ASSESSMENT FRAMEWORK AND MODEL QUESTION PAPER

COMPUTER SCIENCE

Grade IX

NATIONAL CURRICULUM
2022-23

INCLUSIVE SCHEME OF STUDIES 2024



FEDERAL BOARD OF INTERMEDIATE AND SECONDARY EDUCATION, ISLAMABAD

WE WORK FOR EXCELLENCE

FEDERAL BOARD OF INTERMEDIATE AND SECONDARY EDUCATION

H-8/4, ISLAMABAD

ASSESSMENT FRAMEWORK

FOR

COMPUTER SCIENCE GRADE-IX

CURRICULUM 2022-23

ACKNOWLEDGEMENT

It is a great honour that we, at the Federal Board of Intermediate and Secondary Education, have developed the Assessment Framework (AF) for the subject of Computer Science for Grade-IX. The primary objective of the AF is to optimize the current curriculum 2022-23. This comprehensive framework has been crafted meticulously by subject matter and assessment experts who conducted an in-depth review of all learning outcomes for Grade-IX Computer Science curriculum. They evaluated these outcomes in terms of their scope, cognitive level, and progression across the grade.

This significant undertaking was the result of a series of extensive meetings and collaborative efforts of the subject and assessment experts. Their dedication and expertise have been instrumental in bringing this framework to fruition.

The Assessment Framework will serve as a guiding document for students, teachers and paper setters. Students will receive clear directions for preparing themselves for the annual examination. Similarly, teachers will use it as a guide to understand what to teach in class and to prepare students for the final examinations accordingly. Similarly paper setters will also seek guidance from this document.

Following subject as well as assessment experts/committee members remained constantly engaged in the development of the AF:

1. Mrs. Rozina Faheem, Principal, F G College of Home Economic and Management Sciences, F-11/1 Islamabad
2. Mrs. Sadaf Zehra, Associate Professor, Islamabad Model College for Girls (PG), F-7/2, Islamabad
3. Mr. Waseem Aziz, Assistant Professor, Islamabad College for Boys, G-6/3, Islamabad

The whole work was successfully accomplished under the able supervision and guidance of Syed Junaid Akhlaq, Chairman, FBISE and due to the hard work and dedication of the staff of Research Section of FBISE, in particular, Syed Zulfiqar Shah, Deputy Secretary, Research and Academics who played a pivotal and leading role in finalizing the AF.

MIRZA ALI
Director (Research & Academics)
FBISE, Islamabad

ASSESSMENT FRAMEWORK FOR COMPUTER SCIENCE GRADE-IX, CURRICULUM 2022-23

To ensure clarity and precision in assessment, the learning outcomes have been categorized into two distinct groups: formative and summative. This classification helps in effectively measuring student progress and understanding. Each Student learning outcome (SLO) has been carefully marked as either formative or summative within the newly developed Assessment Framework. SLOs of Summative Assessment Format will be part of the Final Examination while SLOs of Formative Assessment will although be part of the teaching-learning activity but they will **NOT** be part of Final Examinations. Estimated cognitive levels i.e Knowledge (K), Understanding (U) and Application (A) of all the SLOs have also been indicated. It may be noted that all the higher cognitive levels have been collectively accumulated in the cognitive level of 'Application'. In subjects involving Practicals (Lab work), it has been mentioned categorically whether an SLO is summative for theory or summative for Practical Based Assessment (PBA). If an SLO is summative for PBA, it means that Laboratory work is required in the teaching-learning activity and it will be part of the Practical Examination/ Practical Based Assessment.

The Assessment Framework will act as a comprehensive guide for students, teachers and paper setters. Students will have clear instructions on how to prepare for the annual examinations. Teachers will use the framework to understand the curriculum and effectively prepare their students for the final examination. Additionally, paper setters will refer to this document for guidance in setting examination papers.

A model question paper has also been developed to provide a clear structure and format for upcoming examinations. The model question paper ensures consistency and fairness, offering students a comprehensive understanding of what to expect in their examinations. By aligning the paper with the Student Learning Outcomes (SLOs) of the curriculum, we ensured that the questions accurately reflect the skills and knowledge that students are expected to acquire.

A detailed Table of Specifications (ToS) has been created to ensure equitable coverage of cognitive levels and content domains in order to generate a balanced question paper. The ToS serves as drawing scale and action plan for the question paper, ensuring that all important areas of the curriculum are adequately and proportionately assessed.

FORMATIVE ASSESSMENT: AN ESSENTIAL COMPONENT OF EFFECTIVE LEARNING

Formative assessment is a pivotal element in the educational process, distinguished by its role in providing ongoing feedback to both students and educators. Unlike summative assessments, which evaluate student learning at the end of an instructional period, formative assessments are integrated into the learning process to monitor student understanding and guide instructional decisions.

The primary objective of formative assessment is to identify learning gaps and misunderstandings as they occur, enabling timely interventions. This dynamic approach allows teachers to adjust their teaching strategies to better meet the needs of their students. For instance, if a teacher notices through a quick quiz or class discussion that a significant portion of the class struggles with a particular concept, they can revisit that topic, providing additional explanations or alternative methods of instruction. This adaptability is crucial for fostering a deeper understanding of the material.

Formative assessments come in various forms, ranging from informal methods like classroom discussions, observations, and questioning, to more structured approaches such as quizzes, peer assessments, and self-reflections. These methods are not limited to paper-and-pencil tasks but can include digital tools that provide instant feedback. The versatility of formative assessments allows educators to cater to diverse learning styles and preferences, ensuring that all students are engaged and supported in their learning journey.

Formative assessment plays a significant role in creating a supportive classroom environment. It shifts the focus from merely achieving grades to understanding the learning process. This approach reduces the pressure on students, as they perceive assessments not as a final judgment of their abilities but as a part of their learning journey. Consequently, formative assessment can lead to increased student motivation and engagement.

In conclusion, formative assessment is a powerful tool that, when effectively implemented, can significantly enhance the learning experience. It provides invaluable insights for both teachers and students, promotes a growth-oriented learning environment, and supports the continuous development of essential skills. As education evolves, the role of formative assessment will undoubtedly continue to be central in fostering successful and meaningful learning experiences.

SUMMATIVE ASSESSMENT: EVALUATING LEARNING OUTCOMES IN THE FORM OF TERMINAL/FINAL EXAMINATION

Summative assessment is a fundamental component of the educational process, designed to evaluate student learning at the conclusion of an instructional period. Unlike formative assessment, which provides ongoing feedback during the learning process, summative assessment serves as a final measure of what students have learned. Typically administered at the end of a unit, course, or academic year. Summative assessment aims to determine the extent to which educational objectives have been achieved.

The primary purpose of summative assessment is to assess the overall effectiveness of instruction and learning. It provides a conclusive evaluation of student performance, often in the form of tests, final projects, or standardized exams. These assessments generate grades or scores that reflect a student's achievement in a given subject area over a specific period or time duration.

Summative assessment is often used to make critical decisions regarding student progression, certification, or placement in subsequent educational levels. Additionally, summative assessments provide valuable data that inform curriculum development and instructional strategies. By analyzing summative assessment results, educators can identify trends, strengths, and weaknesses within their instructional approaches, allowing for improvements in future teaching.

In conclusion, summative assessment plays a critical role in the educational process by providing a final evaluation of student learning. While it differs from formative assessment in its focus and application, it is an essential tool for measuring academic achievement. When balanced with formative assessments, summative assessments contribute to a well-rounded and effective approach to evaluating and supporting student learning.

National Curriculum of Pakistan 2022-23

Assessment Framework

COMPUTER SCIENCE Grade-IX (SSC-I)

Details of Content Areas/ SLOs

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
A: Computer Systems	**[SLO CS-09-A-01]** Students will define and describe types of systems (artificial, natural), computer hardware components such as computer architecture (CPU, microprocessors, etc.) Student will understand that • Brief history of computer systems and generation of computers • Basic concept of a system, types of systems • Name and identify the core components of a computer (input/output devices, system unit(motherboard, memory, CPU, power supply, etc.), and data storage devices • Understand and identify Von Neumann Architecture • Computer architecture How data is transmitted within a computer system • What are some of the requirements for a functioning computer systems and what are some key concepts • The core parts of a computer system and how they all work together, including definitions and key functions of computer architecture such as central processing unit (CPU), arithmetic logic unit (ALU), control unit (CU), memory, operating system and application software, and data representation in computers (bit, byte, binary, denary/ decimal, hexadecimal) • Difference between hardware engineering and software engineering	Summative for Theory and Practical Based Assessment	Knowledge/ Understanding	Question(s) will be asked in the Annual theory paper as well as Lab work will be assessed in the Practical Based Assessment	**40**

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	• Difference between natural and artificial systems • Types and hierarchy of memory with respect to their volatility/retention, speed, storage capacity, cost • Difference between necessary and auxiliary components of a computer system Students will be able to • Recognize and describe key components of a computer system, such as: o Differentiate between natural and artificial systems o Outline the architecture of the central processing unit (CPU) and the functions of the arithmetic logic unit (ALU) and the control unit(CU) and the registers within the CPU. o Differentiate between primary memory, cache, and secondary memory. o Describe the main functions of operating systems and application systems. • Explain how the various components interact together to transmit data and instructions • Illustrate the hierarchy of memory and storage devices with respect to their volatility/retention, speed, storage capacity, cost • Differentiate between necessary and auxiliary components of a computer system				
	[SLO CS-09-A-02] Students will be able to identify and explain system software, application software, low-level and high-level programming languages, and their uses. Students will understand that • The main functions of systems software with some examples	Summative for Theory and Practical Based Assessment	Knowledge / Understanding/ Application	Question(s) will be asked in the Annual theory paper as well as Lab work will be assessed in the Practical Based Assessment	

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	• The main functions of operating systems and application software • Outline the uses of various application software. Students will be able to • Select an appropriate medium to create artifacts (Planning the document / information flow, editing and alignment of page, paragraphs, text, tables, and graphics) to communicate ideas in various digital tools such as: ○ Image processing tools (like Photoshop, Canva.com, GIMP etc.) ○ Word processors (like MS Word, Google Docs etc.) ○ Presentations (like MS PowerPoint or Google Slides etc.) ○ Spreadsheets(like MS Excel or Google Sheets)				
	[SLO CS-09-A-03] Students will be able to identify and analyze data communication, computer networks, networking devices, basic networking systems and understand how data is transmitted and key concepts such as protocols, speeds, etc. Students will understand • How data is transmitted across a computer network for example circuit switching, packet switching, layering, encapsulation, and protocols • Common network topologies and transmission modes • Outline the advantages and disadvantages of wireless networks • Outline the advantages and evolution of the Internet • Outline common applications of the Internet • The internet is the largest computer network ever built and learn how it works	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	• Identify common network problems and provide possible solutions				
B: Computational Thinking and Algorithms	**[SLO CS-09-B-01]** Understand and apply techniques to decompose problems. **[SLO CS-09-B-02]** Solve simple and complex problems computationally. Students will understand • The importance of computational thinking and problem-solving in computer science. • Principles of computational thinking: a) Logical thinking b) Algorithmic thinking • How to identify steps in identifying a computing problem • How to identify the inputs, processes, and outputs of a problem • Different methods to design and construct a solution to a simple problem, such as flow charts, and/or concept maps • Steps to produce simple diagrams to show: a) The structure of a problem b) Subsections and their links to other subsections Students will be able to • Explain the role of computational thinking in computer science • Read and interpret simple computational problems • Apply computational thinking principles to define and refine problems • Identify the procedure appropriate to solving a problem • Evaluate whether the order in which activities are undertaken will result in the required outcome. • Identify the inputs and outputs required in a solution	Summative for Theory and Practical Based Assessment	Knowledge / Understanding/ Application	Question(s) will be asked in the Annual theory paper as well as Lab work will be assessed in the Practical Based Assessment	**25**

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
C: Programming Fundamentals	**[SLO CS-09-C-01]** Students will understand web development and differentiate between a website and a web application. Students will • Grasp the basic concepts and principles of web development, including the technologies, languages, and frameworks commonly used in building websites and web applications. • Understand the distinctive features of web applications. They should learn that web applications are dynamic in nature, offering interactive functionalities, data processing, user authentication, and real-time updates. • Comprehend that websites primarily provide information and content to users, while web applications offer more complex functionality, such as user input, data manipulation, and task execution. Students will be able to… • Distinguish between front end and back-end development • Determine which technology is appropriate for making static and dynamic web pages and web applications • Identify and describe the features and characteristics of a website. This may include static content, informational pages, navigation menus, multimedia elements, and contact forms. • Distinguish between websites and web applications based on specific criteria.	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	**40**
	[SLO CS-09-C-02] Students should be able to create a static website using HTML/CSS in an appropriate environment. Students will know • What is HTML	Summative for Theory and	Knowledge / Understanding/ Application	Question(s) will be asked in the Annual theory paper as well as Lab work will be assessed in the Practical Based Assessment	

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	• What is CSS • What is JavaScript Students will understand • Characteristics, examples, similarities & differences between of static and dynamic website • The purpose of HTML i.e. to display text and image content over the Internet • The capability of HTML documents to hyperlink to other documents/pages • The structure of an HTML document including the underlying DOM tree (Document Object Model) • How JavaScript is used to modify a website Students will be able to • Differentiate between a static and dynamic website • Create a static website using HTML & CSS in an IDE like Visual Studio, NetBeans etc.	Practical Based Assessment			
	[SLO CS-09-C-03] Students should be able to create dynamic websites using JavaScript as the frontend scripting. Students will understand • Variables, Data Types and Arrays in JavaScript • Variable assignment in JavaScript • What aspects of HTML can be changed with JavaScript • What aspects of CSS can be changed with JavaScript Students will be able to • Use JavaScript to modify an HTML website to create a dynamic website	Summative for Theory and Practical Based Assessment	Knowledge / Understanding/ Application	Question(s) will be asked in the Annual theory paper as well as Lab work will be assessed in the Practical Based Assessment	

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	[SLO CS-09-C-04] Students should be able to implement common algorithms that use sequence, selection, and repetition in JavaScript. Students will understand • An algorithm is a set of instructions • How the sequence of instructions affects the result • Sequence, Selection and Repetition in JavaScript • Arrays in JavaScript • Students will be able to • Construct an array and populate its values using a loop in JavaScript	Summative for Theory and Practical Based Assessment	Knowledge / Understanding/ Application	Question(s) will be asked in the Annual theory paper as well as Lab work will be assessed in the Practical Based Assessment	
	[SLO CS-09-C-05] Students will determine ways of debugging their code in JavaScript Students will understand • Code written outside of a function is hard to test • Code written inside a function can be tested • That they can write code that calls functions to ensure the results are correct • Using a debugger allows programmers to set a breakpoint to stop execution of their code to see the state of variables mid-execution for the purpose of discovering errors in their code Students will be able to • Write code to invoke functions and check their return values for correctness • Set a breakpoint to debug mistakes in their code	Summative for Theory and Practical Based Assessment	Knowledge / Understanding/ Application	Question(s) will be asked in the Annual theory paper as well as Lab work will be assessed in the Practical Based Assessment	
D: Data and Analysis	**[SLO CS-09-D-01]** Students will explain the scope of the data science field as an interdisciplinary field (computer sciences, mathematics & statistics, and business knowledge & understanding).	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	**25**

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	• Students will understand the key concepts and principles of data science • Students will know definitions of key terms: data science, data analytics, computer science, mathematics, statistics, and business knowledge & understanding Students will be able to: • Identify the difference between data science, data analytics, computer science, mathematics, statistics, and business knowledge & understanding • Students will develop analytical thinking skills by reading case studies on data science applications • Read a case study or a newspaper article or online paper to identify a problem that can be solved using data science				
	[SLO CS-09-D-02] Students will define and explain data types, data collection, and data storage. Students will understand: • Data is observations or measurements represented as numbers, text, or multimedia(image, sound, video, etc.)and the dataset is a collection of this data that is related in some context. • Different sources of data like sensors • The concept of dataset ○ Table (relation) ○ Rows (record, tuple, object) ○ Column (object attributes, properties) • Types Object attributes or properties: Categorical or Qualitative Attribute ○ Nominal	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	○ Binary ○ Ordinal • Numeric or Quantitative ○ Interval-scaled, ○ Ratio-scaled, ○ Discrete ○ Continuous • Data collection, analysis, and visualization. • Students will know how to use summary statistics to formulate sentences and describe the data, data collection methodology, how the data will be used Students will be able to: • Explain how data, information, and knowledge are represented for computational use. • Collect, upload, and share personal data collected in class(e.g., Stick Figure exercise in Learning Activity#2) • Learn about different representations of distributions using software. • Utilize software to begin to analyze plots of data collected • Interpret different types of data: Numerical and graphical summaries. • Understand that rows and columns area form of data structure. • Explain why the relationship between the variables might exist, or, if there is no relationship, why that might be so • Construct and interpret a frequency table. • (Advanced) Load data into RStudio. Students will be able to: • Distinguish between data and dataset • Collect data from different sources				

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	• Identify missing data in a dataset • Construct summary statements about the data, how it is collected, how it is used, and how to work with it • Explain why the relationship between the variables might exist, or if there is no relationship, why that might be so. • (Advanced) Construct and interpret a frequency table • (Advanced) Understand the connection of databases to machine learning. • (Advanced) Understand the differences between structured and unstructured data, quantitative and qualitative data)				
	[SLO CS-09-D-03] Students will be able to define and explain big data, and applications of big data in real-world business Students will understand • What insights big data can provide to businesses • What tools and systems are used by big data scientists and engineers • How predictive modeling and graph analytics can be leveraged to model problems? • (Advanced) Be able to ask the right questions about data and do basic exploration of large, complex datasets. • Students will know… • Applications of bigdata • What makes big data valuable? • Characteristics of big data • How data science gets value out of big data • Introduction to concepts such as the Internet of Things(IoT) and the role of the cloud. Students will be able to	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	• Identify the different types of big data • Recognize if big data is used to solve a business problem • Read and critique published stories by interpreting the visualizations and experimental conclusions • Formulate questions, identify existing or similar business cases, and evaluate how the new business solutions that leverage big data stack up against the old.				
E: Applications of Computer Science	**[SLO CS-09-E-01]** Students will be able to describe uses and applications of computing like AI, Machine Learning, and Cloud Computing Students will understand… • What is AI and Machine learning and the kind of problems each is able to solve • Different areas of AI–Speech recognition, Computer Vision, Natural Language Processing, and Expert Systems. • Different applications of AI in domains like health care, education, gaming, agriculture. • What is cloud computing and the need for it Students will be able to… • Identify applications that can be solved using these technologies and techniques • Identify different applications of AI	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	**10**
	[SLO CS-09-E-02] Students will be able to discuss the social implication of the usage of AI in decision making that affects humans Students will understand…	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	• AI algorithms make decisions that work for most people but harm or disadvantage others. • Designers to AI algorithms should keep their focus on benefiting people Students will know… • Ethical issues in some popular AI tools Students will be able to… • Explain what some ethical issues are when computers make decisions for humans • Identify decisions that might harm humanity • Identify decisions that might be biased towards are certain group of individuals				
F: Impacts of Computing	**[SLO CS-09-F-01]** Understand and apply safe and responsible use of computers (responsible use of hardware, appropriate use of software, and safe use of digital platforms like data searches, social networking, etc.) Students will understand… • The selection and use different hardware, software, and digital platforms for safe use depending on the tasks to be executed • The need for laws to protect user privacy and intellectual property Students will know… • What is meant by the key concepts of data ethics and intellectual property rights • How to safely use data searches and social networking sites • Legal issues related to computing such as software piracy laws Students will be able to…	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	**15**

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	• Discuss how ethics are guidelines that dictate the responsible use of computing systems • Identify computer related laws • Interpret software agreements, licenses, and application terms				

	[SLO CS-09-F-02] Analyse the beneficial and harmful effects of computing innovations such as social networking, fake news, etc.
	
	Students will understand…
	• Every computing innovation will solve a need but can cause harm to users as well
	  o Benefits can be the need being solved and the societal & user benefits
	  o Harmful effects of computing innovations on users, society, environment, etc.
	• The tradeoffs between information privacy, system security and usability
	• The importance of designing computing systems that will protect user privacy and increase system security
	Students will know…
	• What is meant by key concepts and be able to differentiate between them: scams, software piracy, freeware, shareware, opensource, malware, phishing, hacking
	• The tensions between censorship of internet and freedom of speech
	• Common types of security problems such as spam, spyware, pharming, cookies etc.
	Students will be able to…
	• Explain basics of reliable and unreliable sources of information
		Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	• Distinguish between fake news and credible sources of information • Identify malicious internet scams, phishing, pharming, fraudulent activity, fake websites • Evaluate designs of computing technologies(e.g. social media, generative AI etc.) based on their user privacy policies and agreements				
	[SLO CS-09-F-03] Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices. Students will understand… • Environmental impacts of computing • Computing has changed the way we live and conduct business • Impact of computing on globalization and e-commerce Students will know… • The key terms: patents, trademarks, copyrights Students will be able to… • Strategize on how to minimize the environmental impacts of computing • Search and identify patents, trademarks, and copyright information for computing applications • Determine if technology design maybe infringing on intellectual property • Evaluate designs of computing technologies in terms of personal, environmental, ethical, legal, social, economic, and cultural impacts	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	
G: Digital Literacy	-	-	-	**Not applicable for grade 9.**	-

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)

H: Entrepreneurship in the digital age	**[SLO EN-09-H-01]**: Students identify a problem and create a business using design thinking
	
	Students will understand:
	• Skills needed for problem solving: 4Cs of the 21st century (collaboration, critical thinking, creativity, communication)
	• Define design thinking as a process which includes:
	  o Empathizing to discover the problem
	  o Defining or interpreting the problem
	  o Ideating on how to solve the problem
	  o Experimenting or prototyping the solution
	  o Evolving the solution as insights redefine the problem
	• How to define & articulate an entrepreneurial solution to address a local or global problem
	• Sustainable development goals(SDGs) as the world's development goals, and linking these SDGs to potential problems that need resolving
	• Growth mindset vs. Fixed mindset
	Students will be able to:
	• Define a problem in their local context
	• Categorize the problem according to SDGs
	• Use design thinking to create a solution
	• Identify advantages of having a growth mindset in entrepreneurship
		Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	**10**

	[SLO EN-09-H-02]: Students will use digital tools to create and present a business plan for an entrepreneurial solution. Students will understand: • Key elements of a business plan containing at least the following	Summative for Theory and	Knowledge / Understanding/ Application	Question(s) will be asked in the Annual theory paper as well as Lab work will be assessed in the Practical Based Assessment	

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	○ Market size(in terms of TAM total addressable market, SAM Serviceable Available Market, and SOM Serviceable Obtainable Market) ○ Solution product/service & unique selling proposition ○ Financial feasibility ○ Go to market strategy • How to collect & synthesize information to create a business plan • How to evaluate a business plan Students will be able to: • Create a business plan using digital tools like MS Word or Google Docs to communicate their business problem, suggested solution, and financial feasibility • Evaluate a business plan using criteria such as communication, feasibility, market potential etc.	Practical Based Assessment			

Federal Board SSC-I Examination
Computer Science Model Question Paper

Curriculum 2022-2023 (Inclusive Scheme of Studies 2024)

ROLL NUMBER					
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
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4	4	4	4	4	4
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6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

Version No.			
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3	3	3	3
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7	7	7	7
8	8	8	8
9	9	9	9

Section - A (Marks 12)

Time Allowed: 20 minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. *Do not use lead pencil.*

Candidate Sign._____ **Invigilator Sign. _____**

Q1. Fill the relevant bubble against each question according to curriculum. Each part carries one mark.

Sr no.	Question	A	B	C	D	A	B	C	D
i.	Which of the following keyword is used to declare variables in JavaScript?	dim	Var	Let	const	O	O	O	O
ii.	Which of the following is a commonly used tool for data analysis and visualization?	Microsoft Word	Microsoft Excel	Microsoft PowerPoint	Microsoft Outlook	O	O	O	O
iii.	Which HTML tag is used to create a hyperlink?	<link>	<href>	<hyperlink>	<a>	O	O	O	O
iv.	Which of the following statement is true about a business plan?	a document outlining the goals and strategies of a business	a list of potential customers	a financial statement	a marketing brochure	O	O	O	O
v.	Which of the following memory type is considered as a volatile:	DVD	RAM	PROM	Memory card	O	O	O	O
vi.	How do you write "Hello, World!" in an alert box using JavaScript?	msgBox ("Hello, World!");	alertBox ("Hello, World!");	alert("Hello, World!");	Msg ("Hello, World!");	O	O	O	O
vii.	Which of the following is an example of unethical behavior online?	Sharing positive messages on social media	Cyberbullying	Helping a friend with home task	Respecting others' privacy	O	O	O	O
viii.	What does privacy mean in the context of computer ethics?	Sharing personal information freely online	Keeping personal information confidential and secure	Hacking into others' accounts	Ignoring security measures	O	O	O	O

ix.	What does innovation mean in entrepreneurship?	Copying existing ideas	Creating something new or improving existing products or services	Investing money in the stock market	Following others' ideas	○ ○ ○ ○
x.	Which of the following problems is an example of a complex problem?	Finding the sum of two numbers	Memorizing multiplication table	Figuring out how to organize a fundraising event	Identifying prime numbers between 1 and 100	○ ○ ○ ○
xi.	Which of the following is an example of AI used in everyday life?	Microwave oven	Refrigerator	Bicycle	Self-driving car	○ ○ ○ ○
xii.	In a problem solution involving making a sandwich, what would be considered the input?	A finished sandwich	Spreading butter on bread	Bread and butter	Eating a sandwich	○ ○ ○ ○

Federal Board SSC-I Examination
Computer Science Model Question Paper
Curriculum 2022-2023 (Inclusive Scheme of Studies 2024)

Time allowed: 2.40 hours Total Marks: 48

Note: Answer all parts from Section 'B' and all questions from Section 'C' on the **E-sheet**. Write your answers on the allotted/given spaces.

SECTION – B (Marks 30)

Q.2 Attempt the following questions. **(10x3 = 30)**

Q#	Question	Marks		Question	Marks
i.	Write down the purpose of any three input devices.	03	***OR***	Briefly explain the role of computational thinking in Computer Science with an example?	3
ii.	Consider the following problem: **Y = 5x + 3** Identify the inputs and outputs to find the solution of a problem and fill the relevant boxes. Input | Process | Output | 5x + 3 | If **x = -2**, compute the value of **Y** and show your working.	03	***OR***	Write down HTML tags to display 'Software' as a main heading and make an ordered list as follows: 1. System Software 2. Application Software	03
iii.	What is the importance of buses in computer architecture? Write down the purpose of any two types of buses.	03	***OR***	What is the impact of computing on e-commerce?	03
iv.	You are working with two types of data collected from a school: 1. The number of students in each class. 2. The heights of students in centimeters. Classify each type of data as discrete or continuous, and justify your classification with reasoning.	1.5 +1.5	***OR***	A graphic designer needs a storage device to save and access large multimedia files quickly. Choose the most appropriate storage device (e.g., SSD, HDD, USB flash drive, CD/DVD) and compare it with another storage type in terms of storage capacity, and speed. Justify your choice.	1+2
v.	You are helping a group of middle school students use the internet for a research project. They are unaware of safe and responsible search practices. Recommend three specific strategies these students should follow to ensure safe and responsible data searches.	03	***OR***	You are conducting a survey to understand the eating habits of students in your school for a health awareness project. Identify and explain any three (03) suitable primary data collection methods for gathering reliable information.	03
vi.	What will be the output of the following HTML code? <html> <head> <title>Output Question </title> <style> .text { font-size: 20px; color: red; } </style>	03	***OR***	Why wireless networks are useful? Provide any three (03) reasons.	03

	</head> <body> This is a paragraph. </body> </html>				

vii.	Why is data analytics important for determining the number of students who prefer various ice cream flavors in our school cafeteria?	03	***OR***	let a = 10;
				let b = "5";
				console.log(a + b);
				console.log(a - b);
				Predict the output of the above JavaScript code. Also explain why the values of both statements are different in terms of JavaScript data types.
					03

viii.	Identify and correct errors in the following JavaScript code:
	let fruits = ["Apple, "Banana", "Orange"];
	console.log(fruits.length)
	console.log(fruit.length);
		03	***OR***	Illustrate at least four (04) components of data communication with the help of diagram.	2+1

ix.	Compare simple and complex problems with one daily life example of each problem.	03	***OR***	How AI can be beneficial in education? Give any three (03) reasons.	03
x.	Write down any three (03) characteristics of entrepreneur.	03	***OR***	Write down any three (03) advantages of cloud computing.	03

SECTION – C (Marks 18)

Note: Attempt all questions. Marks of each question are equal. **(3x6=18)**

Q. No.	**Question**	**Marks**	**Question**		**Marks**
Q.3	Differentiate between natural and artificial systems with brief explanation of one example of each system.	3+3	***OR***	What is machine learning and AI? Explain the difference between machine learning and AI.	2+4
Q.4	Draw a flowchart that reads a number and prints whether it is negative, positive or zero.	6	***OR***	Write a JavaScript function called 'CalculateGrade' that takes marks of a student as input and returns grade based on the following grading system: A if marks are greater than or equal to 90, B if marks are between 70 and 89, C if marks are between 50 and 69, and F if marks are below 50.	6
Q.5	What is computing innovation? Explain the harmful effects of computing innovation on society and environment.	6	***OR***	What is big data? Describe applications of big data in health care and manufacturing.	6

Federal Board SSC-I Examination

Computer Science Model Question Paper

(Curriculum 2022-23)

Alignment of Questions with Student Learning Outcomes

Sr No	Section: Q. No. (Part no.)	Content Domain / Area		Student Learning Outcomes		Cognitive Level *	Allocated Marks in Model Paper
1.	A: Q1(i)	Domain C		[SLO CS-09-C-03] Students should be able to create dynamic websites using JavaScript as the frontend scripting.		K	1
2.	A: Q1(ii)	Domain D		[SLO CS-09-D-02] Students will define and explain data types, data collection, and data storage.		U	1
3.	A: Q1(iii)	Domain C		[SLO CS-09-C-02] Students should be able to create a static website using HTML/CSS in an appropriate environment.		U	1
4.	A: Q1(iv)	Domain H		[SLO EN-09-H-02]: Students will use digital tools to create and present a business plan for an entrepreneurial solution.		K	1
5.	A: Q1(v)	Domain A		[SLO CS-09-A-01] Students will define and describe types of systems (artificial, natural), computer hardware components such as computer architecture (CPU, microprocessors, etc.)		U	1
6.	A: Q1(vi)	Domain C		[SLO CS-09-C-03] Students should be able to create dynamic websites using JavaScript as the frontend scripting.		U	1
7.	A: Q1(vii)	Domain F		[SLO CS-09-F-02] Analyse the beneficial and harmful effects of computing innovations such as social networking, fake news, etc.		U	1
8.	A: Q1(viii)	Domain F		[SLO CS-09-F-03] Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.		K	1
9.	A: Q1(ix)	Domain H		[SLO EN-09-H-01]: Students identify a problem and create a business using design thinking		K	1
10.	A: Q1(x)	Domain B		[SLO CS-09-B-02] Solve simple and complex problems computationally.		U	1
11.	A: Q1(xi)	Domain E		[SLO CS-09-E-01] Students will be able to describe uses and applications of computing like AI, Machine Learning, and Cloud Computing		U	1
12.	A: Q1(xii)	Domain B		[SLO CS-09-B-02] Solve simple and complex problems computationally.		U	1
Section B and C							
13.	B: Q2(i)	Domain A	***OR*** Domain B	[SLO CS-09-A-01] Students will define and describe types of systems (artificial, natural), computer hardware components such as computer architecture (CPU, microprocessors, etc.)	***OR*** [SLO CS-09-B-01] Understand and apply techniques to decompose problems.	K	3

14.	B: Q2(ii)	Domain B	***OR*** Domain C	[SLO CS-09-B-02] Solve simple and complex problems computationally.	***OR*** [SLO CS-09-C-02] Students should be able to create a static website using HTML/CSS in an appropriate environment.	U	3
15.	B: Q(iii)	Domain A	***OR*** Domain F	[SLO CS-09-A-01] Students will define and describe types of systems (artificial, natural), computer hardware components such as computer architecture (CPU, microprocessors, etc.)	***OR*** [SLO CS-09-F-03] Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.	K	3
16.	B: Q(iv)	Domain D	***OR*** Domain A	[SLO CS-09-D-02] Students will define and explain data types, data collection, and data storage.	***OR*** [SLO CS-09-A-01] Students will define and describe types of systems (artificial, natural), computer hardware components such as computer architecture (CPU, microprocessors, etc.)	A	3
17.	B: Q(v)	Domain F	***OR*** Domain D	[SLO CS-09-F-01] Understand and apply safe and responsible use of computers (responsible use of hardware, appropriate use of software, and safe use of digital platforms like data searches, social networking, etc.)	***OR*** [SLO CS-09-D-02] Students will define and explain data types, data collection, and data storage.	A	3
18.	B: Q(vi)	Domain C	***OR*** Domain A	[SLO CS-09-C-02] Students should be able to create a static website using HTML/CSS in an appropriate environment.	***OR*** [SLO CS-09-A-03] Students will be able to identify and analyze data communication, computer networks, networking devices, basic networking systems and understand how data is transmitted and key concepts such as protocols, speeds, etc.	U	3
19.	B: Q(vii)	Domain D	***OR*** Domain C	[SLO CS-09-D-02] Students will define and explain data types, data collection, and data storage.	***OR*** [SLO CS-09-C-03] Students should be able to create dynamic websites using JavaScript as the	U	3

20.	B: Q(viii)	Domain C	***OR*** Domain A	[SLO CS-09-C-04] Students should be able to implement common algorithms that use sequence, selection, and repetition in JavaScript.	***OR*** [SLO CS-09-A-03] Students will be able to identify and analyze data communication, computer networks, networking devices, basic networking systems and understand how data is transmitted and key concepts such as protocols, speeds, etc.	U	3
21.	B: Q(ix)	Domain B	***OR*** Domain E	[SLO CS-09-B-02] Solve simple and complex problems computationally.	***OR*** [SLO CS-09-E-01] Students will be able to describe uses and applications of computing like AI, Machine Learning, and Cloud Computing	U	3
22.	B: Q(x)	Domain H	***OR*** Domain E	[SLO EN-09-H-01]: Students identify a problem and create a business using design thinking	***OR*** [SLO CS-09-E-01] Students will be able to describe uses and applications of computing like AI, Machine Learning, and Cloud Computing	K	3
23.	C: Q3	Domain A	***OR*** Domain E	[SLO CS-09-A-01]: Students will define and describe types of systems (artificial, natural), computer hardware components such as computer architecture (CPU, microprocessors,	***OR*** [SLO CS-09-E-01] Students will be able to describe uses and applications of computing like AI, Machine Learning, and Cloud Computing	U	6
24.	C: Q4	Domain B	***OR*** Domain C	[SLO CS-09-B-02] Solve simple and complex problems computationally.	***OR*** [SLO CS-09-C-04] Students should be able to implement common algorithms that use sequence, selection, and repetition in JavaScript.	A	6
25.	C: Q5	Domain F	***OR*** Domain D	[SLO CS-09-F-02] Analyse the beneficial and harmful effects of computing innovations such as social networking, fake news, etc.	***OR*** [SLO CS-09-D-03] Students will be able to define and explain big data, and applications of big data in real-world business	K	6

*Cognitive Level

K: Knowledge

U: Understanding

A: Application

Table of Specification

Model Paper Computer Science – Grade IX (SSC-I)

Content Domain / Area Cognitive Level	Domain A: Computer Systems	Domain B: Computational Thinking and Algorithms.	Domain C: Programming Fundamentals	Domain D: Data and Analysis	Domain E: Applications of Computer Science	Domain F: Impacts of Computing	Domain G: Digital Literacy	Domain H: Entrepreneurship in the digital age	Total Marks	Percentage of cognitive level
Knowledge	Q2(i/f)3 Q2(iii/f)3	Q2(i/s)3	Q1(i)1	Q5(s)6		Q1(viii)1 Q2(iii/s)3 Q5(f)6	-	Q1(iv)1 Q1(ix)1 Q2(x/f)3	31	**28.7%**
Understanding	Q1(v)1 Q2(vi/s)3 Q2(viii/s)3 Q3(f)6	Q1(x)1 Q1(xii)1 Q2(ii/f)3 Q2(ix/f)3	Q1(iii)1 Q1(vi)1 Q2(ii/s)3 Q2(vi/f)3 Q2(vii/s)3 Q2(viii/f)3	Q1(ii)1 Q2(vii/f)3	Q1(xi)1 Q2(ix/s)3 Q2(x/s)3 Q3(s)6	Q1(vii)1	-		53	**49.1%**
Application	Q2(iv/s)3	Q4(f)6	Q4(s)6	Q2(iv/f)3 Q2(v/s)3		Q2(v/f)3	-		24	**22.2%**
Total Marks	22	17	21	16	13	14	0	5	108	-
Total Percentages	20.4%	15.7%	19.4%	14.8%	12%	13%	0	4.6%	-	**100%**

Note:

1 This ToS does not reflect policy, but it is particular to this model question paper.
2 Proportionate / equitable representation of the content areas as per the defined ranges may be ensured.
3 The percentage of cognitive level is 30%, 50%, and 20% for knowledge, understanding, and application, respectively with **± 5%** variation.
4 While selecting alternative questions for Short Response Questions (SRQs) and Extended Response Questions (ERQs), it must be kept in mind that:
- Difficulty levels of both questions should also be same
- SLOs of both the alternative questions must be different

Key: Question Number (part/ first choice) marks example: **Q2 (i / f) 2**
Question Number (part/ second choice) marks example: **Q2 (i / s) 2**



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