B.Tech. I Semester – 2	L	T	P	C
CS 201: DATA STRUCTURES AND ALGORITHMS	3	0	2	4

1. INTRODUCTION TO DATA STRUCTURE	04 Hrs
Basic Terminology, Internal representation of Primitive Data structure: Integers, Floating point numbers, Packed decimal, Characters, Structures, Unions, and Pointers.	
2.BASIC DATA TYPES	
Arrays: Definition, Memory organization, Operations on Arrays: Traversing, Insertion, Deletion, Updating, Resizing	**03 Hrs**
Stacks: Basic operations, Stack, Dstack and applications	**02 Hrs**
Queues : Operations of queues, Circular Queue, Priority Queue, Dequeue, Application of queues	**03 Hrs**
Linked list : Singly linked lists and memory representation, Operations of Link list (Traversing, Searching, Insertion, Deletion, inversion, concatenation, copying and comparison, allocation and deallocation), Doubly linked list and operations, Circular Link list, Multilevel link list	**04 Hrs**
3. TREES	**09 Hrs**
Introduction, Binary Trees and their representation, Operations on Binary trees: Creation, transformation of trees into binary trees, traversal, Searching, Insertion and Deletion. Type of trees: Complete Binary trees, Extended binary trees, General trees, AVL trees, Threaded trees, B trees Application: Arithmetic expression evaluation, infix-prefix-postfix notation conversion.	
4. GRAPH	**08 Hrs**
Formal Introduction, types of graph, Representation of graphs: Sequential, List structure, Adjacency list, multilinked representation, Search in directed and undirected graphs, BFS, DFS, Transversal Connected Component and Spanning trees, Shortest path and Transitive Closure, Activity Networks, Topological Sort and Critical Paths.	
5. ILLUSTRATED ALGORITHMS	**09 Hrs**
Sorting (Bubble, Selection, Quick, Radix, Bucket sort, Heap sort), Dictionaries, hashing, analysis of collision resolution techniques, Searching(Linear Search, Binary Search), Character String and different string operations	
Tutorials will be based on the coverage of the above topics separately	**14 Hrs**
Total: 42 Hours + 14 Hours = 56 Hours	

Recommended Books

1. "An Introduction to Data Structures with Applications", Trembley & Sorenson, 2/E, TMH, 1991
2. "Data Structures using C and C++", Tanenbaum & Augenstein, 2/E, PHI, 2007
3. "Fundamentals of Data Structures", Horowitz and Sahani, Galgotia Publications, reprint 2004.
4. "Introduction to Algorithms", T. H. Cormen, C. E. Leiserson, R. L. Rivest, 2/E, PHI, 2001
5. "Data Structures and Program Design in C", Robert L.Kruse, C.L.Tondo and Brence Leung, Pearson Education, 2/E, 2001

B.TECH. I Semester-2	L	T	P	C
EC 202: Electronic Devices and Circuits	3	0	2	4

Prerequisite
Signals, Frequency Spectrum of Signals, Circuit Models for Amplifiers Intrinsic Semiconductors, Doped Semiconductors, Current Flow in Semiconductors

Diodes	10 Hours
The pn Junction, The pn Junction with an Applied Voltage, Capacitive Effects in the pn Junction The Ideal Diode, Terminal Characteristics of Junction Diodes, Modeling the Diode Forward Characteristic, Operation in the Reverse Breakdown Region—Zener Diodes, Rectifier Circuits, Limiting and Clamping Circuits, Special Diode Types	
MOS Field-Effect Transistors & Bipolar Junction Transistors	**12 Hours**
MOSFETs Device Structure and Physical Operation, Current—Voltage Characteristics, MOSFET Circuits at DC, The Body Effect and Other Topics BJTs Device Structure and Physical Operation, Current–Voltage Characteristics, BJT Circuits at DC, Transistor Breakdown and Temperature Effects	
Transistor Amplifiers	**10 Hours**
Basic Principles, Small - Signal Operation and Models, Basic Configurations, Biasing, Discrete - Circuit Amplifiers	
Building Blocks of Integrated Circuit Amplifiers, Differential Amplifiers	**10 Hours**
IC Design Philosophy, IC Biasing—Current Sources, Current Mirrors, & Current-Steering Circuits, The Basic Gain Cell, The Common - Gate and Common - Base Amplifiers The MOS Differential Pair, The BJT Differential Pair, Common - Mode Rejection, DC Offset	
Total Contact Time: 42 Hours	

Recommended Books
Text-Book 1. A. S. Sedra and K. C. Smith, “Microelectronic Circuits”, Oxford University Press, 7th Edition. Reference-Books 2. Boylestad Robert L. and Nashlesky Louis, “Electronics Device & Circuits and Theory”, PHI, 10th Edition, 2009. 3. Millman Jacob, Halkias Christos C. and Parikh C., “Integrated Electronics”, McGraw-Hill, 2nd Edition, 2009. 4. Schilling Donald L. and Belove E., “Electronics Circuits - Discrete and Integrated”, McGraw-Hill, 3rd Edition, 1989, Reprint 2008. 5. "Electronic Principles", Malvin Albert & David J. Bates, Tata McGraw Hill, 7th edition, 2007. 6. "Pulse, Digital and Switching Waveforms", Millman J., Taub H. and Mothiki Suryaprakash, McGraw-Hill, 2nd Ed., 2007.

B.Tech. I Semester – 2	L	T	P	C
AE 203: ENGINEERING MECHANICS	3	0	2	4

1. INTRODUCTION FORCES/EQUILIBRIUM OF RIGID BODY	06 Hrs
Scalar and vectors, system of forces, resultant force, Statics of particles. Free-body diagrams. Equilibrium of particle in two dimensions, Resultants of three or more concurrent forces, Resolution of a force into components. Rectangular components of a force. Resultants by rectangular components, Concurrent force system in space: Resolution of a force into rectangular components in space, Coplanar Non- Concurrent Force Systems, Moments about Points and Axes. Equilibrium, Non-coplanar Non-concurrent Forces.	
2. CENTROID MOMENT OF INERTIA	**06 Hrs**
Distributed forces: Centroid and centre of gravity. Determination of centroid of lines and areas using integral technique, Determination of centroid of composite wires and areas, Centroid of volumes. Theorems of Pappus-Guldinus and its applications, Second moment of areas. Definition of moment of inertia. Determination of moment of areas by integration, Parallel axis theorem for Moment of Inertia. MI of composite areas.. Concept of Mass moment of inertia of bodies.	
3. TRUSS	**06 Hrs**
Types of structures in Engineering. Trusses and beams: definition, stability and determinateness, Determination of reactions at supports for planar trusses. Basic assumption for analysis of trusses. Procedures for analysis of trusses, Analysis of plane trusses by method of joints. Concept of zero force members. Analysis of plane trusses by method of sections.	
4. BEAMS AND CABLES	**10 Hrs**
Beams- Definitions, types of beams, types of loading, types of supports. Determination of reactions for simply supported and overhanging beams. Relation between distributed load, Shear force and Bending moment Shear force and Bending moment in beams with diagrams Cables- Cables with Concentrated Loads	
5. FRICTION	**04 Hrs**
The Laws of Dry Friction. Coefficients of Friction, Angles of Friction, Analysis of systems involving dry frictions such as ladders spheres etc., Belt Friction, Analysis of flat and v-belt.	
6. KINETICS OF PARTICLES	**05 Hrs**
Force and acceleration. Newton's laws of motion. D'Alembert's principle, Dependent motion of particles. Analysis for dependent motion of particles, Impulse and Momentum: Concept, Definition, Principle of linear impulse and momentum, Conservation of linear momentum of a system of particles.	
7. VIBRATIONS	**05 Hrs**
Definitions, Equation of motion for single degree of freedom, Introduction to free and forced vibrations. Procedure for analysis of system involving free and forced vibrations, Example on free vibration, Example on forced vibration, Concept of earthquake induced waves and its effect on structures.	
Total: 42 Hrs	

Recommended Books

1. "Vector mechanics for engineers: Statics and Dynamics", Beer F.P. and Johnston E.R. Tata McGraw-Hill, New Delhi.
2. "Engineering Mechanics: Statics and Dynamics", Desai J.A. and Mistry B.B., Popular Prakashan, Surat.
3. "Engineering Mechanics: Statics and Dynamics", Hibbeler R.C., Prentice Hall of India, New Delhi.

4. “Engineering Mechanics: Statics and Dynamics”, Meriam J.L., and Kraige L.G., John Wiley and sons, New York.
5. “Engineering Mechanics: Statics and Dynamics”, Rajsekaran S., Vikas Publication, New Delhi.
6. “Applied Mechanics”, Shah H. J. and Junarkar S. B., Charotar publication, Anand.
7. “Engineering Mechanics”, Bhavikatti S. S. and Rajashekarappa K. G., Wiley 'Eastern Ltd.

B.TECH. I Semester-2	**L**	**T**	**P**	**C**
EC 204: Digital Logic Design	**3**	**0**	**2**	**4**

Binary Systems, Boolean Algebra and Logic Gates, Simplification of Boolean Functions	**12 Hours**
Digital Computers and Digital Systems, Binary Numbers, Number-Base Conversions, Octal and Hexadecimal Numbers, Complements, Binary Codes, Binary Storage and Registers, Binary Logic, Integrated Circuits Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, IC Digital Logic Families The Map Method, Two- and Three-Variable Maps, Four-Variable Map, Five- and Six-Variable Maps, Product of Sums Simplification, NAND and NOR Implementation, Other Two-Level Implementations, Don’t-Care Conditions, The Tabulation Method, Determination of Prime-Implicants, Selection of Prime-Implicants	
Combinational Logic **Combinational-Logic With MSI and LSI**	**8 Hours**
Introduction, Design Procedure, Adders, Subtractors, Code Conversion, Analysis Procedure, Multilevel NAND Circuits, Multilevel NOR Circuits, Exclusive-or and Equivalence Functions. Introduction, Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers, Read-Only Memory (ROM), Programmable Logic Array (PLA)	
Sequential Logic, Registers, Counters, And the Memory Unit	**14 Hours**
Introduction, Flip-Flops, Triggering of Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip-Flop Excitation Tables, Design Procedure, Design of Counters, Design with State Equations Introduction, Registers, Shift Registers, Ripple Counters, Synchronous Counters, Timing Sequences, The Memory Unit, Examples of Random Access Memories	
Register Transfer Logic	**8 Hours**
Introduction, Interregister Transfer, Arithmetic, Logic, and Shift Micro-Operations, Conditional Control Statements, Fixed-Point Binary Data, Overflow, Arithmetic Shifts, Decimal Data, Floating-Point Data, Non-Numeric Data, Instruction Codes, Design of Simple Computer	
Total Contact Time: 42 Hours	

Recommended Books
1. “Digital Logic and Computer Design”, Mano Morris, 3rd Edition, Pearson Education, 2005.
2. “Digital Electronics Practice Using Integrated Circuits”, Jain and Anand, TMH, 2004
3. “Logic and Computer Design Fundamentals”, Kime Charles, Pearson Education, 2004.
4. “Digital Circuits and Logic Design”, Lee Samual, PHI, 1998.
5. “Digital Fundamentals”, Floyd and Jain, Pearson Education, 2006.

B.Tech. I Semester – 2	L	T	P	C
AS 205: DISCRETE MATHEMATICS	3	1	0	4

1. GRAPH THEORY	08 Hrs
Graphs, Definition & basic concepts of finite & infinite graph, Incidence & Degree, Isomorphism, Subgraph, Walk, Path & circuits, Operations on graphs, connected graph, Disconnected graph & components, Complete graph, Regular graph, Bipartite graph, Euler's graph, Hamiltonian paths & circuits, Weighted graphs, Applications, Directed & Undirected graphs, Connectivity of graphs.	
2. TREES	**06 Hrs**
Definition & properties of trees, Pendent vertices in a tree, Distance between two vertices Centre, Radius & diameter of a tree, Rooted & binary trees, Representation of Algebraic structure by Binary trees, Binary search trees, Spanning trees & fundamental circuits.	
3. RELATION & LATTICES	**08 Hrs**
Definition & Basic properties, Graphs of relation, Matrices of relation, Equivalence relation, Equivalence classes, Partition, Partial ordered relation, Posets, Hasse diagram, Upper bounds, Lower bound, GLB & LUB of sets, Definition & properties of Lattice, Sub lattice, Distributive &modular lattices, complemented & Bounded Lattices, complete lattices & Boolean algebra	
4. GROUP THEORY	**08 Hrs**
Basic properties of Group, Groupoid, semigroup & monoid, Abelian group, Subgroup, Cosets, Normal subgroup, Lagrange's theorem, Cyclic group , Permutation group, Homomorphism & Isomorphism of groups, Basic properties, error correction & detection code.	
5. MATHEMATICAL LOGIC & PROGRAM VERIFICATION	**12 Hrs**
Propositions, logical operators & propositional algebra, Predicates& quantifiers, Interaction of quantifiers with logical operators, Logical interference & proof techniques, Formal verification of computer programs (elements of Hoare logic).	
Total: 42 Hrs	

Recommended Books

1. "Discrete Mathematics and Its Applications", Rosen K.H., McGraw Hill, 6th Ed., 2006.
2. "Discrete Mathematical Structure", Kolman B., Busby R.C. & Ross S., Prentice Hall of India Pvt. Ltd, 5thEd, 2003.
3. "Discrete Mathematical Structure with Applications to Computer Science", Tremblay J. P. & Manohar R., McGraw Hill, 1999.
4. "Graph theory with applications to Engineering & Computer Science", DeoNarsingh., Prentice Hall of India Pvt. Ltd., 2000.
5. "Elements of Discrete Mathematics", Liu C.L., McGraw Hill, 2000.

B.TECH. I Semester-2	L	T	P	C
EC 206: Signals and Systems	3	0	2	4

1. Discrete-time signals and systems	10 Hrs
An Introduction to Signals and Systems, Signal Processing, Classification of Signals, The Concept of Frequency in Continuous-Time and Discrete-Time Signals. Discrete-Time Signals, Discrete -Time Systems, Analysis of Discrete -Time Linear Time - Invariant Systems, Discrete -Time Systems Described by Difference Equations, Implementation of Discrete - Time Systems, Correlation of Discrete - Time Signals.	
2. The Laplace Transform and Z-Transform	**12 Hrs**
Introduction, The Laplace Transform, The Region of Convergence for Laplace Transform, The inverse Laplace Transform, Geometric Evaluation of the Fourier Transform from the Pole Zero plot. Properties of the Laplace Transform. The Z-Transform, Properties of the Z -Transform, Rational Z-Transforms, Inversion of the Z-Transform. The One-sided Z-Transform. Analysis of Linear Time-Invariant Systems in the Z-Domain.	
3. Frequency analysis of signals and systems	**10 Hrs**
Frequency Analysis of Continuous-Time Signals. Frequency Analysis of Discrete -Time Signals. Properties of the Fourier Transform for Discrete -Time Signals. Frequency-Domain Characteristics of Linear Time -Invariant Systems. Linear Time - Invariant Systems as Frequency -Selective Filters. Inverse Systems and Deconvolution.	
4. The discrete Fourier transform: its properties and Applications	**10 Hrs**
Frequency Domain Sampling: The Discrete Fourier Transform. Properties of the DFT. Linear Filtering Methods Based on the DFT. Frequency Analysis of Signals Using the DFT.	
Total: 42 Hrs	

Recommended Books

1. "Digital Signal Processing: Principle, Algorithms, and Applications", Prokis John G., Pearson Educations, 3rd Ed.,2003.
2. "Signal and Systems", Oppenheim Alan V., Wilsky Alan S. and Nawab Hamid S., Pearson Educations, 3rd Ed., 2006.
3. "Linear Systems and Signals", Lathi B. P., Oxford University Press, 2nd Ed., 2007.
4. "Introduction to Signal and Systems", Stuller John Alan, Thomson India Edition, 1st Ed., 2007.
5. "Fundamental of Signals and Systems", Roberts M. J. and Govind Sharma, Tata McGraw-Hill, 2nd Ed., 2010.