Books & References

1. Engineering Optimization- S.S. Rao, New Age International
2. Applied Optimal Design-E.J. Haug and J.S. Arora; Wiley New York
3. Optimization for Engineering Design-Kalyanmoy Deb; Prentice Hall of India

BAS- 27 DISCRETE MATHEMATICS

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use logical notation to define different function such as set, function and relation.
2. Use of basic properties of group theory in computer science.
3. Use of graph theory models to solve problems of connectivity and constraint satisfaction, for example, scheduling.
4. Use of induction hypotheses to prove formulae.

Topics Covered

UNIT-I 9

Set Theory, Relation and Function: Definition of sets, Countable and uncountable sets, Venn Diagrams, Proofs of some general identities on sets. Definition and types of relation, composition of relation, equivalence relation, partial order relation. Function: Definition, types of function, one to one, into and onto function, inverse function, composition of functions.

UNIT-II 9

Algebraic Structures: Definition, properties and types of algebraic structures, Semi groups, Monoid, Groups, Abelian group, properties of groups, Subgroups, Cyclic groups, Cosets, Factor group, Permutations groups, Normal subgroups, examples and standard results. Rings and fields: Definition and Standard results.

UNIT-III 9

Graphs: Simple graph, multigraph, graph terminology, representation of graphs, Bipartite, regular, planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, graph colouring, chromatic number, chromatic polynomials. Tree: types and definition, rooted tree, properties of trees.

UNIT-IV 9

Combinatorics: Basic counting Technique, Pigeon-hole principle, Discrete Numeric function, Recurrence relations and their solution, Generating function, Solution of recurrence relations by method of generating function.

Books & References

1. Discrete Mathematical Structures with applications to computer science - J.P. Tremblay and R. Manohar,

2. Graph Theory with application to engineering and computer science - Prentice Hall
3. Combinatorics: Theory and applications - V. Krishnamurthy, East

BAS-28 SOLID STATE PHYSICS

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. The fundamental concepts of crystal structure and various kinds of bonds in solid.
2. The knowledge of crystal imperfections and different theories related to molar heat capacity.
3. The knowledge of energy bands in insulators and semiconductors. Concept of Fermi level.
4. The knowledge of electrical and optical properties of semiconductors and brief knowledge of superconductivity.

Topics Covered

UNIT-I 9

Crystal Structure and Binding

Classification of Solids, Space lattice and Bravias lattice, Primitive and unit cell, Co-ordination number , Atomic packing factor, Atomic radii, Miller indices, Inter planner spacing, Important crystal structures (NaCl, CsCl, ZnS, graphite and diamonds), Primary and Secondary bonds, Ionic, covalent, metallic and hydrogen bonds, Vander wall bonds, Forces between bonds, Dislocation energy, Cohesive energy.

Determination of Crystal Structure

Bragg's law, Laue pattern, X-ray diffractometer, Determination of lattice parameters using XRD, Absorption of X-rays, Absorption edge.

UNIT-II 9

Defects in Solids

Various kinds of crystal imperfections, Point defect, Schottky and Frenkel defect, Dislocations, Edge and screw dislocation, Grain boundary, Effect of defects on electrical properties of materials.

Lattice Dynamics and Thermal Properties

Concept of lattice vibrations and thermal heat capacity, classical, Einstein and Debye theories of molar heat capacity and their limitations, concept of phonons.

UNIT-III 9

Band Theory of Solids

Allowed and forbidden energy bands, Classification of materials on the basis of energy bands, Energy bands in insulators and semiconductors, Fermi energy, effect of impurity addition on the