Likelihood Ratio Test - Concept of Most Powerful test (Statement and Results only) - Simple Problems

UNIT - V

Analysis of Variance - One - way and Two-way Classification - Basic Principles of Design of Experiments - Randomization, Replication, Local Control, Completely Randomized Design, Randomized Block Design and Latin Square Design.

Recommended Text:

S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan & sons

Books for Reference

1. Hogg, R.V. & Craig. A. T. (1998): Introduction to Mathematical Statistics, Macmillan
2. Mood.A.M.,Graybill. F.A.&Boes. D.G.(1974): Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967): Statistical Methods, Oxford and IBH
4. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. Wilks . S. S.Elementary Statistical Analysis, Oxford and IBH
6. O. Kempthone - Design of Experiments
7. Das and Giri : Design of Experiments Wiley Eastern

ALLIED PRACTICAL

MATHEMATICAL STATISTICS

1. Measures of location and Dispersion (absolute and relative)
2. Computation of Correlation Coefficient for raw and Grouped data, Rank Correlation Coefficient
3. Computation of Regression Equations for Raw and Grouped Data
4. Curve Fitting by the Method of Least Squares
   a. $y=ax+b$
   b. $y=ax^2+bx+c$
   c. $y=ae^{bx}$
   d. $y=ax^b$
5. Fitting of Binomial, Poisson, Normal distributions and tests of goodness of fit.
6. Large sample tests with regard to population mean, proportion, standard deviation
7. Exact tests with Respect to Mean, Variance and Coefficient of Correlation
8. Test for Independence of Attributes Based on Chi-Square Distribution
9. Confidence Interval based on Normal, t and Chi-square and F Distributions
10. Problems based on ANOVA-one way and two way Classification
11. Completely Randomized Design
12. Randomized Block Design
13. Latin Square Design

Note
Use of scientific calculator shall be permitted for practical examination. Statistical and Mathematical tables are to be provided to the students at the examination hall.

- Mathematics faculty alone should be appointed as examiners.

Books for Reference

1. Hogg, R.V. &Craig.A.T.(1998): Introduction to Mathematical Statistics, Macmillan.
2. Mood.A.M. ,Graybill. F.A.&Boes.D.G.(1974) : Introduction to theory of Statistics, McGraw Hill.
3. Snedecor.G.W. &Cochran.W.G.(1967): Statistical Methods, Oxford and IBH
4. Hoel.P.G (1971): Introduction to Mathematical Statistics, Wiley.
5. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan &sons
6. S.C. Gupta & V.K. Kapoor: Fundamentals of Applied Statistics, Sultan & sons
7. Wilks . S. S. Elementary Statistical Analysis, Oxford and IBH
8. O. Kempthone - Design of Experiments.

ALLIED PAPERS

NUMERICAL METHODS - I

Objectives

This course will cover basic methods for finding the Finite differences, Central differences, Inverse interpolation, Summation of series, Interpolation for equal & unequal intervals, Solutions of simultaneous equations, Important principles, Method and Processes to get numerical results, Reliability of numerical result.

UNIT - I

FINITE DIFFERENCES

First and higher order differences - forward differences and Backward differences - Properties of operators - Differences of a Polynomial - Factorial Polynomials - Operator E, Relation between ▲,▼and E-Interpolation - Newton - Gregory forward & backward formulae for interpolation.

UNIT - II

CENTRAL DIFFERENCES

Central difference Operators - Central differences formulae: Gauss Forward and Backward formulae - Sterling's formula - Bessel's formula.

UNIT - III

INTERPOLATION FOR UNEQUAL INTERVALS

Divided differences - Newton's divided differences formula and Lagrange's - Estimating the Missing terms (With one or more missing values).

UNIT - IV

INVERSE INTERPOLATION

Lagrange's method and Reversion of series method (Using Newton's forward formula only).

Summation of series: Sum to n term of the series whose general term is the first difference of a function-summation by parts.

UNIT - V

SOLUTIONS OF SIMULTANEOUS LINEAR EQUATIONS

Gauss elimination method-matrix inversion method-Gauss-Jordan Method, Gauss-Seidal method (Three unknowns only).

Recommended Text

1. B.D. Gupta.(2001) *Numerical Analysis.*Konark Pub. Ltd., Delhi
2. M.K. Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.

Reference Books

1. S. Arumugham. (2003) *Numerical Methods*, New Gamma Publishing, Palamkottai.
2. H.C. Saxena. (1991) *Finite differences and Numerical analysis* S.Chand & Co., Delhi
3. A.Singaravelu (2004). *Numerical Methods*Meenakshi Agency, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite difference & Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

NUMERICAL METHODS II

Objectives

This course covers the techniques of Numerical Differentiation and Numerical Integration. It also deals with solution of difference equations, Algebraic and Transcendental equations and Numerical solution of Ordinary differential equations of first order.

UNIT - I

NUMERICAL DIFFERENTIATION

Newton's forward and backward differences to compute derivatives-derivative using divided differences formula-maxima and minima using the above formulae.

UNIT - II

NUMERICAL INTEGRATION

General Quadrature formula-Trapezoidal rule-Simpson's one third rule- Simpson's three-eight rule, Weddle's rule- Euler-Maclaurin Summation Formula

UNIT - III

DIFFERENCE EQUATIONS

Linear differences equations-Linear homogeneous difference equation with constant co-efficient-Particular integrals for a^x, x^m, sinax, cosax and a^x f(x).

UNIT - IV

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Bisection method-Iteration method-Regula-falsi method (False Position Method)-Newton-Rapson Method.

UNIT - V

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS (FIRST ORDER ONLY)

Euler's method- Euler's modified method-Picard's method - Taylor's methods-Runge-Kutta method (Fourth order only).

Recommended Text

1. B.D. Gupta. (2001) *Numerical Analysis.*Konark Pub. Ltd., Delhi
2. M.K.Venkataraman. (1992) *Numerical methods for Science and Engineering* National Publishing Company, Chennai.

Reference Books

1. Gupta-Malik, Calculus of finite differences and numerical Analysis, KrishbaPrakashanMandir, Meerut Seveenth Edition.
2. S.C.Saxena, Calculus of finite differences and Numerical Analysis, S.Chand& Co., New Delhi. IX Edition.
3. A.Singaravelu, Numerical methods, Meenakshi Publications-First Edition 1992.
4. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite Difference & Numerical Analysis, S.Chand& Company Ltd., New Delhi-55.

ALLIED PRACTICAL

NUMERICAL METHODS

LIST OF PROBLEMS

1. Derivatives by Newton’s method
2. Gauss elimination method.
3. Gauss-Jacobi method.
4. Gauss-Siedel method.
5. Newton's forward and backward interpolation.
6. Lagrange interpolation.
7. Trapezoidal and Simpson one-third rules.
8. Euler's method.
9. Picard’s method
10. Runge-Kutta's method.

ALLIED
PHYSICS
PAPER-1

Course Objectives

1. To understand the basics of gravitation and to study the properties of matter.
2. To learn the law of thermoelectric circuits and thermoelectric diagrams.
3. To teach the growth and decay of a transient current and magnetometer.
4. To explain production of ultrasonics and reverberation time.
5. To know the basics of laser and fibre optics principles and applications.

UNIT-1: Properties of Matter

Gravitation: Acceleration due to gravity -Determination of 'g' by Simple pendulum - Drawbacks of simple pendulum –Determination of time period of compound pendulum - 'g' by compound pendulum -Centre of Oscillation and Centre of Suspension are interchangeable-Determination of 'g' by Bar/compound pendulum.

Elasticity: Bending of beams -Expression for bending moment - Cantilever Depression at the loaded end of a cantilever Expression forYoung's modulus -non–uniform bending-Pin and microscope method.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period -Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid -Viscous force - Co-efficient of viscosity of a liquid – Poiseuille's formula -Experimental method using Burette- Effect of temperature and pressure on viscosity-applications.

Surface Tension: Surface tension of a liquid-Surface Tension and interfacial surface tension by the method of drops-applications.

UNIT-2: Thermo Electricity

Seeback, Peltier and Thomson effects - laws of thermoelectric circuits -Peltier coefficient - Thomson coefficient -application of thermodynamics to a thermocouple and expressions for Peltier and Thomson coefficients -thermo electric power and thermo electric diagrams.

UNIT-3: Transient Current and Magnetism

Growth and decay of current in a circuit containing resistance and inductance- Growth and decay of charge in circuit containing resistance and capacitor - growth and decay of charge in a LCR circuit – condition for the discharge to be oscillatory – frequency of oscillation.

Magnetism -Magnetic moment and pole strength of a magnet – Deflection magnetometer – Tan C

Position- Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer and the vibration magnetometer .

UNIT -4: Acoustics

Sound: Transverse vibration of strings -Velocity and frequency of vibrations of a stretched string -laws -Sonometer -A.C. Frequency - Steel wire- Brass wire.

Introduction to Ultrasonics – Piezo electric effect–production by Piezo electric method – properties –applications- Acoustics of buildings – reverberation time – derivation of Sabine's formula – determination of absorption coefficient-Acoustic aspects of halls and auditoria.

UNIT-5:Lasers and Fibre Optics

Laser: Introduction - Principles of laser -Einstein's explanation for stimulatedemission – Differences between stimulated and spontaneous emission - Population inversion –Properties of laser -Types of lasers - He- Ne Laser - Semiconductor Laser-Applications of laser.

Fibre optics: Basic principle of an optical fibre -Total internal reflection -Basic structure of an optical fibre -Numerical aperture –Coherent bundle – Attenuation and dispersion - classification of optical fibres-step index and graded index fibers – single mode and multi mode fibers-Fibre optic communication system block diagram.-applications.

Text Books

Unit 1 and Unit 4

1. R. Murugesan and KiruthigaSivaprasath, Properties of Matter and Acoustics, S. Chand & Co. New Delhi, Kindle edition.

Unit 2 and Unit 3

1. R. Murugesan, Electricity & Magnetism, S. Chand & Co. New Delhi, 2019.

Unit 5

1. N Subrahmanyam, BrijLal and M.N Avadhanulu, A Text Book of Optics, S. Chand &Co. New Delhi, Revised Edition as per UGC model syllabus.

Reference Books

1. BrijLal and N Subrahmanyam,Electricity and Magnetism, S Chand & Company Pvt Ltd, New Delhi, 2000.

2. D.C. Tayal, Electricity and Magnetism, Himalaya Publishing House,Bombay, 2014.
3. BrijLal and N.Subrahmanyam, A Text Book of Sound,Vikas Publications, New Delhi (2 Edition)
4. C.L.Arora, Physics for Degree Students B.Sc First Year, S. Chand Publishing, 2013.
5. K.Thyagarajan and Ajay Ghatak, Introduction to Fibre optics-, Cambridge University.
6. Ajay Ghatak and K.Thyagarajan, Fiber optics and Lasers-The two revolutions, Macmillan, 2006.
7. K.Thyagarajan and Ajay Ghatak, Lasers; Fundamentals and applications, Springer.
8. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2016.

E-MATERIALS

1. https://courses.lumenlearning.com/physics/chapter/16-4-the-simple-pendulum/
2. https://www.youtube.com/watch?v=aw0_seEt4v0
3. https://en.wikipedia.org/wiki/Thermoelectric_effect
4. https://www.youtube.com/watch?v=S0I37M2sx_0
5. https://physicscatalyst.com/elecmagnetism/growth-and-delay-charge-R-C-circuit.php
6. https://www.youtube.com/watch?v=PLQQPXot6vE
7. https://www.youtube.com/watch?v=d0_Eff4MXwM
8. https://www.techglads.com/cse/sem1/production-of-ultrasonics-by-piezoelectric-methods/
9. https://thefactfactor.com/facts/pure_science/physics/optical-fibre/5159/
10. https://www.youtube.com/watch?v=auk1OS0SVWc (Tamil video)

Course Objectives

1. After studied unit-1, the student will be able to find the acceleration due to gravity at a place using simple pendulum and compound pendulum. Also can know the properties of matter like elasticity, viscosity and surface tension.
2. After studied unit-2, the student will be able to learn thermo emf using Seebeck and Peltier effects and hence understand thermoelectric circuits.
3. After studied unit-3, the student will be able to explain growth and decay of a transient current in a circuit containing resistance-inductance, resistance-capacitance and LCR in series. Also will be able to determine the horizontal components of earth's magnetic induction at a place using deflection magnetometer in Tan C position.
4. After studied unit-4, the student will be able to derive the expression for the velocity of a sound in a stretched string and hence they can determine the frequency of A.C mains.
5. After studied unit-5, the student will be able to understanding the principle of laser and can demonstrate the working of He-Ne laser and applications of laser. Also, the student will be able to learn the fibre optics, structure and application in communication.

ALLIED
PHYSICS
PAPER-2

Course Objectives

1. To study the concept of special theory of relativity.
2. To expose the structure of atom with different models.
3. To know the definition of binding energy and to study about nuclear models
4. To learn the different number system in digital electronics and logic gates
5. To give an introduction about nanomaterial.

UNIT-1: Special Theory of Relativity

Frames of reference-inertial frames and non-inertial frames -Galilean transformations -Michelson-Morley experiment-interpretation of results - postulates of special theory of relativity Lorentz transformation equations -length contraction - time dilation - transformation of velocities - variation of mass with velocity -Mass-energy equation.

UNIT-2: Atomic Physics

Bohr atom model – Critical Potentials - Experimental determination of critical potentials - Franck and Hertz's experiment -Sommerfield's Relativistic atom model The vector atom model – spatial quantization–spinning of an electron –quantum numbers associated with the vector atom model – coupling schemes –LS and jj coupling – the Pauli's exclusion principle – Stern and Gerlach experiment

UNIT-3: Nuclear Physics

Binding energy-Binding energy per nucleon-Packing fraction-Nuclear models – liquid drop model – semi empirical mass formula – merits and demerits -shell model -evidences for shell model – nuclear radiation detectors –ionization chamber – G.M Counter-Wilson cloud chamber-Particle accelerators-Cyclotron-Betatron.

Unit-4: Digital Electronics

Number systems -Decimal, Binary, Octal and Hexadecimal system – Conversion from one number system to another- Binary Arithmetic -Addition –Subtraction- 1's and 2's complement -Binary codes- BCD code – Excess 3 code, Gray code.

NAND, NOR and EXOR – functions and truth tables. NAND & NOR as universal gates-Half adder and Full adder - Half subtractor and Full subtractor using NAND gate only.

UNIT-5: Nanomaterial

Introduction-Nanomaterial- Properties of nanomaterial (size dependent) -synthesis of nanomaterial- sol gel- hydrothermal method-Scanning Electron Microscope (SEM)- Principle and Instrumentation-Fullerenes- Carbon nanotubes- Fabrication and structure of carbon nanotubes - Properties of carbon nanotubes (Mechanical and Electrical) - Applications ofCNT's.

Text Books

Unit 1 to Unit 3

1. Modern Physics – R,Murugeshan, KiruthigaSivaprasath, S.Chand&Co, New Delhi, 2016

Unit 4

1. V.Vijayendran, Introduction to Integrated Electronics (Digital & Analog), S. Viswanathan, Printers & Publishers Private Ltd, Chennai, 2007

Unit 5

1. V. Raghavan, *Material Science and Engineering* ,Printice Hall India.,2004.

Reference Book

1. Allied Physics – R. Murugesan S. Chand & Co. New Delhi, 2005.
2. A Text book of Digital electronics – R.S.Sedha, S.Chand&Co, 2013
3. Malvino and Leech, Digital Principles and Application, 4th Edition, Tata McGraw Hill, New Delhi, 2000.
4. Dr. M.N. Avadhanulu, *Material science*, S.Chand& Company, New Delhi, 2014.
5. M.Arumugam, *Material science*, Anuradhapuplishers, 1990.
6. V. Rajendran, *Material Science*, Tata McGraw Hill Ltd, New Delhi,2001.
7. D.C.Tayal, Nuclear Physics, Himalaya Publishing House, 2009

E-MATERIALS

1. https://en.wikipedia.org/wiki/Galilean_transformation
2. https://www.youtube.com/watch?v=NH3_lIkSB9s
3. https://www.youtube.com/watch?v=EEWuUst2GK4
4. https://en.wikipedia.org/wiki/Vector_model_of_the_atom
5. https://www.tutorialspoint.com/what-is-a-geiger-muller-counter
6. https://www.youtube.com/watch?v=jxY6RC52Cf0
7. https://www.tutorialspoint.com/digital_circuits/digital_circuits_number_systems.htm
8. https://www.youtube.com/watch?v=4ae9sJBBkvw

9. https://en.wikipedia.org/wiki/Nanomaterials
10. https://www.youtube.com/watch?v=mPxoJz6treE (Tamil video)

Course Outcomes

1. After studied unit-1, the student will be able to study the frames of reference, Galilean transformation equations and special theory of relativity.
2. After studied unit-2, the student will be able to describe the different atomic models and Stern and Gerlach Experiment.
3. After studied unit-3, the student will be able to explain binding energy, liquid drop model, G.M counter and particle accelerators.
4. After studied unit-4, the student will be able to know the conversion of number systems from one to other and also will be able to design universal gates using NAND and NOR gates.
5. After studied unit-5, the student will be able to understanding the basics of nanomaterial, synthesis and its applications.

ALLIED PRACTICAL- PHYSICS

List of Experiments (Any 12 Experiments only)

1. Determination of 'g' using Compound pendulum.
2. Young's modulus-Non-Uniform bending-Pin & microscope
3. Rigidity Modulus – Torsional oscillation method (without masses).
4. Rigidity Modulus – Static Torsion method using Scale and Telescope.
5. Surface tension and Interfacial Surface tension by Drop Weight method.
6. Sonometer – Frequency of a Tuning fork.
7. Sonometer –Determination of A.C. frequency- using steel and brass wire
8. Air Wedge – Determination of thickness of a thin wire
9. Newton's Rings – Radius of Curvature of a convex lens.
10. Spectrometer – Refractive index of a liquid – Hollow prism.
11. Spectrometer grating – Minimum Deviation- Wavelength of Mercury lines.
12. Potentiometer – Calibration of Low range voltmeter.
13. Deflection magnetometer and Vibration magnetometer-Tan C Position-Determination of m and B_H.
14. Figure of merit- Table galvanometer.
15. Construction of AND, OR gates using diodes and NOT gate using a transistor.
16. NAND/NOR as universal gate.
17. Half adder and Full adder using NAND gate.
18. Half subtractor and Full subtractor using NAND gate.
19. Lasers: Study of laser beam parameters.
20. Measurement of Numerical aperture (NA) of a telecommunication graded index optic fiber.
21. Fiber attenuation of a given optical fiber.

Text Books

1. C.C. Ouseph, U.J. Rao, V. Vijayendran, Practical Physics and Electronics, S. Viswanathan, Printers & Publishers Private Ltd, Chennai,2018.

2. M.N.Srinivasan, S. Balasubramanian, R.Ranganathan, A Text Book of Practical Physics, Sultan Chand & Sons, New Delhi, 2015.

Reference Books

1. Dr. S. Somasundaram, Practical Physics, Apsarapublications,Tiruchirapalli, 2012.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

ALLIED

PAPER - 1

CHEMISTRY - I

Objective:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT - I

General Metallurgy - Extraction of Metals - Minerals and Ores - Difference between Minerals and Ores - Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation - Calcination, Smelting, Roasting, Fux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining - Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT - II

Cycloalkanes - Preparation - Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes - Substitution and Ring opening reactions - Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength) - Stereoisomerism - Types - Cause of Optical Activity - Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution - Definition and Methods - Geometrical isomerism - Definition and example - Maleic and Fumaric acid - Differences.

UNIT - III

Chemical Kinetics - Rate of a reaction - Definition of Order and Molecularity - Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction - Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons - Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts - Photochemistry - Grothus-Draper's law - Stark-Einstein's law - Quantum yield - Photosynthesis - Phosphorescence - Fluorescence.

UNIT - IV

VSEPR Theory - Hybridisation and Shapes of simple molecules BF_3, PCl_5, SF_6 and XeF_6. - Fuels - Classification of Fuels - Calorific value of Fuels - Water gas, Carbureted Water gas and Producer gas - Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels - Oil gas, Natural gas and LPG - Uses - Osmosis - Osmotic pressure - Reverse osmosis - Definition - Desalination of Sea water.

UNIT - V

Nuclear Chemistry - Atomic number, Mass number - Isotopes, Isobars and Isotones - Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries - Carbon Dating - Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking - Naphthalene - Preparation - Haworth's method - Properties - Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary) - Conductors, Insulators, Semiconductors, N - and P - Type Semiconductors - Definitions and Examples.

ALLIED PAPER – 2

CHEMISTRY - II

OBJECTIVE:

Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II-semester.

UNIT - I

Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion - Definition and Examples - Coordination Number - Werner's Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll - Industrial Chemistry - Fertilisers and Manures - Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite and Super Phosphate of Lime - Contents in Match Sticks and Match Box - Industrial making of Safety Matches - Preparation and Uses of Chloroform, DDT, Gammexane and Freons.

UNIT - II

Carbohydrates - Definition and Examples - Classification - Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate - Amino Acids - Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis - Properties - zwitterion and Isoelectric point - Structure of Glycine - Proteins - Definition - Classification of Proteins based on Physical properties and Biologcal functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) - Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning - Chrome Tanning.

UNIT - III

Electrochemistry - Electrolytes - Definition and Examples - Classification - Specific and Equivalent Conductance - their determination - Variation of Specific and Equivalent conductance with Dilution - Ostwald's Dilution Law and its Limitations - Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations - pH - Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT - IV

Paints - Components of Paint - Requisites of a Good Paint - Pigments - Classification of Pigments on the basis of Colour - Examples - Dyes - Definition - Chromophores and Auxochromes - Examples - Colour and Dyes - Classification based on Constitution and Application - Examples - Vitamins - Definition - Classification - Water Soluble and Fat Soluble - Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones - Definition and Examples - Biological Functions of Insulin and Adrenaline - Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT - V

Drugs - Sulpha Drugs - Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol - LSD - Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS - Electrochemical Corrosion and its Prevention - Electroplating - Applications.

ALLIED PRACTICAL

CHEMISTRY

VOLUMETRIC ANALYSIS

1. Estimation of HCl - Standard sulphuric acid.
2. Estimation of Borax - Standard Sodium Carbonate.
3. Estimation of NaOH - Standard Oxalic Acid.
4. Estimation of $FeSO_4$ - Standard FAS.
5. Estimation of Oxalic acid - Standard $FeSO_4$.
6. Estimation of FAS - Standard Oxalic Acid.
7. Estimation of Oxalic acid - Standard Oxalic Acid.
8. Estimation of Fe^{2+} using Diphenylamine / N- Phenyl Anthranilic acid as indicator.

ORGANIC ANALYSIS

Systematic Analysis of Organic Compounds containing One Functional Group and Characterisation by Confirmatory Tests.

Reactions of Aromatic Aldehyde, Carbohydrates, Mono and Dicarboxylic acids, Phenol, Aromatic Primary Amine, Amide and Diamide.

Reference Books

- Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
- Inorganic Chemistry - B. R.. Puri, L. R. Sharma and K. C. Kallia - Milestone Publications (2013).
- Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
- Text Book of Inorganic Chemistry - R. Gopalan, Universities Press - 2012.
- Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
- Advanced Organic Chemistry - Bahl and Arun Bahl - Sultan Chand and Co. Ltd - 2012.
- Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.

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