



Centre for Teacher Accreditation

Syllabus for Computer Science

COMPUTER SCIENCE

Computer System and Organization

BEGINNER

Introduction to Computers - Definition of a Computer, History and Generations of Computers, Functions and Characteristics of a Computer, Operating a Computer.

Parts of a Computer - Different parts of a Computer and their Functions, Peripheral devices, Definition of Hardware, Input/output and Central Processing Unit (CPU).

Memory and Storage - Types of Memory: Internal and External, Storage Devices, Portable Storage, Hard Disk.

INTERMEDIATE

Parts of a Computer - Different parts of a Computer and their Functions, Peripheral devices, Computer Hardware, Input/output and Central Processing Unit (CPU).

Memory and Storage - Primary (RAM and ROM) and Secondary memory, Storage Devices, Portable Storage, Hard Disk.

Database - Introduction to Database concept and its need, Properties of a database, Database Management Systems (DBMS).

ADVANCED

Memory and Storage Devices - Primary (Cache, RAM and ROM) and Secondary memory, Storage Devices, Portable Storage, Hard Disk, Memory Units: bit, byte, MB, GB, TB, and PB.

Logic Gates and Boolean Logic - OR, AND, NAND, NOR, XOR, NOT truth tables, De Morgan's laws, Logic circuits.

Number Systems and Encoding Schemes: Numbers in base 2, 8 and 16, Binary Addition, Conversion between two different number systems, ASCII, UTF8, UTF32, ISCII and Unicode.

Database - DBMS, Different types of DBMS, Types of Data Models, Introduction to Structured Query Language (SQL), Advantages of SQL, SQL Commands, SQL functions, Basics of NoSQL databases.

Cloud Computing - Concept of Cloud Computing and Cloud services, Blockchain Technology, Introduction to Parallel Computing

Computer Software

BEGINNER

Introduction to Computer Software - Definition of Software, Types of Software: System and Application Software, Introduction to Operating System, Graphics, Multimedia and Presentation Software.

Windows - Features of Windows, Windows Explorer, Taskbar, Files and Folders, Types of Files, Elements of Windows.

TUX Paint - Introduction to TUX Paint, Features of TUX Paint, Different Tools in TUX Paint, Working with TUX Paint.

MS Office - MS Paint and its tools, Working with MS Paint, MS Word and its tools, MS PowerPoint and its tools, MS Excel and its tools

LOGO - Introduction to LOGO, Parts of LOGO screen, Commands in LOGO, Primitives in LOGO, Coding in LOGO.

Scratch - Introduction to Scratch, Parts of Scratch screen, Commands in Scratch, Programming in Scratch.

INTERMEDIATE

Introduction to Computer Software - Definition of Software, Types of Software: System and Application Software, Utility Software, Graphics, Multimedia and Presentation Software.

System Software - Operating Systems: Introduction to Operating Systems(OS), Different types of OS, Features of Windows, Windows Explorer, Basics Computer Operations: Accept data, Store data, Process data as desired, Retrieve stored data as and when required, Print the result in desired format.

Application Software - MS Office: MS Word and its tools, Working with MS Word, MS PowerPoint and its tools, Working with MS PowerPoint, MS Excel and its tools, Working with MS Excel, MS Access and its tools, Working with MS Access

Multimedia: Images, Audio, Video, Animation, Photoshop: Introduction to Photoshop and its tools, Working with Photoshop.

ADVANCED

Introduction to Computer Software - Definition of Software, Types of Software: System and Application Software, Utility Software, Open source Software, Freeware and Shareware, Graphics, Multimedia and Presentation Software.

System Software - Operating Systems: Introduction to Operating Systems (OS), Different types of OS, Need and Function of OS, Commonly used OS, Mobile OS, User Interface, Basics Computer Operations: Accept data, Store data, Process data as desired, Retrieve the stored data as and when required, Print the result in desired format, Language Processors: Assemblers, Interpreters, Compilers.

Application Software - MS Office: MS Word and its tools, Working with MS Word, Word processor, MS PowerPoint and its tools, Working with MS PowerPoint, MS Excel and its tools, Working with MS Excel, MS Access and its tools, Working with MS Access.

File handling: Need for a data file, Types of file: Text files, Binary files and CSV (Comma separated values) files.

Multimedia: Images, Audio, Video, Animation, Photoshop: Introduction to Photoshop and its tools, Working with Photoshop.

Computational Thinking and Programming

BEGINNER

Introduction to Computational Thinking - History of Computing Devices, Types of Computing Devices, Pattern Recognition.

Algorithms and Flowcharts - Introduction to Algorithms and Flowcharts, Algorithm and Flowchart for different problems.

Basics of Programming - Programming in LOGO and Scratch, Debugging code.

INTERMEDIATE

Algorithms - Basic Algorithms and Flowcharts, Different types of Algorithms: Search algorithms and Sorting algorithms.

Data Structures - Introduction to Data Structures: stack, queue, lists, simple data structures functions: push(), pop(), insert(), delete().

Programming - Introduction to Object Oriented Programming (OOP), Properties of OOP, Introduction to HTML, Properties of HTML, HTML tags, basic programming in HTML, Introduction to C programming: Data Types, Variables, Operators, Running and Debugging programs, Different types of errors.

ADVANCED

Algorithms - Different types of Algorithms: Search algorithms and Sorting algorithms, Recursive algorithms, Efficiency of algorithms.

Data Structures - Simple and Complex Data Structures: stack, queue, table, array, binary tree, different types of lists, advanced data structure functions, Application of data structures.

Basics of Computational Thinking - Decomposition, Pattern Recognition/ Data representation, Generalization/ Data Abstraction and algorithm, Problem Solving Methodology: Understanding of the problem, Solution for the problem, Breaking down solution into simple steps, Identification of arithmetic and logical operations required for solution, Control structure - conditional control and looping (finite and infinite).

Programming - Python: Data Types, Variables, Expressions, Operators, Operands, Tuples, Functions, Libraries and Programming, Object Oriented Programming (OOP), Properties of OOP, C++: Introduction to C++, Tokens, Operators, Functions, Header files and Programming, Java: Introduction to Java, Objects and Classes, Basic datatypes, Methods, Advanced C Programming: Functions, Structures, SQL: SQL Commands, Functions, Programming, Interface of Python with SQL.

Web Designing - Advanced HTML, CSS and XML, Properties of HTML, CSS and XML, Introduction to Web Designing, Web Development Tools.

Computer Networks

BEGINNER

Networks - Types of Systems, What is Computer Networks, Different types of Networks: LAN, MAN, WAN, Different types of Network Topology.

Internet - What is the Internet, World Wide Web (www), Web Browsers, Websites and Webpages, Search Engines, Cyber Security and Safety, Computer privacy, Electronic mails (Emails).

INTERMEDIATE

Networks - Different types of Networks: PAN, LAN, MAN, WAN, wired/wireless communication, Wi-Fi, Bluetooth, cloud computers (private/public), Different types of Network Topology and its applications.

Internet - What is the Internet, World Wide Web (www), Web Browsers, Websites and Webpages, Search Engines, Electronic mails (Emails).

Society, Law and Ethics - Cyber Security and Safety, Computer privacy, Child safety, Appropriate usage of Social Networks, Safely accessing web sites: Adware, Malware, Viruses, Trojans, Secure Connection, Intellectual property rights, Privacy Laws, Technology and society: understanding of societal issues and cultural changes induced by technology, Gender and disability issues while teaching and using computers, E-waste management: proper disposal of used electronic gadgets.

ADVANCED

Networks - Different types of Network Topology and its applications, Evolution of Networking: ARPANET, Internet, Interspace Different ways of sending data across the network with reference to switching techniques (Circuit and Packet switching), Data Communication terminologies, Different modes of Networking channels: Simplex, Half Duplex, Full Duplex, Different layers of Computer Network, Multiplexing, Different types of Multiplexing, Transmission media: Twisted pair cable, coaxial cable, optical fibre, infrared, radio link, microwave link and satellite link, Network devices: Modem, RJ45 connector, Ethernet Card, Router, Switch, Gateway, Wi-Fi card, Network Addresses: Internet Protocol (IP), Media Access Control (MAC) address etc.

Network Protocol – TCP/IP, File Transfer Protocol (FTP), PPP, HTTP, IP, SMTP, POP3, Remote Login (Telnet) and Internet, MAC Protocols: ALOHA, CSMA, CSMA/CD, CSMA/CA etc., Wireless/Mobile Communication protocols, Mobile Telecommunication Technologies, Mobile processors, Electronic mail protocols such as SMTP, POP3, Protocols for Chat and Video Conferencing: VoIP, Wireless technologies such as Wi-Fi and WiMAX, Versions of IP: IPv4 and IPv6.

Network Security - Security Protocols, Threats and prevention from Viruses, Worms, Trojan horse, Spams, Use of Cookies, Protection using Firewall, https

Introduction To Web services - WWW, Hypertext Markup Language (HTML), Extensible Markup Language (XML); Hypertext Transfer Protocol (HTTP); Domain Names; URL; Website, Web browser, Web Servers; Web Hosting, Web Scripting – Client side (VB Script, Java Script, PHP) and Server side (ASP, JSP, PHP), Web 2.0 (for social networking), E-commerce payment transactions using online banking, mobile banking, payment apps and services.

Society, Law and Ethics - Cyber Security and Safety, Computer privacy, Child safety, Appropriate usage of Social Networks, Safely accessing web sites: Adware, Malware, Viruses, Trojans, Cyber Law, Cyber Crimes, IPR issues, hacking.