U.G. 2ⁿᵈ Semester

Paper: BCA201C (Core)
Data Structures

Credits: 5 = 3+1+1 (48 Lectures)

UNIT I: Introduction [4 lectures]
Definition of data structure, classification of data structure: primitive and non-primitive, linear and non-linear, ADT, data structure operations. Algorithms : definition, different approaches of designing an algorithm, Complexity, Time Space tradeoff, Asymptotic Notations for Complexity of Algorithms.

UNIT II: Arrays [8 lectures]
Introduction, Representation and Analysis, Single and Multidimensional Arrays, address Calculation of single and two dimensional arrays, operations of one dimensional array, passing arrays to functions, Pointers and arrays, array of pointers, array of structures, Two dimensional array, operations of two dimensional array

UNIT III: Stacks and Queues [12 lectures]
Introduction, Operations on Stack: Push & Pop, Array and Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.
Queue-Operations on Queue: insertion & deletion, Array and linked representation of queue, Circular queues: definition, operation and implementation, Concept of D-queues and Priority Queues.

UNIT IV: Linked List [6 lectures]
Introduction, Operations on linked list, Representation and Implementation of Singly Linked Lists, Overflow and Underflow
Doubly Linked List: definition, operations and implementation, Circular Link List: definition, operations and implementation

UNIT V: Trees [10 lectures]
Introduction, Basic terminology,Binary Trees, Binary tree representation, Strictly Binary Tree, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees. Binary Search Tree (BST): Introduction, Insertion and Deletion in BST

UNIT VI: Searching and Sorting [8 lectures]
Sequential search, binary search, Insertion Sort, Bubble Sorting, Selection Sorting, Quick Sort, Merge Sort, Heap Sort, Radix Sort. Hashing, Hash Functions, Collision Resolution Strategies

Textbooks:
1. Seymour Lipschutz, "Data Structures", Tata McGraw Hill

Recommended Books:
1. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., New Delhi.
2. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-2002
3. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.
4. K Loudon, "Mastering Algorithms with C", Shroff Publisher & Distributors Pvt. Ltd.
5. Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", Jhon Wiley & Sons, Inc.
6. Adam Drozdek, "Data Structures and Algorithms in C++", Thomson Asia Pvt

Paper: BCA202C (Core)
Digital Logic

Credits: 5 = 4+1+0 (64 Lectures)

UNIT I: Data Representation [8 Lectures]
Information Representation: Number Systems, Number base conversion, Binary Arithmetic, Fixed-point and Floating-point representation of numbers, BCD Codes, Error detecting and correcting codes, Character Representation – ASCII, EBCDIC, Gray code, Unicode.

UNIT II: Boolean Algebra and Logic Gates [10 Lectures]
Basic Definitions of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra - Boolean Functions - Canonical and Standard Forms - Other Logic Operations - Digital Logic Gates.

UNIT III: Boolean Functions [10 Lectures]
Simplification of Boolean Functions: The Map Method - Two and Three Variable Maps - Four Variable Map - Five and Six Variable Maps - Product of Sums Simplifications - NAND and NOR Implementation - Other Two Level Implementations - Don't Care Conditions.

UNIT IV: Combinational Logic [12 Lectures]
Introduction - Adders - Subtractor - Code Conversion - Binary Adder – Encoder - Decoders – multiplexer and Demultiplexer.

UNIT V: Sequential Logic [12 Lectures]
RS, JK, D, and T Flip-Flops - Edge-Triggered - Master-Slave Flip- Flops. Registers: Shift Registers -Types of Shift Registers.

UNIT VI: Counters [12 Lectures]
Asynchronous Counters Ripple, Mod, Up-Down Counters- Decoding Gates - Synchronous Counters - Ring, Decade, Presettable, Shift Counters. Memory: Basic Terms & Ideas - Magnetic Memories - Memory Addressing - Types of ROMs - Types of RAMs.

Textbooks:
1**.** M.Moris Mano, Digital Logic and Computer Design, PHI, 2001.

Recommended Books:
1. D.P.Leach & A.P.Malvino, Digital Principles and Applications -TMH - Fifth Edition - 2002.
2. Computer Organization and Architecture; William Stallings, Pearson.
3. T. C.Bartee, Digital Computer Fundamentals, 6th Edition, Tata McGraw Hill, 1991.
4. R.J.Tocci, Digital System Principles and Applications, 8th Edition.

Paper: BCA203C (Core)
Mathematical Computing
Credits: 4 = 3+1+0 (48 Lectures)

UNIT I: Representation of numbers [4 lectures]

Floating point representation, single and double precision, round off errors and truncation errors.

UNIT II: Solution of non-linear equations [8 lectures]

Bisection method, Newtons method, Regula Falsi method, secant method, Chebyshev method.

UNIT III: Solution of simultaneous linear equations [10 lectures]

Basic elimination method, Gaussian elimination method,Gauss Jordan method, Crout's reduction method. Methods of successive approximations: Jacvobi's method, Gauss-Siedel method, Given's method.

UNIT IV: Numerical integration [6 lectures]

Newton's Cotes method , Trapezoidal's rule, Simpson's rule,.

UNIT V: Ordinary differential equations [6 lectures]

Euler's method, Runge Kutta method.

UNIT VI: Interpolation [6 lectures]

Newton's interpolation, Lagrange's interpolation, Newton's divided difference method.

UNIT VII: Statistical methods [8 lectures]

Measure of central tendency: Mean, Median and Mode. Probability, probability distribution, Binomial, Poison and normal distribution. Mathematical expectations, moments, correlation, regression.

Textbooks:

1. M.K.Jain, S.R.K.Iyenger, R.K.Jain, " Numerical methods for Scientific and Engineering

Computation", Wiley Easterns.

Recommended Books

1. K.E. Atkinson, "An introduction to numerical analysis", J.Willey and Sons.

Paper: BCA204C (Core)
Professional Ethics & Cyber Law
Credits: 4 = 3+1+0 (48 Lectures)

UNIT I: Introduction to Professional Ethics [12 lectures]

Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT II: Basic Theories [12 lectures]

Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT III: Cyber Law [12 lectures]

Basic Concepts of Technology and Law: Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence Law of Digital Contracts : The Essence of Digital Contracts, The System of Digital Signatures, The Role and Function of Certifying Authorities,

The Science of Cryptography Intellectual Property Issues in Cyber Space: Domain Names and Related issues, Copyright in the Digital Media, Patents in the Cyber World. Rights of Netizens and E-Governance : Privacy and Freedom Issues in the Cyber World, EGovernance, Cyber Crimes and Cyber Laws

UNIT IV: Information Technology Act 2000 [12 lectures]

Information Technology Act-2000-1, Information Technology Act -2000-2 (Sec 14 to 42 and Certifying authority Rules), Information Technology Act-2000-3 (Sec 43 to 45 and Sec 65 to 78), Information Technology Act-2000-4(Sec 46 to Sec 64 and CRAT Rules), Information Technology Act-2000-5 (Sec 79 to 90), Information Technology Act-2000 -6 (Sec 91-94) Amendments in 2008

Textbooks:

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.

Recommended books:

1. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

2. Cyber Laws – Singh Yatindra

3. Cyber law, E-commerce & M-Commerce –Ahmand Tabrez

4. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e , Cengage learning, 2015.

5. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.

6. The Indian Cyber Law, Second Edition 2001, Vishwanathan Suresh T., Bharat Law House.