



GOVERNMENT OF SINDH
SCHOOL EDUCATION & LITERACY DEPARTMENT
Karachi, dated: 20th November, 2019

NOTIFICATION

School Education & Literacy Department, Government of Sindh is pleased to notify the reviewed Curriculum for Grade XI and XII for the subjects of Sindhi, Biology, Physics, Chemistry, English Literature and Computer Science, Ethics for Grade III and IV, Computer Science for Grade IX and X developed by the Directorate of Curriculum, Assessment & Research (DCAR).

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Secretary to Government of Sindh

NO: SO (G-III) SELD/3-910/18

Karachi, Dated: 20th November, 2019

Copy is forwarded for information and necessary action:

1. The Chairman, Sindh Textbook Board, Jamshoro.
2. The Director, Directorate of Curriculum, Assessment & Research, Jamshoro
3. The Chief Program Manager, Reform Support Unit (RSU), Karachi.
4. The Chief Advisor, School Education & Literacy Department, Karachi.
5. The P.S to Secretary School Education & Literacy Department, Karachi.
6. Office Order File.



Ahsan
20/11/2019
SECTION OFFICER (G-III)

Curriculum for
COMPUTER SCIENCE
GRADES IX-X
2018



SCHOOL EDUCATION & LITERACY DEPARTMENT
GOVERNMENT OF SINDH

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ACRONYMS

1	AC	Accumulator
2	ALU	Arithmetic and Logic Unit
3	CD	Compact Disc
4	CDMA	Code Division Multiple Access
5	CLI	Command Line Interface
6	CPU	Central Processing Unit
7	CRT	Cathode Ray Tube
8	CU	Control Unit
9	DOS	Disk Operating System
10	DSL	Digital Subscriber Line
11	DVD	Digital Versatile Disk
12	GCD	Greatest Common Divisor
13	GUI	Graphic User Interface
14	HTML	Hyper Text Mark-up Language
15	I/O	Input/ Output
16	IDE	Integrated Development Environment
17	ISDN	Integrated Services Digital Network
18	IT	Information Technology
19	LAN	Local Area Network
20	MAN	Metropolitan Area Network
21	MB	Mega Byte
22	OOP	Object Oriented Programming
23	OS	Operating System
24	PIN	Personal Identification Number
25	RAM	Random Access Memory
26	ROM	Read Only Memory
27	URL	Uniform Resource Locator
28	VGA	Video Graphic Array
29	WAN	Wide Area Network
30	WWW	World Wide Web

INTRODUCTION

Computer and Information Technology becomes the integral part of every field of life and plays a vital role in reshaping the society. We live in the era of education where we cannot secure the future of our children without 21st century learning skills; like Information and communication Technology (ICT). Every employer in today's job market is demanding these skills. In order to secure the future of our generation and make them the successful professionals of this century who can globally compete. It is also necessary to equip them with ICT related skills.

Being Luciana in existing scheme of studies 2007, there is no compulsory subject of computer science at grade 9-10. This subject is elective for the humanities group for the SSC group and at HSSC level this is introduced as Chemistry/Computer Science. Whereas, the curriculum for this subject is redesigned as compulsory subject for grade 9 and 10 for all groups.

The design of the curriculum combines theory and practice into a learning experience. It will enhance the knowledge and skills of the students about the computer and information technology. They will learn to use computers effectively and incorporate the idea of algorithmic thinking into their daily life problems. The students will be able to acquire information from electronic resources in a variety of formats.

Framework of Curriculum

Competencies, standards, benchmarks and student learning outcomes (SLOs) formulate the structure of Curriculum for Computer Science for Grade IX-X. This curriculum framework provides a comprehensive image of the curriculum.

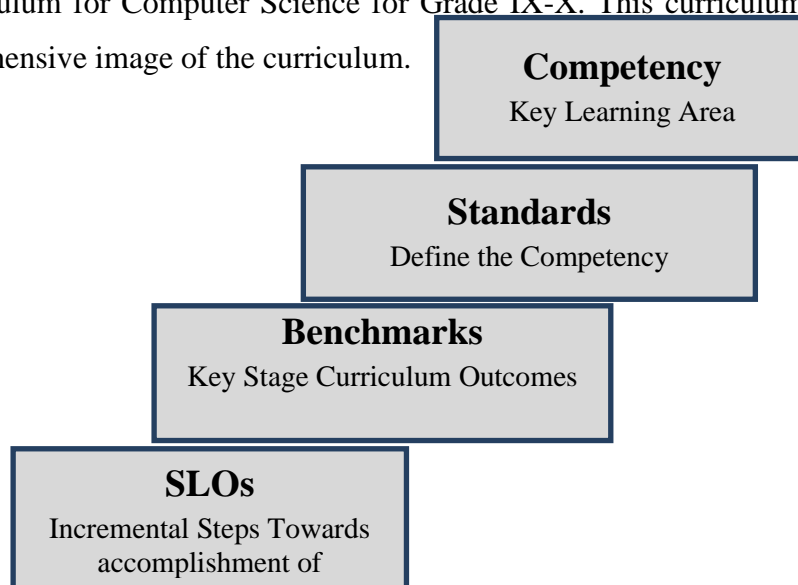


Figure No. 1 Curriculum Framework

- **Competency:**Competencies or strands are the key learning area that student will accomplish and learn
- **Standard:**The standard defines the competency by specifying broadly, the knowledge, skills and attitudes that students will acquire, should know and be able to do in a particular learning area during twelve year of schooling.
- **Benchmark:**The benchmark further elaborates the standards, indicating what the students will accomplish at the end of each developmental level in order to meet the standards.
- **Student Learning Outcome:**Student Learning Outcomes (SLOs) are based on the knowledge, skills, abilities, and attitudes that students are intended to have achieved at the end of a unit. SLOs are measurable instructional goals established for a specific group of students over a set period of time. SLOs serve as one of the measures of student growth. These are built on the description of the benchmarks and describe what student will accomplish at the end of each grade.

Competencies of Computer Science Curriculum for Grade IX-X

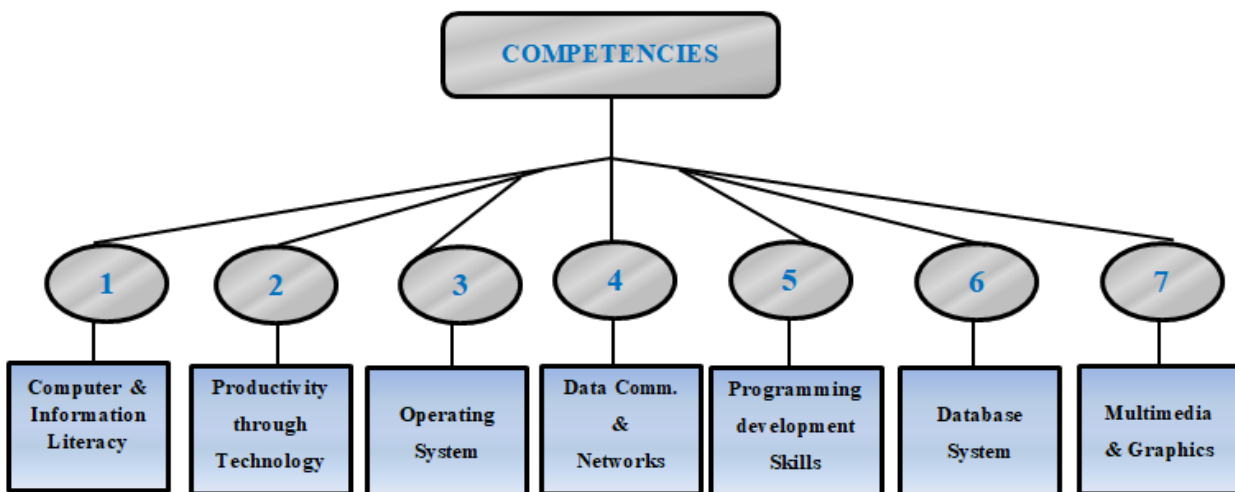


Figure No. 2 Competencies of Curriculum

Competencies, Standards and Benchmarks of the Curriculum

Sr.	Competency	Standard	Benchmark
			By the end of grade X students are expected to:
1	Computer and Information Literacy	Students will understand the fundamentals of computer and Information Technology (IT), possess Computing skills for speedy information handling and check virus attacks and authentication loopholes to take appropriate remedial measures.	1.1. Know operations of computer using various hardware components and software modules 1.2. Use and manage Windows Operating System 1.3. Use computers realizing moral and ethical values 1.4. Identify careers in IT/Computing industry 1.5. Configure latest Anti-virus software and incorporate secure authentication mechanism to safeguard the machine.
2	Productivity Through Technology	Students will develop their understanding about the use of productivity tools (like Word Processor, Spreadsheet, presentation tools, graphic tools and) which will help to enhance learning, to increase productivity and to promote creativity.	2.2 Use productivity tools (like Word Processor, Spreadsheet and Urdu/ Sindhi editor) which help to enhance learning, to increase productivity and to promote creativity
3	Operating System	To describe different types of operating systems and their functions and understand process management	3.1 Explain various types of Operating Systems 3.2 Describe functions of Operating Systems 3.3 Know the process management
4	Data Communication & Networks	To have knowledge of communication using transmission media and devices with various technologies, describe communication in different types of networks, know communication standards	4.1 Recognize communication medium and devices 4.2 Understand transmission impairments associated with appropriate communication technologies 4.3 Describe communication in different types of networks

		and identify commonly used technologies in wired and wireless networks.	<p>4.4 Describe ISO's OSI 7 layers model</p> <p>4.5 Explain TCP/IP protocol sites used on the Internet</p> <p>4.6 Illustrate understanding of wireless technologies</p>
5	Programming Development Skills	To write code to solve problems using high level programming languages and understand the concept of Object Oriented Programming (OOP).	<p>5.1 Write algorithms using various I/O requirements for solving problems</p> <p>5.2 Draw flowcharts for given problems</p> <p>5.3 Program in C++ languages using standard structures</p>
6	Database Systems	To understand database fundamentals, types, terminologies, entities and relationships, and ER-models and develop database application in MS Access.	<p>6.1 Know database system and its operation</p> <p>6.2 Build ER-data models</p> <p>6.3 Understand the use of DBMS</p> <p>6.4 Create, populate and manage tables</p> <p>6.5 Create different types of queries in MS Access</p> <p>6.6 Design ER model in MS Access</p>
7	Multimedia and Graphics	To understand and apply concepts of multimedia graphics through Scratch	<p>7.1 Understand the purpose and use of Scratch</p> <p>7.2 Use basic Scratch commands like</p> <p>7.3 Develop different projects using Scratch options.</p> <p>7.4 Understand code that are working behind objects.</p>

CURRICULUM FOR COMPUTER SCIENCE GRADE IX

UNIT 1 FUNDAMENTALS OF COMPUTER

Contents	Student Learning Outcomes
	Students will be able to:
1.1 Introduction to Computer 1.1.1 Evolution of Computers 1.1.2 Classification of Computers	<ul style="list-style-type: none"> ● Demonstrate the understanding about the history of computers ● Outline the various generation of computers ● Classify the computers as per their size and technology used to date.
1.2 Role of Computer 1.2.1 Use of Computers in Various Fields 1.2.2 Careers in IT and Computer Science:	<ul style="list-style-type: none"> ● Explain the uses of computers in different fields of life ● Discuss how computer is affecting our Lifestyle by providing variety of choices for entertainment and day to day tasks ● Tell about scope of the different careers in IT sector: <ul style="list-style-type: none"> ○ Software Engineer, ○ Network Administrator, ○ Database Administrator ○ Web Designer ○ Graphics Designer ○ Information Security Analyst ○ Teacher and others
1.3 Computer hardware 1.3.1 System Unit 1.3.2 Input Devices 1.3.3 Output Device 1.3.4 Storage Devices	<ul style="list-style-type: none"> ● Describe computer hardware ● Explain the function of different parts of system unit like: <ul style="list-style-type: none"> ○ Motherboard ○ Processor ● Differentiate between various input devices ● Recognize different output devices ● Differentiate between: <ul style="list-style-type: none"> ○ Primary memory

	<ul style="list-style-type: none"> ○ Secondary memory ● Classify different hardware devices as per their functionality
1.4 Basic operations of computer	<ul style="list-style-type: none"> ● Understand the basic operations of computer: <ul style="list-style-type: none"> ○ Input operation ○ Processing operation ○ Storage operation ○ Output operation ● Differentiate among the four basic operations of computer ● Draw the block diagram of computer's basic operations
1.5 Computer Software 1.5.1 System Software <ul style="list-style-type: none"> ● Operating System ● Device drivers ● Utility programs ● Language processors 1.5.2 Application Software <ul style="list-style-type: none"> ● Productivity software ● Business software ● Entertainment software ● Education software 	<ul style="list-style-type: none"> ● Develop the understanding about computer software ● Recognize various types of system software ● List out the names of different application software ● Differentiate between application software and system software

UNIT 2 FUNDAMENTALS OF OPERATING SYSTEM

Contents	Student Learning Outcomes
	The students will be able to:
<p>2.1 Introduction of Operating System (OS)</p> <p>2.1.1 Functions of OS:</p> <ul style="list-style-type: none"> • Memory management • I/O management • Files Management • Resource Management • Users Management <p>2.1.2 Types of OS Interface</p> <ul style="list-style-type: none"> • Command Line Interface (CLI) • Graphical User Interface (GUI) 	<ul style="list-style-type: none"> • Define OS • Develop the understanding about different functions of OS • Distinguish among the various types of interfaces of OS
<p>2.2 Types of Operating System</p> <p>2.2.1 Single User and Multi-User OS</p> <p>2.2.2 Batch Processing OS</p> <p>2.2.3 Time Sharing OS</p> <p>2.2.4 Real Time Processing OS</p>	<ul style="list-style-type: none"> • Discuss different types of OS • Differentiate among the various types of operating systems
<p>2.3 Software Installation</p> <p>2.3.1 Install Windows Operating System</p> <p>2.3.2 Install Office Automation Software</p> <p>2.3.3 Install Antivirus</p>	<ul style="list-style-type: none"> • Apply installation process of Windows operating system and other software in a computer • Demonstrate the installation process of Windows Operating System and other software • Apply installation process of any antivirus in a computer

UNIT 3 OFFICE AUTOMATION

Contents	Student Learning Outcomes
<p>3.1 MS Word</p> <p>3.1.1 Page Layout Tab Themes</p> <ul style="list-style-type: none">• Page Background• Paragraph• Arrange <p>3.1.2 Insert Table of Contents</p> <ul style="list-style-type: none">• Automatic Table of Contents• Manual Table of Contents <p>3.1.3 Typing in Urdu & Sindhi Languages</p>	<p>The students will be able to:</p> <ul style="list-style-type: none">• Demonstrate Page Layout Tab of MS Word• Identify the different groups of Page Layout Tab• Apply different features available in groups of Page Layout Tab• Insert manual and automatic table of contents in a document• Compose in Urdu and Sindhi languages in MS Word
<p>3.2 MS Excel</p> <p>3.2.1 Sorting</p> <p>3.2.2 Formulas</p> <p>3.2.3 Charts</p>	<ul style="list-style-type: none">• Review the basics of MS Excel• Identify the Elements of MS Excel User Interface• Display data with Charts

UNIT 4 DATA COMMUNICATION AND COMPUTER NETWORKS

Contents	Student Learning Outcomes
	The students will be able to:
<p>4.1 Basics of Communication</p> <p>4.1.1 Define the following terms:</p> <ul style="list-style-type: none"> • Data • Data Communication • Data Transmission • Analog Signals • Digital Signals • Data Rate • Baud Rate • Signal to Noise Ratio <p>4.1.2 components of a communication system:</p> <ul style="list-style-type: none"> • Sender • Receiver • Message • Protocol • Transmission Medium <p>4.1.3 properties of a good communication system</p> <ul style="list-style-type: none"> • Delivery • Accuracy • Timeliness 	<ul style="list-style-type: none"> • Define the basic terminology of data communication • Elaborate the terms data rate and baud rate with corresponding formulas and standard units • Differentiate between analog and digital signals • Distinguish between data rate and baud rate • Recognize different components of a communication system • Tell the various properties of a good communication system

<p>4.2 Transmission Medium</p> <p>4.2.1 Guided Media</p> <p>4.2.2 Unguided Media</p> <p>4.2.3 Transmission impairments</p> <ul style="list-style-type: none"> • Attenuation • Distortion • Noise 	<ul style="list-style-type: none"> • Develop the understanding about the transmission medium • Recognize with different types of guided and unguided media • Explain different types of guided media: <ul style="list-style-type: none"> ○ Twisted pair cable ○ Coaxial cable ○ Fiber optic cable • Describe various types of unguided media: <ul style="list-style-type: none"> ○ Radio Waves ○ Microwave ○ Infrared ○ Satellite • Differentiate between guided and unguided media • Describe the different types of flaws and faults in transmission signals.
<p>4.3 Communication Devices</p> <p>4.3.1 Switch/Router</p> <p>4.3.2 Modem</p> <ul style="list-style-type: none"> • Dial-up modem • DSL modem • ISDN modem <p>4.3.3 Network Interface Card</p>	<ul style="list-style-type: none"> • Define different communication devices • Explain the function of router • Differentiate among different types of modems • Describe the function of switch/router • Elaborate the functions of different communication devices
<p>4.4 Basics of Computer Networks</p> <p>4.4.1 Computer Network & Networking</p> <p>4.4.2 Types of Computer Networks</p> <ul style="list-style-type: none"> • Local Area Network (LAN) • Metropolitan Area Network (MAN) • Wide Area Network (WAN) 	<ul style="list-style-type: none"> • Define the term computer network and networking • Classify the network types on the basis of their characteristics

<p>4.5 Fundamental Topologies</p> <p>4.5.1 Bus topology</p> <p>4.5.2 Ring topology</p> <p>4.5.3 Star topology</p>	<ul style="list-style-type: none"> • Define the term network topology • Develop understanding about physical layout of bus topology • Familiar with design constraints of ring topology • Demonstrate the architecture of star topology • Differentiate the network topologies according to their design and physical layout
<p>4.6 Standards Organizations</p>	<p>List out the names of standards organizations:</p> <ul style="list-style-type: none"> ○ International Organization for Standardization (ISO) ○ Institute of Electrical & Electronics Engineers (IEEE) ○ Internet Engineering Task Force (IETF) ○ International Telecommunication Union (ITU) ○ American National Standards Institute (ANSI) and others
<p>4.7 Network Architecture</p> <p>4.7.1 ISO's OSI model</p> <p>4.7.2 TCP/IP model</p>	<ul style="list-style-type: none"> • Define network architecture • Memorize the names of seven layers of OSI's ISO model: <ul style="list-style-type: none"> ○ Application ○ Presentation ○ Session ○ Transport ○ Network ○ Data-link ○ Physical • Define the functions of all layers of OSI's ISO model • Describe functions of Application, Transport, Internet and Network layers of TCP/IP model
<p>4.8 Network Addressing</p> <p>4.8.1 IPV4</p>	<ul style="list-style-type: none"> • Define network address • Differentiate between: <ul style="list-style-type: none"> ○ Physical address ○ Logical Address • Describe IPV4 address

UNIT 5 COMPUTER SECURITY AND ETHICS

Contents	Student Learning Outcomes
<p>5.1 Computer Security</p> <p>5.1.1 Importance of computer security</p> <p>5.1.2 safeguard against viruses, worms</p> <p>5.1.3 Cyber Attacks</p>	<p>The students will be able to:</p> <ul style="list-style-type: none"> • Explain the importance of computer security in daily life • Define various terms related to computer security: <ul style="list-style-type: none"> ○ Cyber crime ○ Hacker ○ Cracker • Explain computer crimes by giving real-life examples • Define computer virus and how to prevent them • Describe cyber-attacks and how to prevent them
<p>5.2 Computer Viruses</p> <p>5.2.1 Viruses</p> <p>5.2.2 Ways of viruses spread</p> <p>5.2.3 Antivirus</p>	<ul style="list-style-type: none"> • Define various types of viruses: <ul style="list-style-type: none"> ○ Virus ○ Worm ○ Adware ○ Spyware ○ Malware • Differentiate between virus, worm, adware, spyware and malware • Identify that a virus, worm, adware, spyware and Malware can spread via: <ul style="list-style-type: none"> ○ Infected flash drives/ CD's ○ Pirated software ○ Network and Internet ○ E-mail attachment • Recognize that the antivirus software like a Avast, Norton, MacAfee and others can help safeguard against viruses

<p>5.3 Authentication Mechanism</p> <p>5.3.1 Types of Security mechanisms:</p> <ul style="list-style-type: none"> • Username and password • Personal Identification Number (PIN) • Biometrics 	<ul style="list-style-type: none"> • Describe the authentication mechanism • List out the different authentication mechanisms • Differentiate between username & password, personal identification number and biometric authentication mechanisms
<p>5.4 Professional Ethics in computer field</p> <p>5.4.1 Information Accuracy</p> <p>5.4.2 Intellectual Property Rights</p> <p>5.4.3 Software Piracy</p> <p>5.4.4 Information Piracy</p> <p>5.4.5 Cyber Crime and Cyber Harassment</p>	<ul style="list-style-type: none"> • Explain the importance of professional ethics in computer field • Define information accuracy • Explain various types intellectual property rights: <ul style="list-style-type: none"> ○ Patents ○ Copyright ○ Trademarks • Explain software piracy and its impact on the security • Describe the information privacy • Discuss plagiarism • Explain Cyber Crime and Cyber- Harassment and what to do in case of becoming a victim of it. • Explain how to seek help from National Response Center for Cyber Crime and other departments

UNIT 6 WEB DEVELOPMENT

Contents	Student Learning Outcomes
	The students will be able to:
6.1 Basic terminology of Web Development 6.1.1 Definition of terms: 6.1.2 Types of Web sites	<ul style="list-style-type: none">• Recall the understanding of basic terms related to web development• Define different terms:<ul style="list-style-type: none">○ World Wide Web (WWW)○ Web page○ Web site○ Web Browser○ Uniform Resource Locator (URL)○ Search Engine○ Home Page○ Web Hosting○ Web Server• Identify different types of websites• Compare various types of websites:<ul style="list-style-type: none">○ Portal○ News○ Informational○ Educational○ Personal○ Business○ Blogs○ Forums○ Entertainment

<p>6.2 Introduction to HTML</p> <p>6.2.1 Hypertext Markup Language (HTML)</p> <p>6.2.2 Steps involved in Creating a HTML file</p> <p>6.2.3 HTML Tags</p> <p>6.2.4 Basic structure of HTML document</p> <ul style="list-style-type: none"> • HTML tag • Head Section • Body Section 	<ul style="list-style-type: none"> • Develop the understanding about HTML language • Apply the various steps involved in creating a web page • Develop understanding about HTML tags • Recognize the basic structure of a HTML document
<p>6.3 Text Formatting</p> <p>6.3.1 Titles and Footers</p> <p>6.3.2 Paragraph and Line break tags</p> <p>6.3.3 Heading Styles tags</p> <p>6.3.4 Text formatting tags</p> <ul style="list-style-type: none"> • Bold • Italic • Underline • Pre • Font Size • Font Color • Font Face • Centre • Subscripted text • Superscripted text 	<ul style="list-style-type: none"> • Use Title and Address tags for inserting title and footer in a Web Page. • Compose a paragraph in a webpage • Use line break tag for starting the text from new line. • Use different text formatting tags like bold, italic, underline and etc. • Apply Pre-tag for preserving both spaces and line breaks • Change text color, face • Align the portion of text in center of web page • Write subscript and superscript text in a web page

<p>6.4 Creating Lists</p> <p>6.4.1 Unordered Lists</p> <p>6.4.2 Ordered Lists</p> <p>6.4.3 Definition Lists</p> <p>6.4.4 Nested Lists</p>	<ul style="list-style-type: none"> • Differentiate among unordered list, ordered list, definition list and nested list • Create unordered, ordered, definition and nested lists
<p>6.5 Images and Backgrounds.</p> <p>6.5.1 Image tag</p> <p>6.5.2 Attributes of Image Tag:</p> <ul style="list-style-type: none"> • BORDER • WIDTH • HEIGHT • ALT <p>6.5.3 Body tag attributes:</p> <ul style="list-style-type: none"> • BGCOLOR • BACKGROUND 	<ul style="list-style-type: none"> • Add an Image to a web page • Apply Border to Image a web page • Specify width and Height of an Image • Specify an alternate text for the image • Apply background color to a webpage • Use an image as a background of web page
<p>6.6 Hyperlinks</p> <p>6.6.1 Hyperlink</p> <ul style="list-style-type: none"> • Links to an external document • Links within the same document <p>6.6.2 Anchor Tag</p> <ul style="list-style-type: none"> • HREF • NAME • TARGET 	<ul style="list-style-type: none"> • Define a hyperlink • Create a hyperlink to an external webpage or within a same webpage. • Develop the understanding about anchor tag • Use different attributes of anchor tag.

<p>6.7 Creating Tables</p> <p>6.7.1 Table Row</p> <p>6.7.2 Table Heading</p> <p>6.7.3 Table Data</p> <p>6.7.4 Table attributes:</p> <ul style="list-style-type: none"> • ALIGN • VALIGN • WIDTH • BORDER • CELLPADDING • CELLSPACING • COLSPAN • ROWSPAN 	<ul style="list-style-type: none"> • Define term table • Differentiate between rows and columns • Differentiate between table heading and table data tags • Create a table in webpage • Change horizontal and vertical alignment of cell contents • Set the width of contents to specific number of pixels or percentage • Draw a border around the table • Control the distance between data in a cell using cellpadding attribute • Control space between adjacent cells by using cellspacing attribute • Create data cells that span given number of rows or column using colspan and rowspan attributes.
<p>6.8 Creating Frames</p> <p>6.8.1 Frameset Tag attributes:</p> <ul style="list-style-type: none"> • ROWS • COLS <p>6.8.2 FrameTag attributes:</p> <ul style="list-style-type: none"> • SRC • MARGINHEIGHT • MARGINWIDTH • NORESIZE • SCROLLING 	<ul style="list-style-type: none"> • Define a frame • Differentiate between a frame and a frameset • Use rows and cols attributes of <Frameset> tag for divide the browser screen into rows and columns • Use different attributes like Src, Marginheight, Marginwidth, Name, Noresize, and Scrollingof <Frame> tag.
<p>6.9 Web Designing Tools</p> <p>6.9.1 Software for web designing</p>	<ul style="list-style-type: none"> • List out different website development tools like: <ul style="list-style-type: none"> ○ Front Page ○ Coral Draw ○ Adobe Dreamviewer and others

UNIT 7 INTRODUCTION TO DATABASE SYSTEM

Contents	Student Learning Outcomes
	The students will be able to:
<p>7.1 Flat File System (File Management System) & Database System (Database Management System)</p> <p>7.1.1 Flat File System 7.1.2 Database System 7.1.3 Advantages of Database Management System over Flat File System</p>	<ul style="list-style-type: none"> • Define terms flat file system and database system • Differentiate between flat file system and database system • Discuss the advantages of database system over flat file system.
<p>7.2 Fundamental of Database System</p> <p>7.2.1 Basic Database Terminology:</p> <ul style="list-style-type: none"> • Database • Table • Field/Attribute/Column • Record/Tuple/Row • Data Type • View <p>7.2.2 Difference between Database, and Database Management System</p>	<ul style="list-style-type: none"> • Define basic database terms like table, field, record, data type and etc. • Differentiate between database, and Database Management System (DBMS)
<p>7.3 Data Modeling & Entity Relationship ER-Model/ Diagram</p> <p>7.3.1 Entity 7.3.2 Relationship 7.3.3 Keys</p> <ul style="list-style-type: none"> • Primary Key • Foreign Key • Referential Key <p>7.3.4 ER-Model</p>	<ul style="list-style-type: none"> • Define entity • Discuss about term relationship, in the context of database • Distinguish among primary, foreign and referential keys. • Define term ER model • Design ER model for a database in MS Access

CURRICULUM FOR COMPUTER SCIENCE – GRADE X

UNIT 1 PROBLEM SOLVING AND ALGORITHM DESIGNING

Contents	Student Learning Outcomes
	The students will be able to:
1.1 Understanding the Problem 1.1.1 Problem 1.1.2 Analyze the problem 1.1.3 Plan the solution of problem	<ul style="list-style-type: none">• Define the term problem• Evaluate a problem in order to find out its best solution• Design a strategy for the solution of problem• Find feasible solutions of a problem
1.2 Algorithm 1.2.1 Algorithm definition 1.2.2 Role of algorithm in problem solving 1.2.3 Algorithms for finding: <ul style="list-style-type: none">• Sum,• Average• Acceleration• Volume of a cube, area of triangle• Prime number,• Percentage• Series of even and odd numbers and others.	<ul style="list-style-type: none">• Define term algorithm• Discuss the importance of algorithm in problem solving• Design algorithm to find sum, average, volume, percentage and others.

<p>1.3 Flow Chart</p> <p>1.3.1 flow chart definition</p> <p>1.3.2 Flowchart symbols for:</p> <ul style="list-style-type: none"> • Start/End • Arrows • Process • Input/output • Decision/Condition <p>1.3.3 Importance of a flow chart for solving a Problem</p> <p>1.3.4 Difference between algorithm and flowchart</p> <p>1.4 Data Structure</p> <p>1.4.1 Linear</p> <p>1.4.2 Non- Linear</p>	<ul style="list-style-type: none"> • Define the flowchart • Identify the different symbols used in flowchart designing • Discuss the importance of flowchart in problem solving • Design flowchart for any problem by using various flowchart symbols • Differentiate between algorithm and flowchart. • Define Linear data types <ul style="list-style-type: none"> ▪ Stack ▪ Queue ▪ Array • Define Non-Linear data types <ul style="list-style-type: none"> ▪ Tree ▪ Graph
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UNIT 2 BASICS OF PROGRAMMING IN C++

Contents	Student Learning Outcomes
	The students will be able to:
2.1 Introduction 2.1.1 Define: <ul style="list-style-type: none">• Computer Program• Program Syntax 2.1.2 Programming languages <ul style="list-style-type: none">• High Level Languages• Low Level Languages 2.1.3 Types of Translators: <ul style="list-style-type: none">• Compiler• Interpreter• Assembler 2.1.4 Types of Errors: <ul style="list-style-type: none">• Syntax Error• Runtime Error• Logical Error	<ul style="list-style-type: none">• Define computer program• Describe the importance of syntax in any programming language• Classify different programming languages into High, middle and low level languages on the basis of their characteristics• Distinguish among various types of translators• Differentiate between syntax, runtime and logical errors.
2.2 Programming Environment of C++ 2.2.1 Integrated Development Environments (IDE) 2.2.2 Components of IDE <ul style="list-style-type: none">• Compiler• Linker• Loader• Debugger	<ul style="list-style-type: none">• Discuss about Integrated Development Environment (IDE) of C++• Develop the understanding about functions of different components of IDE

<p>2.3 Basics of C++ Programming</p> <p>2.3.1 Reserved words/Key words</p> <p>2.3.2 Basic structure of a C++ program:</p> <p>2.3.3 Pre-processor directives:</p> <ul style="list-style-type: none"> • Include • define <p>2.3.4 Comments and their syntax</p>	<ul style="list-style-type: none"> • List out different reserved words commonly used in C++ program • Explain basic structure of a simple C++ program • Introduce the use of preprocessor directives in C++ program • Use comments in a C++ program
<p>2.4 Constant and Variables</p> <p>2.4.1 Variable and constant</p> <p>2.4.2 Rules for specifying variable names</p> <p>2.4.3 Variable declaration and initialization</p> <p>2.4.4 Data types offered in C++</p>	<ul style="list-style-type: none"> • Differentiate between variable and constant • Comprehend variable declaration rules in C++ • Differentiate between variable declaration and initialization • Use different data types in a C++ program

UNIT 3 INPUT/OUTPUT HANDLING in C++

Contents	Student Learning Outcomes
<p>3.1 Input / Output Handling in C++</p> <p>3.1.1 Output functions</p> <ul style="list-style-type: none">• Cout• puts() <p>3.1.2 Input functions</p> <ul style="list-style-type: none">• Cin• getch()• getche()• getchar()• gets() <p>3.1.3 Statement terminator (;)</p> <ul style="list-style-type: none">• Escape sequences:• Alert (\a)• Backspace (\b)• Newline (\n)• Carriage Return (\r)• Tab (\t)• Backslash (\)• Single quotation mark (\')• Double quotation mark (\")	<p>The students will be able to:</p> <ul style="list-style-type: none">• Differentiate between input and output functions• Use input and output functions in a program• Describe the use of statement terminator in a program• Use escape sequences in any C++ program.

3.2 Operators

3.2.1 Arithmetic operators:

- Addition (+)
- Subtraction (-)
- Multiplication (*)
- Division (/)
- Remainder (%)

3.2.2 Increment Operator (++)

3.2.3 Decrement Operator (--)

3.2.4 Relational Operators

3.2.5 Logical operators:

- AND (&&)
- OR (||)
- NOT (!)

3.2.6 Assignment operator (=)

Vs. Equal to operator (=)

3.2.7 Arithmetic Assignment Operators:

- += (addition-assignment)
- -= (subtraction-assignment)
- *= (multiplication-assignment)
- /= (division-assignment)

- Develop a simple calculator in C++ by using arithmetic operators
- Use increment and decrement operator in a program
- Differentiate between relational and logical operators
- Use relational and logical operators
- Differentiate between assignment and equal to operators
- Use assignment operator in initialization of a variable
- Use equal to operator in order to compare two variables

UNIT 4 CONTROL STRUCTURE

Contents	Student Learning Outcomes
	The students will be able to:
4.1 Control Structure	<ul style="list-style-type: none"> • Recognize the various types of control statements: <ul style="list-style-type: none"> ○ Selection/Decision Making Structure ○ Iteration ○ Jump
4.2 Selection/ Decision Making Structure 4.2.1 If statement 4.2.2 If-else statement 4.2.3 Else-If statement 4.2.4 Switch-default statement	<ul style="list-style-type: none"> • Define decision making structure • Understand the syntax of If and If-Else statements • Use If and If-Else statements in C++ programming • Differentiate between If, If-Else and switch decision making structures • Use switch statement in the programs
4.3 Iteration Statements/ Loops 4.3.1 For loop 4.3.2 While loop 4.3.3 Do-while loop	<ul style="list-style-type: none"> • Explain the concept of loop structure • Explain for, while and do-while loop structures • Differentiate between for, while and do-while loop structures and their use • Use these three loop structures into C++ programming • Explain the concept of nested loops
4.4 Jump Statements	<ul style="list-style-type: none"> • Recognize the use of jump statements: <ul style="list-style-type: none"> ○ Break Statement ○ Continue Statement ○ Goto Statement ○ Return Statement ○ Exit Function

UNIT 5 FUNCTIONS

Contents	Student Learning Outcomes
	The students will be able to:
5.1 Introduction to functions 5.1.1 Function Declaration 5.1.2 Function Definition 5.1.3 Function Call 5.1.4 Types of functions <ul style="list-style-type: none">● Pre define functions● User define functions	<ul style="list-style-type: none">● Define the term function● Differentiate between function call and function definition● Differentiate between pre define and user define functions● Use pre define functions in any program● Write code for user define functions in C++

UNIT 6 Digital LOGIC AND Design

Contents and Scope	Student Learning Outcomes
	The students will be able to:
6.1 Data Representation in a computer	<ul style="list-style-type: none"> Recall that data is represented using binary pulses (0 and 1) Explain that binary pulses have a respective low and high voltage
6.2 Logic Gates 6.2.1 Basic Logic Gates <ul style="list-style-type: none"> NOT AND OR 6.2.2 Universal Gates <ul style="list-style-type: none"> NAND NOR 	<ul style="list-style-type: none"> Explain the three basic logic gates Construct the 2, 3, 4, . .n variable truth tables for basic logic gates Explain the universal gates with the help of truth tables Differentiate between basic and universal logic gates
6.3 Boolean Algebra 6.3.1 12 Laws of Boolean Algebra	<ul style="list-style-type: none"> Apply 12 rules of Boolean algebra for simplification of any expression Design a logic circuit for any Boolean expression Derive Boolean expression for any logic circuit

UNIT 7 INTRODUCTION TO SCRATCH

Contents and Scope	Student Learning Outcomes
	The students will be able to:
7.1 Introduction to Scratch 7.1.1 Using Scratch 7.1.2 Environment 7.1.3 Working with Scratch 7.1.4	<ul style="list-style-type: none">• Explain scope, possibilities and limitations of scratch• Demonstrate downloading and installation process of Scratch Editor OR Working with Scratch Online• Explain the environment and tools in Scratch including sprite and scripts• Demonstrate the use of Code, Costumes and Sound Tabs• Use Code keys to manage simple program• Develop a project using different multimedia component

Lab Activities

Grade IX

1. Operating System

- Installation of O.S. (MS Windows latest version)
- Manage files and folders
- Customize desktop
- Installation of MS Office latest version
- Installation of Antivirus Software

2. MS Word

- Write different applications / letters
- Design class time table
- Design greeting / invitation cards
- Design certificates

3. Spread Sheet

- Create a marksheet
- Create a utility bill
- Monthly attendance record
- Create a Stock Control list for a grocery shop

4. Create a webpage / website involving

- Lists
- Images and backgrounds
- Hyperlinks
- Tables
- Frames

Grade X

1. Installation of C++IDE

2. Familiarization with IDE of C++ – Compiler

3. Write some programs using cout, cin, Escape Sequences, and getch etc.

4. Write programs like:

- Solving arithmetic problems to calculate average, percentage, and grades
- Calculating area, volumes, parameters of some geometric shapes
- Comparing numbers
- Solving quadratic Equation
- Finding factorial of given numbers
- Finding Table of a given number

- Generating / Summing of simple series (even/odd)
- Use of code.org

5. Demonstrate the installation or used of Scratch

6. Demonstrate how to use different tools in Scratch

7. Develop a projected using the multimedia options available in Scratch

ASSESSMENT AND EVALUATION

Assessment is the process of gathering information by using a variety of tools and techniques that reflects how well a student is achieving the curriculum expectations in the subject. As part of assessment, teachers provide students with descriptive feedback that guides their efforts towards improvement. The quality of assessment largely determines the quality of evaluation. Evaluation refers to the process of judgment and decisions based on the interpretation of evidence gathered through assessment. Rowntree* (1990) defined assessment as having two purposes: firstly to support and provide feedback to learners and improve their ongoing learning, and secondly to report on what they had already achieved. In essence, the first is formative assessment and the second is summative assessment. Morgan and O'Reilly' (1999) believe that assessment is the engine that drives and shapes learning, rather than an end of course event that grades and reports on performance.

Assessment and evaluation should be based on the expectations outlined in the national curriculum. To ensure that assessment and evaluation lead to the improvement of student learning, teachers must use specific assessment and evaluation strategies that:

- Address both what students learn and how well they learn
- Are aligned with student learning outcomes of the curriculum.
- Are administered over a period of time and designed to provide opportunities for students to demonstrate full range of their learning
- Ensure that each student is given clear directions for improvement
- Promote students' ability to assess their learning, and
- Are communicated clearly to students and parents in advance

For assessment and evaluation of grade level IX-X the institutions adopt their own criteria. The means by which each institution achieves quality should differ according to the circumstances in which it operates, but each must give priority to meet

students' expectations in terms of learning outcomes they can legitimately expect to achieve. In essence an effective learning-outcomes-oriented quality assurance system must be based on constant monitoring and effective feedback loops.'

Unit-wise Weightages

Following tables explain weightages of specified units with respect to grades IX-X. They will be supportive to:

- The teachers and education planners to develop the assessment and evaluation strategies,
- The textbook writers to give a specific weightage to a particular unit

Unit-wise Weightages for Grade IX

Unit	Title	Weightage
1	Fundamentals of Computer.	10%
2	Fundamentals of Operating System.	10%
3	Office Automation.	20%
4	Data Communication Computer Networks.	20%
5	Computer Security and Ethics.	10%
6	Web Development	20%
7	Introduction to database System	10%
TOTAL		100%

Unit-wise Weightages - Grade X

Unit	Title	Weightage
1	Problem Solving & Algorithm Designing.	10%
2	Basics of Programming in C++.	15%
3	Input / Output Handling in C++.	15%
4	Control Structures	20%
5	Functions	15%
6	Digital Logic and Design	15%
7	Introduction to Scratch	10%
TOTAL		100%

The Distribution of Time - Theory and Lab

Teaching schedules are among the integral parts of classrooms. They help school management to run and monitor the teaching of a particular subject. The following tables, indicating unit-wise time distribution for theory and lab classes, will be supportive to the teachers and education planners. Although the time to be spent, may be varied according to circumstances. It is advisable that teachers should not grossly depart from the suggested time.

Unit-wise Time Distribution of Grade IX

Unit	Title	No. of Periods	
		Theory	Lab
1	Fundamentals of Computer	15	5
2	Fundamentals of Operating System	15	5
3	Office Automation	10	40
4	Data Communication and Computer Networks	35	
5	Computer Security and Ethics	15	
6	Web Development	10	10
7	Introduction to database Systems	10	10
TOTAL		180	

Unit-wise Time Distribution of Grade X

Unit	Title	No. of Periods	
		Theory	Lab
1	Problem Solving & Algorithm Designing	15	0
2	Basics of Programming in C++	10	10
3	Input / Output Handling in C++	10	10
4	Control Structures	10	20
5	Functions	10	25
6	Digital Logic and Design	20	0
7	Introduction to Scratch	15	25
TOTAL		180	

The Textbook

There are many important entities involved to revamp the entire education system. The school has to play its own role, parents have to contribute their share and teachers have to assume a significant place in fostering education. Print materials, particularly the textbooks, have to play a key role towards providing quality education at all levels. Although there are many stakeholders that contribute towards the overall learning of the child yet the importance of textbook as a reservoir of information / knowledge cannot be ignored.

Textbook writers have a vital role to play in penetrating the young minds through their writing. A textbook:

- content as well as presentation is thoughtfully planned
- is written by the qualified and competent subject expert(s),
- is attractive and engaging must stimulate the interest of teacher and the taught.
- Subject expert (s)/ textbook authors prefer to use latest version of MS Office and softwares included in curriculum document in order to equip students with latest knowledge.

Guidelines for Textbook Authors

Textbooks aimed at lower level tend to include more learning features than those at higher level. However in textbook writing generally the following aspects may be taken into consideration:

- The textbook should be in line with the objectives of Curriculum
- The author should continuously focus on standard, benchmarks and SLOs
- The textbook should be visually appealing and should maintain the interest of the students
- The title page should be attractive and representative of the content of the textbook
- The color scheme of pictures should be close to real life
- The textbook should include detailed table of contents
- Activities/ Exercises must be designed must be designed related to 21st Century learning skills like critical thinking and problem solving skills.
- The text should be clear and concise

- The material should not be cramped. To make it more digestible, it may be chunked into smaller parts with headings
- The author should bring himself to the mental level of students, he/she is writing for
- The span of the textbook should be fairly reasonable
- The textbook is expected to provide accurate and up-to-date information
- Textbook should build vertical linkage between various concepts from lower to higher grade level
- The text material should be arranged in a logical manner; simple to complex, familiar to unfamiliar and concrete to abstract
- The text material must be free from ambiguities and errors
- Highlight the headings, sub-heading, key words, terms and definitions. For distinction use level heading “A” 4.1, 4.2-----level “B” 4.1.1, 4.2.1-----
--level “C” (a), (b), (c)----- (i), (ii), (iii)-----and level “D” bold but unnumbered.
- Draw figures to size and should be numbered as Fig.4.1, 4.2, 4.3----- followed by captions, label if needed (font size 9).

Textbook Style and Structure

To make a textbook an effective teaching and learning resource its style and structure is given due importance. The material needs to be structured in a coherent and logical way, and that writing style should be reader friendly.

Unit Opening	
Unit Outline	Include list of headings.
Student Learning Outcomes (SLOs)	One SLO for each heading may be included. If they are numerous then a reasonable number is acceptable.
Short Introduction	Explain what this unit covers and why.

Unit Body	
Key Terms	Use italics for emphasis and bold for key terms. Define key terms when first introduced and collate them with their definitions for the glossary.
Tips or Hints	Separated from the main body of text, they allow the author to speak directly to the student, offering useful advice or flagging important points.
Visuals	Include pictures that illustrate the use and importance of computer and technology.

Unit Ending	
Checkpoint Exercises	Include multiple-choice questions, interpretive exercises, fill-in and matching items. Students may also be asked to label diagrams or write a one word answer to short question and other current days exercises .
Lab Exercises	Include computer lab exercises, appropriate to the unit.
Summary	Include a review of the main concepts. This can relate to the SLOs by covering each in turn (bullet points work well). The summary should not include any new information.

End of Textbook	
Glossary	Include only the key terms in the glossary.
Bibliography	Include bibliography and list of books for suggested reading.
Index	Include index for the key terms used in the book.

The Workbook

Workbooks contain writing activities and exercises that are related to each unit in the textbook. Workbook exercises help to develop students' conceptual understanding of the topics dealt within the text. They assist students in developing skills by applying knowledge to new situations. A workbook has the workbook should:

- Be easy for students to understand and follow
- Involve clear and explicit instructions
- Be stimulating, challenging and innovative
- Correspond to knowledge and skill developed in the textbook
- Consist of many exercises and activities for each unit, topic and sub-topic
- Be non-repetitive in style and structure
- Avoid using too many activities for one topic or skill
- Include exercises and activities which are different from those in textbook or teacher's manual
- Suggest accessible and affordable materials/resources for the proposed activities

The Teacher's Manual

Ideally the teacher's manual should come with the textbook. The manual is aimed at informing teachers how the textbook is written and how best to use it to facilitate student learning. It can be seen as the means of helping teachers develop professionally. It provides detailed explanation of key concepts and the way to teach a particular topic.

The teachers' manual should:

- Be easy to understand and use
- Help teachers to teach text and extend activities
- Give sequenced instructions for each activity
- Include detailed lesson plans
- Suggest projects to assign
- Include teaching learning resources
- Establish a test bank (having questions different from text) and suggest interactive quizzes corresponding to each unit
- Involve various up-to-date and relevant teaching strategies and rationale for suggested teaching
- Explain how to implement each teaching strategy
- Identify constraints and strengths of each strategy or activity
- Identify resources needed for teaching strategies and extension of activities
- Expand and develop teachers repertoire of knowledge and skills
- Identify various assessment strategies

The Web-Based Resources

The World Wide Web is growing very fast to access an immense volume of rapidly evolving information. It is acting as a driving force since its ease of use makes the internet trivially accessible. Through web-based links like the ones mentioned below the teachers, parents and students can

- Access various sites around the world;
- Access additional information and currency on the topics,
- View three-dimensional figures, graphics, lesson plans, activities and various books of interest

Title of Website	Universal Resource Locator (URL)
About.com	www.about.com
Coloring.com	www.colouring.com
Computer Knowledge	www.cknow.com/vtutor/index.html
Excel Tutorial	www.usd.edu/triu/tut/excel
Funbrain	www.funbrain.com
HowStuffWorks	www.howstuffworks.com
Internet4Classrooms	www.internet4classrooms.com/on-line.word.htm
Learn the Net	www.learnthenet.com/english/index.html
PowerPoint in the classrooms	www.actden.com/pp
Robot Magazine	www.robotmag.com
Typing Master	www.typingmaster.com
Typing Tutor	www.typingtutor.com
Wikipedia	en.wikipedia.org

Computer Science Provincial Review Committee (PRC)

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