

SYLLABUS OF COMPUTER SCIENCE SUBJECT FOR B.Sc. (ELECTIVE)
NORTH LAKHIMPUR COLLEGE (AUTONOMOUS)

B.Sc. (GENERAL) PROGRAMME
COURSE STRUCTURE

For the session 2014-15 onwards

Semester	Subject	L T P	Credit
<i>I</i>	1. Course Code: ET-3-CSC-101 TITLE: Fundamentals of ICT	3 0 0	3
	2. Course Code: EP-2-CSC-102 TITLE: Basics of HTML and Scripting	0 0 4	2
<i>II</i>	3. Course Code: ET-3-CSC-201 TITLE: Programming and Problem Solving	3 0 0	3
	4. Course Code: EP-2-CSC-202 TITLE: Solving problems using C	0 0 4	2
<i>III</i>	5. Course Code: ET-3-CSC-301 TITLE: Operating System	3 0 0	3
	6. Course Code: EP-2-CSC-302 TITLE: Working with LINUX, DOS and Windows	0 0 4	2
<i>IV</i>	7. Course Code: ET-3-CSC-401 TITLE: DBMS	3 0 0	3
	8. Course Code: EP-2-CSC-402 TITLE: Practical on DBMS	0 0 4	2
<i>V</i>	9. Course Code: ET-3-CSC-501 TITLE: Data Structure and Algorithms	5 0 0	5
	10. Course Code: EP-2-CSC-502 TITLE: Data Structure	0 0 4	2
<i>VI</i>	11. Course Code: ET-5-CSC-601 TITLE: Data Communication and Computer Networks	4 0 0	4
	12. Course Code: EP-2-CSC-602 TITLE: Object Oriented Programming and Design	0 0 3	3

ET-3-CSC-101

FUNDAMENTALS OF ICT

Unit 1: Introduction to computer and information technology.

Brief history of development of computers, computer system concepts, capabilities and limitations, types of computers: Analog, Digital, Hybrid, general, special purpose, Micro, mini, mainframe, super computers, generations of computers, personal computers, Classification of Computers: Desk-top Workstations/ PCs, Mainframe, Super-Computer, Parallel computer;

Unit 2: Computer organisation and working:

Basic components of computer system, Input devices, output devices, storage devices. Binary, octal and hexadecimal; positive and negative numbers, fixed and floating point.

Unit 3: Computer Hardware and Softwares:

Basic Hardware Concept, Need of softwares, types of software, system software and application software, programming languages, machine, assembly, high level, 4GL, their merits and demerits.

Unit 4: Internet and Network Basics: Network, Types of networks, concept on Communication channel (Guided and Unguided), Internet, Topology, Internet Protocol, e-mail, Browser, ftp, http, WWW, Virus and Antivirus, Firewall, client server architecture

Books:

1. Introduction of Computer Sc. ITL ESL Pearson Education India

References:

2. Trainer T.N., Computers, 4th Edn, McGrawHill.

3. Rajaraman V., Fundamentals of Computers, 2nd Edn, PHI.

EP-2-CSC-102

BASICS OF HTML AND SCRIPTING

HTML, Page structure, html text, links, document tables, frames, images multimedia.

Shell script

Books:

1. Introduction of Computer Sc. ITL ESL Pearson Education India

References:

2. Trainer T.N., Computers, 4th Edn, McGrawHill.

3. Rajaraman V., Fundamentals of Computers, 2nd Edn, PHI.

ET-3-CSC-201

PROGRAMMING AND PROBLEM SOLVING

Unit 1:

Notion of an algorithm, tools for design and analysis of algorithms - Flow chart, Decision table, Pseudocode, Concepts of m/c language and high level language.

Unit 2:

Features of a high level language : Assignment statement, input-output statements; Expressions; data types; conditional statements, Iterative statements; Array data type and use of arrays; character data type and text processing; functional and procedural abstraction; Recursion; Pointer data type and simple applications of pointers, Structure and union.

Example algorithms: string processing, root finding, matrix operations, record processing, searching, sorting, file handling etc. Documentation, Debugging.

Books:

1. Dromey, G: How to solve it by computer, PHI (EEE),
2. Kanitkar: Let us C

References:

1. Karnighan and Ritchie: The C Programming Language

EP-2-CSC-202

SOLVING PROBLEMS USING C

Unit 1: Simple Programs

Find factorial of a number, Pascal's triangle, Real roots of a quadratic equation, Searching for Palindromes, Sequences/series like $2/9 - 5/13 + 8/17 \dots$ etc

Unit 2: Control Structures

Demonstrate the use of ternary operator, break, continue statement, type casting etc., demonstrate the use of macros (substitution, with arguments, nesting etc), demonstrate the difference between static & auto variable

Unit 3: Arrays

Compute mean, variance, and standard deviation, Merge two sorted arrays

Unit 4: Matrices

Check if a matrix is magic square or not, Sort matrix row wise, Check singularity of a matrix

Unit 5: Recursion

Factorial, GCD of two numbers, binary search, minimum & maximum of numbers, Fibonnaci series.

Unit 6: Strings

Vowels, consonants, numbers, palindrome, Find the position of pattern in the main string, Sort string of names, Match pattern of the given string

Unit 7: Pointer

Multiplication of Matrix, concatenate strings, function parameters.

Unit 8: Structures

Process records using structures.

Unit 9: Searching and Sorting

Binary search, bubble sort, selection sort, insertion sort.

ET-3-CSC-301

OPERATING SYSTEM

Section 1: Operating System

Unit 1: Introduction to Operating Systems

What is an operating system (OS)?, History of OS, Simple Batch Systems, Multiprogrammed Batched Systems, Time-Sharing Systems, Personal Computer Systems, Distributed Systems and Real –Time Systems, Operating System Structures- Command Interpreter System, Operating System Services, System Calls, System Programs.

Unit 2: Process Management

Process Concept, Process control Block, Process Scheduling, CPU Scheduling – Basic Concepts, Scheduling Algorithms – FIFO, RR, SJF, Multi-level, Multi-level feedback.

Unit 3: Storage Management

Basic Concepts, Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Virtual Memory – Demand Paging, Page Replacement, Page Replacement Algorithms.

Unit 4: File System

File Concept, Access Methods, Directory Structure, Protection, File system Structure, Allocation Methods, Free-Space Management.

Books:

1. “Operating System Concept”, Abraham Silberschatz, Peter B. Galvin

EP-2-CSC-302

Working with DOS, Windows and Linux

Practicals to be performed on

1. Dos Commands
2. Windows basics
3. Linux introduction - Basic Features, Different flavors of Linux. Advantages, Installing requirement, Basic Architecture of Unix/Linux system, Kernel, Shell. Linux File system-Boot block, super block, Inode table, data blocks, How Linux access files, storage files, Linux standard directories.
Essential Linux commands Understanding shells, Commands for files and directories cd, ls, cp, md, rm, mkdir, rmdir, pwd, file, more, less, creating and viewing files using cat, file comparisons – cmp & comm, View files, disk related commands, checking disk free spaces.

ET-3-CSC-401

DBMS

Unit I: Databases and database users

Database System Concepts and Architecture: Data models, schemas and instances, DBMS architecture, database languages and interfaces, classification of DBMS

Unit II: Data Modelling Using E-R Model:

E-R model concept

Unit III: Relational Data Models:

Relational model concepts, relational model constraints, update operations on relations, defining relations, Relational algebra, Relational database languages: SQL

Unit IV: Database Design:

Functional dependencies and normalisation for relational database

Unit V: Transaction Processing Concept:

Introduction, transaction and system concept, properties, schedules and recoverability, serializability of schedules, Concurrency control, error recovery and security.

Books:

1. Silberschatz A., Korth H.F., Sudarshan S., *Database System Concepts*, 3/e, McGraw-Hill (IE)
2. Elmasri R, Navathe S.B., *Fundamentals of Database Systems*, Benjamin Cummings Publishing Company

EP-2-CSC-402

PRACTICAL ON DBMS & WEB PROGRAMMING

Practical to be done in MySQL / SqlServer or any other DBMS package with PHP.

ET-5-CSC-501

DATA STRUCTURE AND ALGORITHMS

Concept of Data type, Data object Data Structure and Representation, Abstract Data Structures, Introduction To Analysis of Data Structure and Algorithm.

Arrays as ADT, Implementation of arrays, Single dimensional and Multidimensional.

Stack as ADT, Implementation of Stack, Push and Pop Operations, conversion of Infix to Postfix Notation, Evaluation of Postfix Notation Recursion Using Stacks(Concept only)

Queues as ADT, Implementation of queues, Application of queues to pre-Emptive Scheduling in Transaction Processing, Circular queues Using Arrays.

Linked List as ADT, Singly Linked list, Operations on Linked List, Implementations of Stacks and queues using Linked list Doubly Linked Lists, Application of Doubly Linked List in Dynamic Management, concept of Generalized Link List.

Trees as ADT, Basic Terminology, Binary Tree Traversal In order, post order, Preorder (both recursive and non-recursive versions). Threaded Binary Trees, Traversal of Thread-ed Binary Trees, Binary Tree Representation of Trees

Searching: Linear Search, Binary search, Depth First Search and Breadth First Search on Binary Trees.

Sorting: Bubble sort, Insertion sort, Quick sort

Textbooks:-

1. Data structure Using 'C', by Tanenbaum.
2. Data structure, by Seymore Lipschutz

EP-2-CSC-502

PRACTICAL ON DATA STRUCTURES

Practical to be done on Data Structures

ET-4-CSC-601

DATA COMMUNICATION AND COMPUTER NETWORKS

UNIT – I

Data Communication Component, Distributed processing, network criteria, protocol and standards, Line configuration, Topologies, Transmission mode, Categories of networks, Inter-networks. Devices: Repeaters, bridges, gateways, routers

UNIT – II

The OSI model, Function of the layers, TCP/IP Protocol suite, Analog - Digital data & signals, Periodic and Aperiodic signals, Time and Frequency Domains, Composite Signals.

UNIT – III

Digital to Digital Conversion, Analog to digital conversion, Digital to analog Conversion, Analog to Analog conversion, Digital data transmission, DTE- DCE Interface, EIA449, EIA530, X.21 Standards, Modems, Cable Modem.

UNIT – IV

Transmission media - Introduction, Guided Media, Unguided Media, Transmission Impairment, Performance, Wavelength, Shannon capacity, Media Comparison, Multiplexing– FDM, WDM, TDM, Multiplexing Application, DSL and types of Digital subscriber lines.

UNIT – V

Error detection and correction, types of errors, detection, VRC, LRC, CRC, error correction, LAN Project 802, IEEE 802.x, LLC,MAC,PDU, Ethernet , Token Bus, Token Ring. FDDI, LAN Comparison.

BOOKS

1. Computer Networks – A S. Tannenbaum
2. Data Communication and Networking – B. A. Forouzan – Tata McGraw Hill

EP-3-CSC-602

OBJECT ORIENTED PROGRAMMING AND DESIGN

Basics of Object Oriented Programming (OOP)

Introduction to OOP- difference between OOP and procedure oriented programming – Classes, Objects and Methods – Overview of Inheritance and Polymorphism.

Object Oriented Design

Trends in software design- Notation of objects- Hybrid design method- Separation of responsibilities – Responsibility driven design- design phases and tools- step by step design – Grady Booch approach.

Data Abstraction: Class, Object, Constructors, Destructors, Member allocations for objects, New and Delete operators.

Inheritance: Single, multiple, multilevel inheritance, hierarchical inheritance

Polymorphism: Compile time polymorphism, Runtime polymorphism, Abstract Class, Dynamic Method Dispatch, Final Members and Classes.

Object Oriented Design

Object Oriented Design Approaches: Object Model, Dynamic Model, and Functional Model. (Objet Diagram, State Diagram, and DFD).

Phases of Object Oriented Development: Object Analysis, System Design, Object Design.

Books:

1. Herbert Schild : The Complete Reference to C++, Osborne McGrawHill.
2. Rambaugh et al. : Object Oriented Modeling and Design, PHI(EEE).