

National Curriculum of Pakistan 2026

COMPUTER SCIENCE

Grades 9-12



NATIONAL CURRICULUM COUNCIL WING
MINISTRY OF FEDERAL EDUCATION AND
PROFESSIONAL TRAINING, ISLAMABAD
GOVERNMENT OF PAKISTAN

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Acknowledgement

The National Curriculum Council Wing, Ministry of Federal Education and Professional Training, Government of Pakistan, has undertaken the rationalization of curricula for various subjects, including Computer Science Curriculum, at the secondary and higher secondary levels, with the aim of enhancing their coherence, effectiveness, and practical applicability.

During this process, a broad-based and systematic consultative approach was adopted, incorporating valuable input from education departments, subject experts, principals, teachers, examination and assessment bodies, and textbook publishers from both public and private sectors. As a result of this collaborative effort, unnecessary repetition, excessive content load, and ambiguities within the curriculum have been reduced, making it more streamlined, focused, and pedagogically sound.

I would like to express my sincere appreciation to all distinguished experts, institutions, and stakeholders who generously contributed their professional expertise and valuable time to this national endeavor. Their committed engagement has led to the development of a curriculum that is not only aligned with national priorities but also comparable with international standards.

I am confident that this rationalized National Curriculum of Computer Science will play a significant role in enhancing the effectiveness of teaching and learning processes, facilitating teachers, and fostering meaningful, deep, and sustained learning among students.

Dr. Tabassum Naz

Director

National Curriculum Council wing

Ministry of Federal Education and Professional Training,

Islamabad

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Introduction

This curriculum provides a coherent and progressive framework for ICT, Computer Science from Grade IX to Grade XII. It is designed to support the systematic development of digital literacy, computational thinking, and intelligent technology skills, beginning with foundational concepts in the early grades and advancing toward applied programming, data-driven reasoning, and intelligent systems at the secondary level. The curriculum emphasizes continuity, real-world relevance, ethical awareness, and learner readiness for higher education, emerging careers, and responsible participation in a technology-driven society.

VISION

The curriculum envisions preparing all learners in Pakistan to become confident, responsible, and creative users of digital technologies. It aims to progressively develop learners' understanding from foundational digital literacy in the early grades to informed, analytical, and innovative application of intelligent systems by the end of higher secondary education enabling them to solve real-world problems, participate ethically in a digital society, and contribute positively to national and global development.

RATIONALE

Digital technologies and intelligent systems increasingly influence everyday life, education, and the future of work. Early exposure to ICT and age-appropriate CS concepts builds strong foundations in digital literacy, problem solving, and computational thinking, while reducing future learning barriers. A structured and continuous curriculum from primary through higher secondary levels ensures coherent progression from basic technology use to advanced understanding of HTML, Java Script, SQL AI, Python, Machine Learning, and Robotics. This integrated approach supports relevance, innovation, ethical awareness, and readiness for higher education and emerging careers, while positioning technology as a practical tool for learning across disciplines and real-life contexts.

AIMS

By the end of Grade XII, learners will be able to:

- Use digital tools confidently to create, communicate, analyze information, and solve problems across academic and real-life contexts.
- Apply computational thinking and programming skills, progressing from block-based environments to text-based languages, to design logical and efficient solutions.
- Understand core concepts of Artificial Intelligence, Machine Learning, and Robotics, including how intelligent systems sense, learn, decide, and act.

- Analyze and evaluate real-world applications of AI and Robotics across multiple sectors and contexts.
- Demonstrate ethical awareness, responsible digital citizenship, and informed decision-making related to data privacy, safety, bias, and technology use.
- Identify academic pathways, skill sets, and career opportunities related to Machine Learning, AI, Data Science and emerging technologies.

PEDAGOGY AND LEARNING APPROACH

The curriculum adopts a progressive, learner-centered pedagogy that supports the continuous development of digital literacy, computational thinking, and intelligent technology skills from primary through higher secondary education. Learning begins with exploratory, activity-based experiences that encourage curiosity and foundational understanding, and gradually advances toward structured application, analytical thinking, and independent inquiry.

Teaching and learning emphasize hands-on engagement through projects, simulations, programming, and problem-solving tasks that connect concepts to real world contexts. Instruction evolves from guided discovery and creation in the early grades to text-based programming, data-driven analysis, and system-level understanding in the secondary grades. Collaborative learning, reflection, documentation, and presentation of work are integral components throughout the curriculum.

Ethical awareness, digital safety, inclusivity, and responsible use of technology are embedded across all grade levels and learning activities. Assessment-informed pedagogy, supported by continuous formative feedback and appropriate summative evaluation, guides instructional decisions and supports learner progression.

This approach prepares students for higher education, emerging careers, and responsible participation in a technology-driven society

Progression Grid (IX - XII)

Domain A: Computer Systems			
Grade 9	Grade 10	Grade 11	Grade 12
Standard: Students will learn about components and interactions between computer systems, stages of software development, data representation and transmission across networks of computing systems, and the implications on usability, accessibility etc.			
Benchmark I: Students will identify and analyze components of computer systems and different levels of interactions between hardware, software, users, and computer networks		Benchmark I: Students will identify and analyze digital logic Benchmark II: Students will identify stages of system development life cycle Benchmark III: Students will learn about usability and accessibility of Human computer interface	
Student Learning Outcomes			
[SLO CS-09-A-01] Define System, Artificial system, natural system, Von Neumann Architecture ,Components of Von Nueman architecture, purpose of registers(Accumulator, PC,IR,MAR,MBR etc),Computer software and its types [Remembering]	[SLO CS-10-A-01] Define the number systems, encoding schemes for data representation (Text, image, audio, video)in computer systems: [Remembering]	[SLO CS-11-A-01] Know Analog data, digital data, logic gates, Boolean function [Remembering]	[SLO CS-12-A-01] Define the user needs in context of interface design ,the Common problems regarding HCI ,fundamentals and importance of HCI [Remembering]

[SLO CS-09-A-02] Understand following: • types of memories(volatile,non volatile, magnetic, optical solid state) • Working principle of Von Neumann (I/O ,memory ,buses) • relationship among data storage units (Bit, byte, KB, MB, GB, TB, EB, word size) • Types of programming language , • programming language translators (Compiler, Interpreter, Assembler), • Components of IDE [Understanding]	[SLO CS-10-A-02] Execute interconversion of numbering systems, addition of binary numbers, subtraction of binary numbers (using 1's and 2's complement) [Applying]	[SLO CS-11-A-02] construct Truth table ,logic circuit and simplified logic circuit using K-Map [Applying]	[SLO CS-12-A-02] Describe principles(Accessibility principles such as contrast, readability, color-blind, friendly design, testing and evaluation of HCI [Understanding]
[SLO CS-09-A-03] Define data communication (including its components like sender, receiver, medium etc.),Computer network and purpose of devices(Hub, Router, Switch, AP, Gateway, Bridge, Wi-Fi) [Remembering]	[SLO CS-10-A-03] Describe functions of Operating system, Types of Operating system process, process state model. [Understanding]	[SLO CS-11-A-03] Explain the stages of the software development life cycle (analysis, design, coding, testing, etc.), and become familiar with different software development methodologies .(waterfall, Agile) [Understanding]	[SLO CS-12-A-03] Implement UI/UX HCI using any tool like Figma/Adobe XD [Applying]
	[SLO CS-10-A-04] Explain the features, shape, advantages and disadvantages of network topologies (Bus, Ring, Star, Mesh). [Understanding]	[SLO CS-11-A-04] Understand reliability and scalability of network topologies, OSI model, purpose of layers, Protocol used in layers, TCP/IP Model [Understanding]	[SLO CS-12-A-04] Examine testing and evaluation of UI/UX HCI developed in Figma/Adobe XD [Analyzing]

Domain B: Computational Thinking & Algorithms

Grade 9

Grade 10

Grade 11

Grade 12

Standard: Students will identify and decompose simple and complex problems, create & evaluate appropriate solutions using computational approaches, and understand and apply common algorithms used in solving computational problems.

Benchmark I: Students will understand and apply computational thinking techniques to solve complex, real-world problems.

Benchmark I: Students have core concepts of basic data structures and algorithms used extensively in computer science and knowledge of how to apply these techniques toward solving more complex and real-life problems.

Student Learning Outcomes

[SLO CS-09-B-01] Explain computational problem-solving techniques such as decomposition, abstraction, pattern recognition, and algorithmic thinking. [Understanding]	[SLO CS-10-B-01]: Apply computational thinking to design and develop problem-solving artifacts such as pseudocode and flowcharts. [Applying]	[SLO CS-11-B-01]: Explain real-world problems by identifying their components and demonstrating how computational thinking strategies (abstraction, decomposition, pattern recognition) can be applied to solve them. [Understanding]	[SLO CS-12-B-01] Define the basic concept of data structures, distinguishing between linear and non-linear forms. [Remembering]
[SLO CS-09-B-02]: Define Input–Process–Output (IPO) model in computational thinking to show how problems are solved systematically. [Remembering]	[SLO CS-10-B-02]: Analyze computational artifacts using dry runs and trace tables. [Analyzing]	[SLO CS-11-B-02]: Describe the importance of algorithms in systematic problem-solving and explain their role in achieving efficiency and accuracy. [Understanding]	[SLO CS-12-B-02] Explain how data retrieval occurs in linear and non-linear data structures such as arrays, lists, and queues. [Understanding]

[SLO CS-09-B-03] : Apply computational thinking techniques to develop solutions for real-world problems. [Applying]	[SLO CS-10-03]: Evaluate the correctness and efficiency of computational artifacts by detecting and justifying structural and logical errors. [Evaluation]	[SLO CS-11-B-03]: Apply suitable searching algorithms (e.g., linear, binary) for problems face in daily life. [Applying]	[SLO CS-12-B-03] Apply advance sorting algorithms (Selection, Quick and merge) to organize and retrieve data effectively, selecting appropriate techniques for given problems [Applying]
SLO CS-09-B-04]: Create Input–Process–Output (IPO) model to solve complex real world scenario [Creating]	SLO CS-10-B-04]: Create Pseudocode and flowcharts to implementation of solution for complex real world scenario(Admission system, Book issuance system, reservation system) [Creating]	[SLO CS-11-B-04]: Apply sorting algorithms (bubble and insertion) to organize and retrieve data effectively, selecting appropriate techniques for given problems [Applying]	[SLO CS-12-B-04] Analyze algorithms for correctness using trace tables or stepwise reasoning, identifying structural and logical issues. [Analyzing]
		[SLO CS-11-B-05]: Create Solution of real-world using computational thinking strategies (abstraction, decomposition, pattern recognition) can be applied to solve them. [Creating]	[SLO CS-12-B-05] Evaluate the clarity and efficiency of algorithms by assessing modularity, readability, and number of steps, and suggest refinements for improvement. [Evaluation]

			[SLO CS-12-B-06] Develop linear and non-linear data structures such as arrays, lists, and queues for real world scenario [Creating]



Domain C: Programming Fundamentals

Grade 9

Grade 10

Grade 11

Grade 12

Standard: Students will create and debug projects in programming languages Python, HTML, and JavaScript, learning how to translate algorithms into code and define and apply fundamental programming constructs such as sequence, selection, and iteration.

Benchmark I: Students will develop, test, and debug static website (using HTML and CSS) and a dynamic website (using JavaScript)

Benchmark I: Students demonstrate foundational understanding of Python programming concepts by using IDEs, variables, operators, control structures, functions, data structures, file handling, libraries, and debugging techniques to write and execute simple programs accurately.

Benchmark II: Students apply Python programming skills to develop modular and efficient solutions for real-world problems using functions, loops, conditional statements, file management, libraries, and appropriate data structures independently.

Student Learning Outcomes

[SLO CS-09-C-01] Define the features of web development, static websites, and web applications.

[Remembering]

[SLO CS-10-C-01] Understand the basic concepts of JavaScript, differentiate between dynamic and static websites, and DOM model

[Understanding]

[SLO CS-11-C-01] Understand the fundamental concepts of Python programming and recognize its real-world applications in areas such as web development, data science, artificial intelligence, automation, and game development.

[Understanding]

[SLO CS-12-C-01] Understands the concept of lists, tuples, sets and dictionaries in Python.

[Understanding]

[SLO CS-09-C-02] Explain the concept of front-end and back-end development of a website, including relevant examples. [Understanding]	[SLO CS-10-C-02] Practice basic syntax including variables, data types, and operators in JavaScript. Write simple programs using <code>alert()</code>, <code>console.log()</code>, <code>document.write()</code>, and basic expressions. [Applying]	[SLO CS-11-C-02] Execute appropriate programming environments (e.g., IDLE, VS Code, or online compilers) for Python programs and elements of an Integrated Development Environment. [Applying]	[SLO CS-12-C-02] Construct Python programs that utilize lists, tuples, sets, and dictionaries to solve real-world problems such as managing student records, counting word frequency, or organizing structured data. [Applying]
[SLO CS-09-C-03] Use a text editor (e.g., Notepad, VS Code) to write simple HTML code and test it in a web browser. [Applying]	[SLO CS-10-C-03] Apply sequence, selection (if, else if, else), and repetition (for, while, do...while) in JavaScript. Write programs that demonstrate these control structures. [Applying]	[SLO CS-11-C-03] Apply the concepts of variables, naming rules, and data types in Python. Use arithmetic, relational, logical, assignment, bitwise, and membership operators effectively. Incorporate different types of comments to document code [Applying]	[SLO CS-12-C-03] Understand the purpose and structure of functions in programming. Differentiate between built-in and user-defined functions, the concept of scope (local vs. global variables), lambda function, parameters and how it influences the behavior of functions. [Understanding]
[SLO CS-09-C-04] : Analyze the structure of an HTML document and differentiate between basic tags (headings, paragraphs, links, images, lists) and advanced features (tables, forms). [Analyzing]	[SLO CS-10-C-04] Develop dynamic websites, interactive features such as image sliders or greeting messages based on user input using JavaScript. [Applying]	[SLO CS-11-C-04] Develop simple input/output programs using the <code>input()</code> and <code>print()</code> functions. Debugging the syntax, runtime and logical	[SLO CS-12-C-04] Develop Python programs that use built-in functions (numpy, pandas, matplotlib for data manipulation, visualization)

		errors in code using different debugging tools present in IDE. [Applying]	and user-defined functions to implement local variables, global variable, lambda function, function definition, function call, return variable, and parameters [Applying]
[SLO CS-09-C-05] Apply inline and internal CSS to format text, images, and page layout by using properties such as color, background-color, margin, and padding within the <style> tag to enhance the visual presentation of a static website. [Applying]	[SLO CS-10-C-05] Apply event handling (onclick, onchange, onmouseover) to respond to user actions. Build a small project (e.g., quiz app, calculator) to demonstrate dynamic behavior. [Applying]	[SLO CS-11-C-05] Apply selection constructs (if, else if, else) and repetition constructs (for, while) in Python programs. Demonstrate the use of break and continue statements to control loop execution. [Applying]	[SLO CS-12-C-05] Understand the concept of file handling in Python and explain how data is stored, retrieved, and managed using files. [Understanding]
[SLO CS-09-C-06] : Construct a multi-page static website project (e.g., personal profile or school information site) by applying HTML structure, hyperlinks, tables, forms, and CSS styling in a text editor and testing it in a web browser. [Applying]	[SLO CS-10-C-06] Evaluate debugging as the process of identifying and fixing errors in code. Distinguish between syntax, runtime, and logical errors in JavaScript. [Evaluation]	[SLO CS-11-C-06] Apply commonly used Python libraries such as math, random, and datetime to perform calculations, data manipulation, visualization, and time-based operations. [Applying]	SLO CS-12-C-06] Apply the use of file modes and file-handling functions to perform operations such as reading, writing, and closing a file. [Applying]
	[SLO CS-10-C-07] :Develop a small project (e.g., quiz app, calculator) to	[SLO CS-11-C-07] Develop a small python project (e.g., log book, calculator, calendar, game,	

	demonstrate dynamic behavior.[Creating]	fake record generator, word counter demonstrate different statements, structures and built in function [Creating]	
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Domain D: Data and Analysis			
Grade 9	Grade 10	Grade 11	Grade 12
Standard 1: Students will be able to understand the scope of data science and how to collect, store, process, visualize, and interpret data?			
Standard 2: Students will get an introduction to the relational data model, relational database engines and SQL.			
Benchmark I: Students will be able to define and explain how to collect, store, analyze, visualize data		Benchmark I: Students will be able to represent databases using UML diagrams and extract data using queries, and create data visualizations using software tools	
Student Learning Outcomes			
[SLO CS-09-D-01] Define data, the types of data [Remembering]	[SLO CS-10-D-01] Understand data science, its life cycle and applications. [Understanding]	[SLO CS-11-D-01] Understand basic types of relationships (1:1, 1:M, M:N) and Referential integrity (cascade update/delete) [Understanding]	[SLO CS-12-D-01] Memorize important terminologies regarding connectivity (database engine)between database (any SQL tool like

			MySQL))and python [Remembering]
[SLO CS-09-D-02] understand data collection, and data storage. [Understanding]	[SLO CS-10-D-02] Understand role ,Importance of database and its applications ,elements of database (field, record, table/ relation, primary key) [Understanding]	[SLO CS-11-D-02] Apply a Entity-Relationship Models using real life examples. and database using relational DBMS using MS Access to get hands on experience of database objects (tables, forms and queries) [Applying]	[SLO CS-12-D-02] Demonstrate connectivity between database and python also perform basic queries using Python [Applying]
	[SLO CS-10-D-03] Create tables and perform basic operations on table (Insert, delete) using MS Access [Creating]	[SLO CS-11-D-03] Analyze existing datasets to create summary statistics and data visuals using MS Access reports regarding: • Functions regarding grouping data (like minimum, maximum, sum, count etc.) • Statistical analysis e.g. average. • Data visualization (like bar chart, pie chart, column chart, line chart, combo chart etc.)[Analyzing]	[SLO CS-12-D-03] Apply data visualization techniques such as measures of central tendency and spread, box plots, bar charts, histograms, and scatter plots using python libraries. [Applying]
			[SLO CS-12-D-04] Develop a small interactive python project which use database, file handling and data visualization [Creating]

Domain E: Applications and Impacts of Computing

Grade 9

Grade 10

Grade 11

Grade 12

Standard 1: Students will understand emerging computing technologies such as Artificial Intelligence (AI), Machine Learning, Internet of Things (IoT), Cloud Computing, Neural Networks, Deep Learning and their real-world applications.

Standard 2: Students will analyze the ethical, social, environmental, cultural, legal and security impacts of computing technologies, including responsible use of digital platforms, data, AI systems and online collaboration tools.

Benchmark I: Students learn about different popular fields in Computer Science like AI, Cloud Computing, IoT, and Blockchain.

Benchmark I: Students demonstrate understanding of emerging technologies by explaining IoT, neural networks, deep learning, digital information reliability, and their applications and societal impacts.

Benchmark II: Students apply responsible digital practices by analyzing security threats, ensuring secure collaboration, promoting inclusivity, and designing ethical and accessible digital solutions.

Student Learning Outcomes

[SLO CS-09-E-01] Explain :

- Basic concepts of AI and ML
- Tools of AI and Machine learning
- Digital citizenship and online safety
- Privacy, intellectual property, and legal issue[Understanding]

[SLO CS-10-E-01] Describe :

- Block chain technologies
- technologies that enable Block chain (Cryptography, Block chain networks and transaction process on the network).
- Use of Block chain in the field of supply chain, protection of copyright and intellectual property, voting, asset administration, etc.
- Understand Cloud computing and its benefits with examples. [Understanding]

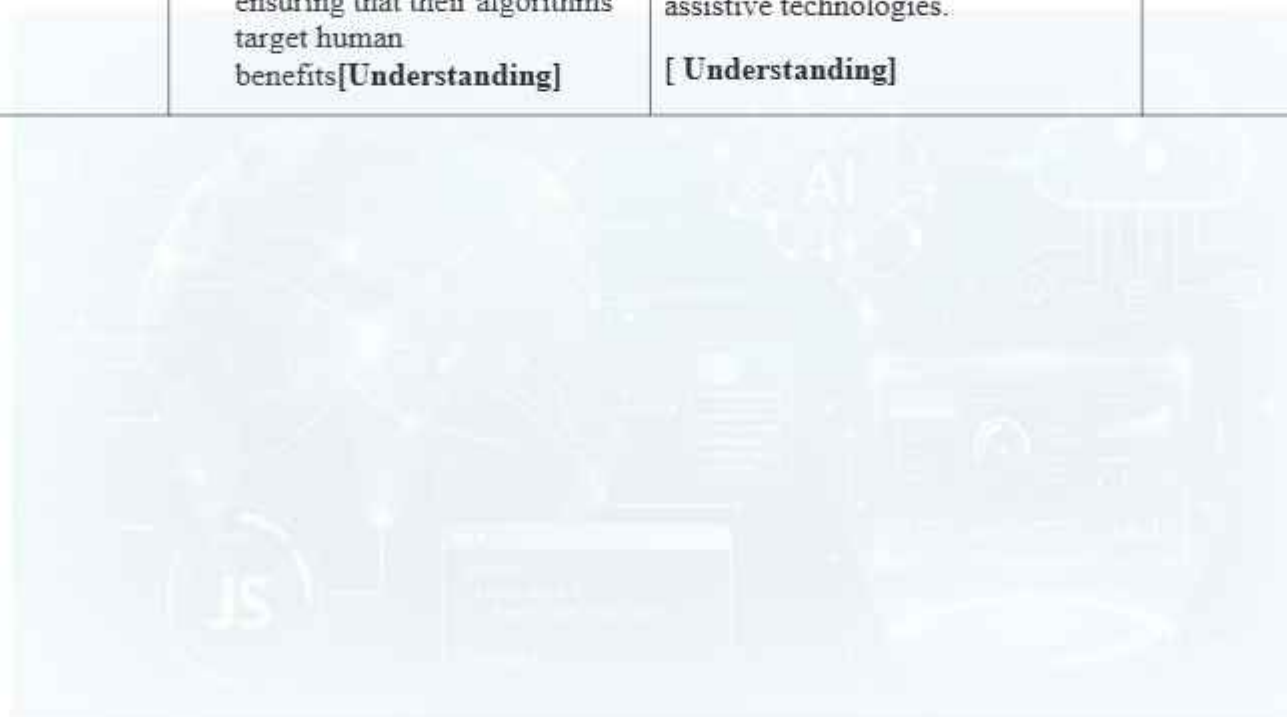
[SLO CS-11-E-01] Describe Internet of Things (IoT) technologies and their applications.

- components of IoT and data analytics
- uses of IoT in smart cities, industry, healthcare, education etc. automation, smart grid, smart farming, wearables, etc. [Understanding]

[SLO CS-12-E-01] Explain Neural Networks and deep learning concepts.

- Explain the basic concepts of neural networks and deep learning
- Identify the applications of neural networks and deep learning models [Understanding]

[SLO CS-09-E-02] Describe use of tools of AI and ML in education, health and business [Understanding]	[SLO CS-010-E-02] Illustrate the social implications of AI regarding: • The improper use of AI tools can result in injustice to specific groups of people. • AI designers have a responsibility towards ensuring that their algorithms target human benefits[Understanding]	[SLO CS-11-E-02] Describe the reliability of digital information, the societal(environmental, cultural, and human)impacts of computing ,equity and equal access implications using collaborative tools ,and the importance of assistive technologies. [Understanding]	[SLO CS-12-E-02] Design secure and inclusive digital solutions involving : • Secure collaboration and data protection • security threats and mitigation techniques [Creating]
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Domain F: Digital Literacy			
Grade 9	Grade 10	Grade 11	Grade 12
Standard: Collect and analyze information and publish it to various audiences using digital tools and media-rich resources and use digital tools to design and develop a significant digital artefact through research design, data collection, and communication.			
Benchmark I: Students will obtain knowledge of ethical and legal issues surrounding the use of computing.		Benchmark I: Students will interpret documents related to computing systems and evaluate their legal and ethical implications.	
Benchmark II: Students will understand privacy and network security issues surrounding computing applications and devices they use everyday		Benchmark II: Students will be able to illustrate how they can maintain privacy online and address security concerns they may encounter with the use of computing devices and applications	
Benchmark III: Students will understand the role of assistive technologies and understand the implications of the digital divide		Benchmark III: Students will demonstrate their ability to collaborate and communicate on the design of computing applications	
Student Learning Outcomes			
[SLO CS-09-F-01] Understand how to gather information on simple topics, extract key ideas, and present them in different formats. [Understanding]		[SLO CS-11-F-01] Define data-collection strategies such as interviews, surveys, prototypes, and simulations. [Remembering]	
[SLO CS-09-F-02] Apply key ideas and create appropriate copies and graphics to communicate effectively (e.g., posters, billboards). [Applying]		[SLO CS-11-F-02] Implement data-collection approach to gather original data for a research question. [Applying]	

[SLO CS-09-F-03] Illustrate use cases of social media platforms for communicating key ideas to diverse audiences. [Applying]		[SLO CS-11-F-03] Apply best practices to present primary and secondary data using appropriate formats. [Applying]	
[SLO CS-09-F-04] Apply best practices in reaching audiences across various digital platforms. [Applying]		[SLO CS-11-F-04] Illustrate data Presentation effectively using digital tools such as graphs, infographics, and reports. [Applying]	
[SLO CS-09-F-05] Support key ideas and details to a variety of audiences using appropriate digital tools and media-rich resources. [Evaluation]		[SLO CS-11-F-05] Recommend an artefact that answers a research question, communicates results, and draws conclusions using digital resources. [Evaluation]	

Domain G: Entrepreneurship in the Digital Age			
Grade 9	Grade 10	Grade 11	Grade 12
Standard: Students will create a business using design thinking with the help of digital tools.			
Benchmark I: Students apply design thinking, problem-solving, and entrepreneurial skills to develop, evaluate, and effectively pitch a feasible business solution using digital tools and effective communication strategies.		Benchmark I: Students design, develop, test, and refine prototypes and minimum viable products (MVPs) by applying entrepreneurial concepts, identifying business assumptions, analyzing user feedback, and improving solutions for target markets.	
Student Learning Outcomes			
	[SLO CS-10-G-01]: Demonstrate Identification a problem and creation a business plan using design thinking. [Applying]		[SLO CS-12-G-01]: Discuss the concept of prototyping and explain its importance in business idea development. [Understanding]
	[SLO CS-10-G-02]: Compare growth mindset and fixed mindset in entrepreneurial contexts. [Understanding]		[SLO CS-12-G-02]: Demonstrate testing of prototype for a business idea, iterating based on feedback. [Applying]
	[SLO CS-10-G-03]: Illustrate Articulate the 4Cs of problem solving (critical thinking, creativity, collaboration, communication). [Understanding]		[SLO CS-12-G-03]: Define the concept of minimum viable product (MVP) and a prototype. [Remembering]
	[SLO CS-10-G-04]: Define design thinking as a process involving empathizing, defining, ideating, prototyping, and evolving solutions.		[SLO CS-12-G-04]: Illustrate Identification of the riskiest business model assumptions and MVP using offline or online tools. [Applying]

	[Remembering]		
	[SLO CS-10-G-05]: Use digital tools to create and present a business plan for an entrepreneurial solution. [Applying]		[SLO CS-12-G-05]: Demonstrate developing and testing of MVP by defining features, estimating costs, planning marketing, and collecting feedback. [Applying]
	[SLO CS-10-G-06]: Evaluate a business plan by assessing market size, USP, financial feasibility, and go-to-market strategy. [Evaluation]		[SLO CS-12-G-06]: Evaluate and improve the MVP by interpreting feedback and identifying a beachhead market for testing. [Evaluation]
	[SLO CS-10-G-07]: Create a business idea effectively by differentiating a business plan from a pitch document, creating customer profiles, and applying strong communication skills. [Creating]		

ASSESSMENT AND EVIDENCE OF LEARNING

Assessment is a continuous and integral process for evaluating learners' understanding, skills, application, and ethical awareness in different disciplines of computer science. It supports learning through formative feedback and measures achievement of curriculum outcomes through summative evaluation.

In Grades IX–XII, assessment focuses on depth of understanding, application, and analysis through written examinations, practical programming tasks, laboratory work, data analysis, and project-based learning. Learners demonstrate competence through text-based programming.

DOMAIN-WISE WEIGHTAGES AND TIME DISTRIBUTION

The following tables present the weightages and time allocation for specified domains across all grades. They serve as a guide to ensure effective planning.

teaching, and assessment.

- For Teachers and Education Planners: The information helps in developing assessment and evaluation strategies, planning lessons, and scheduling both theory and practical sessions.
- For Textbook Writers: These tables guide the allocation of content, ensuring that each topic receives appropriate emphasis according to its weightage.
- Teaching Schedules: Theory and practical periods are integral to classroom management and curriculum delivery. While the suggested time may be adjusted based on local circumstances, it is advisable not to deviate significantly from the recommended allocation.

Grade IX: Domain wise weightage and time distribution (150)

Domain	Domain Title	Suggested Weightage	Total no. of periods	Theory	Practical
A	Computer System	15%	22	17	05
B	Computational thinking & algorithms	15%	21	15	06
C	Programming fundamentals	25%	40	10	30
D	Data and analysis	20%	30	10	20
E	Applications and impacts of computing	15%	22	17	05
F	Digital literacy	10%	15	05	10
G	Entrepreneurship in the digital age	-	-	-	-
Total		100%	150	74	76

Grade X: Domain wise weightage and time distribution (150)

Domain	Domain Title	Suggested Weightage	Total no. of periods	Theory	Practical
A	Computer System	15%	22	17	05
B	Computational thinking & algorithms	15%	21	15	06
C	Programming fundamentals	25%	40	10	30
D	Data and analysis	20%	30	10	20
E	Applications and impacts of computing	15%	22	17	05
F	Digital literacy	-	-	-	-
G	Entrepreneurship in the digital age	10%	15	05	10
Total		100%	150	74	76

Grade XI: Domain wise weightage and time distribution (150)

Domain	Domain Title	Suggested Weightage	Total no. of periods	Theory	Practical
A	Computer System	15%	22	17	05
B	Computational thinking & algorithms	15%	21	15	06
C	Programming fundamentals	25%	40	10	30
D	Data and analysis	20%	30	10	20
E	Applications and impacts of computing	15%	22	17	05
F	Digital literacy	10%	15	05	10
G	Entrepreneurship in the digital age	-	-	-	-
Total		100%	150	74	76

Grade XII: Domain wise weightage and time distribution (150)

Domain	Domain Title	Suggested Weightage	Total no. of periods	Theory	Practical
A	Computer System	15%	22	17	05
B	Computational thinking & algorithms	15%	21	15	06
C	Programming fundamentals	25%	40	10	30
D	Data and analysis	20%	30	10	20
E	Applications and impacts of computing	15%	22	17	05
F	Digital literacy	-	-	-	-
G	Entrepreneurship in the digital age	10%	15	05	10
Total		100%	150	74	76

REQUIRED IT INFRASTRUCTURE

The minimum requirements for IT infrastructure are as follows:

- High Speed internet 100MBps recommended
- Networking of systems
- Smart interactive LED
- Core I5 5th Generation (minimum)
- Number of PC according to enrollment

THE TEXTBOOK

Revamping the education system requires the active involvement of multiple stakeholders. Schools must fulfill their institutional responsibilities, parents need to actively support their children's learning, and teachers play a pivotal role in nurturing knowledge and skills. Among the various factors influencing education, print materials, particularly textbooks remain central to delivering high-quality learning experiences at all levels. While numerous stakeholders contribute to a child's overall development, the significance of textbooks as comprehensive reservoirs of knowledge cannot be overstated.

Textbook authors, therefore, bear a crucial responsibility in shaping young minds. An effective textbook is one that:

- features content and presentation that are carefully structured and thoughtfully planned
- is authored by qualified and competent subject matter experts
- is engaging, visually appealing, and capable of capturing the interest of both teachers and students

Such textbooks have the potential to inspire curiosity, facilitate understanding, and enhance overall teaching and learning experience.

GUIDELINES FOR TEXTBOOK AUTHORS

Textbooks designed for lower levels generally incorporate a greater number of learning features compared to those intended for higher levels. Nevertheless, the following considerations are essential when developing textbooks:

- The textbook should align with the objectives of the National Curriculum.
- Authors must consistently adhere to established standards and benchmarks.
- The textbook should be visually appealing and capable of sustaining students' interest.
- The title page should be attractive and accurately reflect the content of the textbook.
- Illustrations and images should employ a colour scheme that is realistic and relatable.
- A detailed table of contents should be included to facilitate navigation.
- Text should be clear, concise, and easily comprehensible.
- Content should be well-spaced and organized; breaking material into smaller, labeled sections can enhance readability and comprehension.
- Authors should consider the cognitive and developmental level of the target students.
- The length and scope of the textbook should be reasonable and appropriate for the intended level.
- Information presented must be accurate, current, and reliable.
- Materials should be arranged logically progressing from simple to complex, familiar to unfamiliar, and concrete to abstract concepts.
- The textbook must be free from ambiguities, errors, and misleading content.

By adhering to these principles, textbooks can effectively support learning, stimulate curiosity, and provide a reliable foundation for students' educational development.

TEXTBOOK STYLE AND STRUCTURE

To serve as an effective teaching and learning tool, a textbook must prioritize clarity, coherence, and reader friendly presentation. Content should be organized logically, with a structured flow that gradually builds understanding while engaging young learners.

SUGGESTED UNIT STRUCTURE

Unit Opening

- **Unit Overview:** List the main headings or topics covered in the unit.
- **Student Learning Outcomes (SLOs):** Clearly state one SLO per heading; for longer units, select a reasonable number that captures the key learning goals.
- **Introduction:** Provide a short, age-appropriate explanation of what the unit covers and why it is important, connecting content to real-life experiences when possible.

Unit Body

- **Key Terms:** Highlight key terms using bold and italicize supporting emphasis. Define terms when first introduced and compile them in the glossary.
- **Tips and Hints:** Present as separate call-out boxes or side notes to engage students directly, offer guidance, or highlight critical points.
- **Visuals and Illustrations:** Use age-appropriate images, diagrams, and infographics to explain concepts, making content relatable and visually stimulating.

- **Interactive Elements:** Include simple activities such as drag-and-drop exercises, labelling diagrams, or short reflection questions to enhance engagement.

Unit Ending

- **Checkpoint Exercises:** Incorporate multiple-choice questions, fill-in-the-blank items, matching exercises, or short-answer questions suitable for the grade level.
- **Lab/Practical Exercises:** Include hands-on activities, especially for subjects like Computer Science or Science, ensuring tasks are simple and guided.
- **Summary:** Provide a concise review of the main concepts, ideally aligned with the SLOs. Use bullet points or visual cues to reinforce understanding. Avoid introducing new content.

End of Textbook

- **Glossary:** Include only essential terms introduced in the textbook.
- **Bibliography/Suggested Reading:** Provide references for further reading, appropriate to the comprehension level of students.
- **Index:** Include an organized index of key terms for quick reference.

RECOMMENDATIONS FOR ENHANCING READABILITY AND ENGAGEMENT

- Use simple, clear language with short sentences appropriate to the age group.
- Include colourful, relatable illustrations and infographics that connect to students' daily experiences.
- Maintain consistent layout and formatting across units (headings, subheadings, and highlighted terms).
- Include frequent interactive features such as quizzes, reflection questions, or small projects to reinforce learning.
- Chunk information into small, digestible sections with clear headings and subheadings to avoid overwhelming young learners.
- Integrate storytelling, real-life examples, or scenarios to make abstract concepts tangible and relatable.

THE TEACHER'S MANUAL

The Teacher's Manual is an essential companion to the textbook, designed to guide teachers in understanding the structure, content, and instructional approach of the textbook. It serves as a professional development tool, helping teachers enhance their teaching practices and facilitate effective student learning. By providing detailed explanations of key concepts and step-by-step guidance on instructional strategies, the manual ensures that teachers can maximize the educational value of the textbook.

KEY FEATURES OF THE TEACHER'S MANUAL:

- **Clarity and Usability:** The manual should be easy to understand and practical to use in daily teaching.
- **Support for Instruction:** Provide guidance on teaching the text, extending activities, and deepening student understanding.
- **Sequenced Instructions:** Include step-by-step directions for conducting each activity.
- **Lesson Planning:** Offer detailed lesson plans aligned with unit objectives and Student Learning Outcomes (SLOs).
- **Project Guidance:** Suggest meaningful projects and activities for students to reinforce learning.
- **Teaching-Learning Resources:** List relevant materials, digital resources, and supplementary aids for instruction.
- **Assessment Support:** Establish a test bank with questions different from those in the textbook and suggest interactive quizzes corresponding to each unit.
- **Instructional Strategies:** Present up-to-date and relevant teaching methods, along with the rationale for their use.
- **Implementation Guidance:** Explain how to apply each teaching strategy effectively in the classroom.
- **Strategy Evaluation:** Identify strengths, limitations, and potential challenges associated with each teaching approach.
- **Resource Identification:** Specify the resources required for implementing strategies and extending activities.
- **Professional Development:** Expand teachers' repertoire of pedagogical knowledge and instructional skills.
- **Assessment Strategies:** Recommend formative and summative assessment methods to monitor and enhance student learning.

By integrating these features, the Teacher's Manual not only supports instructional planning but also empowers teachers to deliver engaging, effective, and evidence-based learning experiences.

THE WORKBOOK

Workbooks are designed to complement the textbook by providing writing activities and exercises that reinforce the concepts introduced in each unit. They support the development of students' conceptual understanding and enable learners to apply knowledge and skills in new and meaningful contexts. Workbooks serve as a bridge between learning and practice, helping students consolidate their understanding while fostering critical thinking and problem-solving abilities.

KEY FEATURES OF AN EFFECTIVE WORKBOOK:

- **Clarity and Accessibility:** Exercises should be easy for students to understand and follow, with clear and explicit instructions.
- **Engaging and Challenging:** Activities should be stimulating, thought-provoking, and encourage creative thinking.
- **Alignment with the Textbook:** Exercises should correspond to the knowledge and skills developed in the textbook.
- **Comprehensive Coverage:** Include multiple exercises and activities for each unit, topic, and subtopic.
- **Variety and Innovation:** Avoid repetition in style or structure; provide diverse types of exercises to maintain interest.
- **Balanced Workload:** Ensure that no single topic or skill is overloaded with activities.
- **Supplementary Activities:** Include exercises that differ from those in the textbook or Teacher's Manual, offering additional practice.
- **Resource Guidance:** Suggest accessible, affordable, and safe materials or resources to support the proposed activities.

By incorporating these features, the workbook becomes an interactive learning tool that enhances understanding, reinforces skills, and encourages independent learning.

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NOTIFICATION

F. No.1-1/2025/NCC(Acad). In exercise of the powers conferred under Section 3(2)(a) of the Federal Supervision of Curricula, Textbooks and Maintenance of Standards of Education Act, 1976, the competent authority, i.e., the Director, NCC Wing, Ministry of Federal Education and Professional Training (M/o FE&PT), has approved National Curriculum of Pakistan (NCP-2026) for the subjects **Urdu, English, Mathematics, Physics, Chemistry, Biology, Computer Science** for grades IX to XII & **General Science** for grades IX-X. The NCP-2026 has been developed through the rationalization and refinement of the National Curriculum of Pakistan (NCP2022-23).

This curriculum shall be implemented in all public and private educational institutions within the Islamabad Capital Territory (ICT), and in educational institutions under the Federal Government across the country, w.e.f academic year 2027. The curriculum can be downloaded from official website of the National Curriculum Council Wing M/o FE & PT, at www.ncc.gov.pk



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3. SPS to Senior Joint Secretary (Admn), M/o FE&PT, Islamabad
4. APS to Joint Educational Advisor, FE&PT, Islamabad
5. The Chairman, Federal Board of Intermediate & Secondary Education, Islamabad.
6. The Executive Director, Inter-Board Coordination Commission, Islamabad (with the request to circulation with IBCC members)
7. APS to Director, NCC Wing, M/o FE&PT, Islamabad

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NATIONAL CURRICULUM COUNCIL WING
MINISTRY OF FEDERAL EDUCATION AND
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