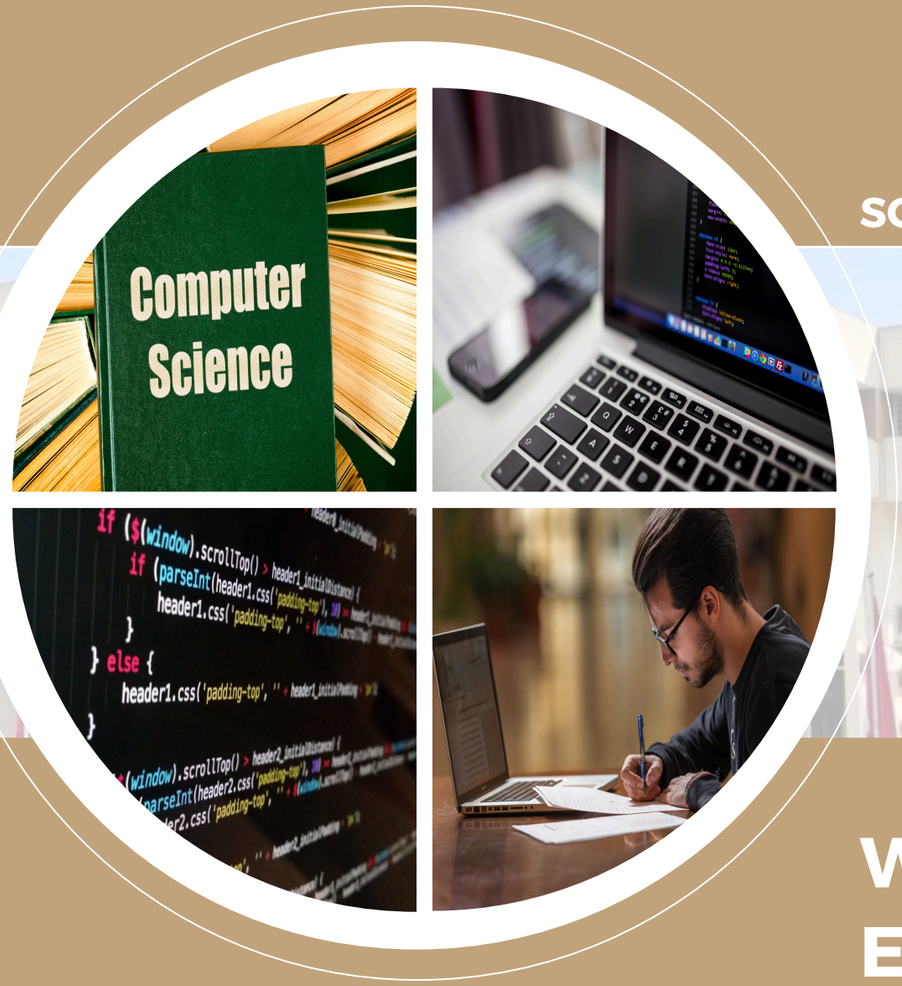
ASSESSMENT FRAMEWORK AND MODEL QUESTION PAPER

COMPUTER SCIENCE

Grade X

NATIONAL CURRICULUM OF PAKISTAN
2022-23

SCHEME OF STUDIES 2009



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ASSESSMENT FRAMEWORK

FOR

COMPUTER SCIENCE GRADE-X

CURRICULUM 2022-23

SCHEME OF STUDIES 2009

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-X. 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-X 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. Ms. Rozina Faheem, Principal, F G College of Home Economics and Management Sciences, F-11/1 Islamabad
2. Ms. Sadaf Zehra Kazmi, Associate Professor, Islamabad Model College for Girls (PG), F-7/2, Islamabad
3. Ms. Sadia Mujtaba, Assistant Professor, Islamabad Model College for Girls, I-8/4 Islamabad
4. Mr. Saghir Ahmed, Lecturer, Islamabad Model College for Girls, St# 25, F-6/2 Islamabad

The whole work was successfully accomplished under the able supervision and guidance of Dr. Ikram Ali Malik, 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 Assessment Framework.

MIRZA ALI
Director (Test Development)
FBISE, Islamabad

ASSESSMENT FRAMEWORK FOR COMPUTER SCIENCE GRADE-X, 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-X (SSC-II)

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: Computing Systems	**[SLO CS-10-A-01]** Students will be able to understand and describe number systems and encoding schemes for data representation in computer systems Students will understand… • What is Machine level representation of data • What are the different numbering systems (decimal, binary, hexadecimal, octal) • How text is represented digitally using common text encoding (ASCII, Unicode) Students will know • Key terms: ASCII, Unicode, binary, signed, and unsigned numbers, bit, byte, negatives in binary, 1's complement, 2's complement, binary arithmetic, overflow and underflow. • How computers use binary arithmetic. Students will be able to • Understand and explain data representation, instruction sets and addressing modes. • Demonstrate how data is encoded using ASCII and Unicode	Summative for Theory	/ Understanding/ Application	Question(s) will be asked in the Annual theory paper as well as	**30**
	[SLO CS-10-A-02] Students will be able to explain how system software controls the flow of information between hardware components used for input, output, storage, and processing Students will understand that • What is an operating system • What main tasks an operating system performs • How application programs run on top of operating systems • What are the different types of operating systems	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper as well as	

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 know • Key terms: System calls, Processes, threads, synchronization, interrupts, system calls scheduling, deadlock, File system interface, Memory system and virtual memory. • The primary resources managed by an operating system • What a process is and the sequence of events executed for a process to complete Students will be able to explain • How programming languages, operating systems, and architectures interact and how to use each effectively. • The services provided by and the design of an operating system. • The structure and organization of the file system. • What a process is and how processes are synchronized and scheduled. • Different approaches to memory management.				
	[SLO CS-10-A-03] Students will identify and learn common software tools such as translators, integrated development environments, online and offline computing platforms, code repositories, etc. Students will understand that • The types of software and how they are different • Where software is hosted and pros and cons of on-premise vs. in cloud • How programming software helps programmers write code that can then get compiled. • Explain the difference between system software, programming software, application software and driver software. • Identify common examples of the different types of applications • Describe uses of common productivity application software • Describe uses of programming software such as language editors, debuggers, compilers, IDEs, source code repositories and build	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)
	systems (e.g. Eclipse for Java, Coda for Mac, Visual Studio for multiple languages, GitHub for source code) Students will know • Understand uses of different software and tools • Apply common software tools such as translators, integrated development environments, online and offline computing platforms, code repositories etc. • Definitions of key software tools such as translators, integrated development environments, online and offline computing platforms, code repositories etc. • Difference between on premise and hosted application software • What applications can be used without internet (offline) and which require internet to work (online)				
B: Computational Thinking & Algorithms	**[SLO CS-10-B-01]** Students will identify common algorithms used to develop software, store, search, or sort information Students will understand **1)** How to solve the counting problems **a)** Basics of a counting problem **b)** Basic counting principles **i)** Multiplication **ii)** Addition **iii)** Permutation **iv)** Combination **v)** The pigeonhole principle **vi)** Inclusion and exclusion principle **2)** Properties of Algorithm **a)** Input **b)** Output **c)** Definiteness **d)** Finiteness **e)** Effectiveness	Summative for Theory	Knowledge / Understanding/ Application	Question(s) will be asked in the Annual theory paper	**20**

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	v) Generality 3) Logical reasoning and will be able to solve a) Boolean logic b) Verbal logical reasoning c) Non-verbal logical reasoning 4) Understand data search and sort, and briefly describe standard algorithms on linear arrays such as linear search, binary search, insertion sort, bubble sort etc. Students will be able to 1) Apply logical reasoning to refine and solve problems 2) Apply algorithmic thinking to refine and solve problems 3) Identify when & where to use key search & sort algorithms 4) Discuss an algorithm to solve a specific problem.				
	[SLO CS-10-B-02] Develop and apply abstractions to create generalized, modular solutions Students will understand • Steps in an algorithm to solve computational problems • Dry running or Trace Table to run algorithm • Identify logical and syntax errors • Abstractions to create generalized, modular solutions Students will be able to • Use algorithmic approach to solve the computational simple problems • Apply abstractions to create generalized, modular solutions • Create and use dry runs/trace tables to follow an algorithm • Identify syntax/logic errors in code and solve logical errors	Summative for Theory	Knowledge / Understanding/ Application	Question(s) will be asked in the Annual theory	
C: Programming Fundamentals	**[SLO CS-10-C-01]** Students should be able to differentiate between front-end development, and back-end development of a website Students will understand… • Back-end development allows writing code that emits HTML/CSS/JavaScript	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	**40**

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	• Front-end development deals with HTML/CSS/JavaScript in the browser Students will be able to… • Differentiate between back-end and front-end development				
	[SLO CS-10-C-02] Students should be able to use more advanced HTML/CSS features in an appropriate environment Students will understand… • How HTML tags can be used to show tabular date • How HTML can be used to retrieve inputs from users • How to apply animation movements to HTML components Students will be able to… • Create forms in HTML using an IDE like Visual Studio, Netbeans etc. • Create tables in HTML using an IDE like Visual Studio, Netbeans etc. • Create animations in CSS using an IDE like Visual Studio, Netbeans etc.	Summative for Practical Based Assessment	Understanding/ Application	Lab work will be assessed in the Practical Based Assessment	
	[SLO CS-10-C-03] Students should be able to use more advanced programming constructs (lists, etc.) to create dynamic websites using JavaScript as backend scripting Students will understand… • How to create and use arrays inJavaScript • How to create and use bullet points in HTML Students will be able to… • Create bullet points in HTML that are generated from an array in JavaScript	Summative for Practical Based Assessment	Understanding/ Application	Lab work will be assessed in the Practical Based Assessment	
	[SLO CS-10-C-04] Students should be able to implement complex algorithms that use more complex data structures (lists, etc.) in JavaScript Students will understand… • The array data structure is similar to a list • Finding an element in a list requires iterating through entire list till	Summative for Practical Based Assessment	Understanding/ Application	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 element is found Students will be able to… • Write an algorithm that finds an element in a list • Implement an algorithm that finds an element in a list using JavaScript				
	[SLO CS-10-C-05] Students will determine more advanced techniques (unit tests, breakpoints, watches) for testing and debugging their code in JavaScript Students will understand… • The purpose of a unit test • Debugging allows them to analyze code as it runs Students will be able to… • Write simple unit tests for the functions intheir code • Set a breakpoint and use it to analyze intermediate values of variables in JavaScript	Summative for Practical Based Assessment	Understanding/ Application	Lab work will be assessed in the Practical Based Assessment	
Domain D: Data and Analysis	**[SLO CS-10-D-01]** Students will understand and explain the scope of data science, Artificial Intelligence (AI), and Machine Learning (ML), including types of supervised and unsupervised learning models, and their applications to common real-world problems. Students will know **1)** Definitions of data science, artificial intelligence and machine learning. They will also learn to differentiate between the three fields and overlapping areas. **i.** Machine Learning skills include **a.** Technique used by AI **b.** Enables systems / machines to learn from large data **c.** Uses supervised and unsupervised learning **d.** Automation and scalability **e.** Uses in fraud detection. **ii.** Artificial intelligence skills include: Teach machines to emulate human behavior e.g. natural language	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	**20**

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	processing, chatbots, image recognition **2)** Data science lifecycle: Collecting, processing, analyzing, visualizing and understanding model outcomes (predictions / descriptive). Students will know **i.** The difference between data science, AI and machine learning. Recognize different types of supervised learning vs unsupervised learning models including algorithms. **ii.** How to interpret the results from churn prediction and behavioral segmentation models Students will • Differentiate between the three fields of data science, AI, and ML and overlapping areas. • Interpret the results from Churn Prediction and behavioral segmentation through simple examples. • Decide if a problem and its solution is using supervised, unsupervised, or reinforcement learning.				
	[SLO CS-10-D-02] Students will understand and explain the types, uses, and methods of data visualizations and understand the benefits of visualizing data. Students will understand that data and data products (charts, graphs, and statistics) can be analyzed and evaluated, similar to analyzing arguments. Students will • Understand the benefits of visualizing data and appropriate methods to create visualizations. • Know visualization techniques such as measures of center and spread, boxplots, bar plots , histograms, scatterplots, graphical summaries of multivariate data, side-by-side bar plots and association, scatterplots • Understand the connection of databases to machine learning. • Explain sorting, visualizing, and using data. • Read plots (identify the name of the plot, interpret the axes, look	Summative for Theory	Knowledge / Understanding/ Application	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)
	for trends, identify confounding factors). • Understand relational databases (entities, attributes, and keys) Students will be able to… • Develop relational schema representing simple Entity-Relationship diagrams • Create tables, forms, reports, and queries using common operations like SELECT, CREATE, JOIN etc. in any database tool (MS Excel, MS Access, MySQL etc.) • Analyze tables in any database tool and develop simple insights (i.e. sales are increasing/decreasing over time etc.) • Develop E-R data models, physical and logical design. • Represent data with plots on the real number line (dotplots, histograms, bar plots, and boxplots). • Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).				
	[SLO CS-10-D-03] Students will be able to apply stages of the data science life cycle e.g. understanding a real-world business problem, data gathering, building model, and interpreting results). Students will understand… • Define data science life cycle • Explain different steps of data gathering including the source of data, query the data on a database tool (e.g. MS Access, SQL etc.), collect & store the data, format the data to make it ready for modeling. • Different types of real-world business problems and how to formulate them into a data science problem e.g. define a problem e.g. can you help calculate sales for next year. This becomes a sales predictive model. • The data gathering step e.g. from retail stores asking for the last	Summative for Theory	Knowledge / Understanding/ Application	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)
	three years of sales data. • What kind of algorithms are possible for example simple linear regression or decision tree? • Key performance metrics (for example mean squared error) • Students will be able to formulate a business problem into a data science problem and link to types of problems (e.g. questions "my customers are leaving me" is a churn prediction model)				
E: Applications of Computer Science	**[SLO CS-10-E-01]** Students will be able to describe uses and applications that are enabled by technologies like IoT, and Blockchain Students will know… • IoT and it's foundational components • Applications that are enabled by IoT • Applications that are enabled by blockchain • The benefits of cloud computing Students will be able to… • Analyze different technologies that use blockchains • Evaluate if a scenario fits an application of IoTs • Evaluate how we can use cloud computing	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	**20**
	[SLO CS-10-E-02] Students will be able to explain that AI can be applied to specific applications in areas like NLP, Robotics, Speech Recognition, etc. Students will understand… • Specific applications of speech recognition like personal assistants, Quran Memorization applications, Speech-to-text typing applications, Speech recognition for authentication, Speech recognition for surveillance and national security, etc. Students will be able to… • Enumerate and explain the use of AI techniques in different real-world applications like personal assistants, Quran Memorization applications, Speech-to-text typing applications, Speech	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)
	recognition for authentication, • Specific applications of NLP like email filtering to protect against spam and scams, Language translation, document analysis, predictive text, Sentiment analysis, etc. • Applications of Robotics in rescue and search operations, industrial robotics for manufacturing, vacuum cleaners like Romba robotic operations, farming, etc. • Speech recognition for surveillance and national security, etc.				
	[SLO CS-10-E-03] Students will be able to demonstrate the social implications of AI Students will understand… • That 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 benefit Students will be able to… • Show that there are instances where use of AI causes social injustices. • Identify the ethical norms for creating AI algorithms	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	
F: Impacts of Computing	**[SLO CS-10-F-01]** Understand and apply safe & responsible use of the internet to prevent addiction, promote information and data security Students will understand… • The concerns of technology addiction • The need for cyber security to protect data • The ways in which the internet can be used to promote information for good and bad purposes • The effects of threats to individual privacy and security of data from spam, spyware, cookies, etc. • Basics of security & privacy of cloud computing Students will be able to… • Analyze the impact of new technology laws on digital privacy and	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	**20**

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	information security • Explain safety and security concepts and strategies including peer pressure and cyberbullying in social media impacts lives • Discuss the need for cyber security in relation to privacy and data security of information • Compare ways software developers protect devices and information from unauthorized access				
	[SLO CS-10-F-02] Evaluate the impact of and apply strategies to prevent cyberbullying/harassment Students will understand… • Basics of data, network and cyber security: backups, access, network monitoring, public and private clouds • Use of hardware and software methods to protect devices Students will be able to… • Discuss ways in which to deal with cyberbullying as a victim or someone you know • Discuss cybercrimes laws, instances of cybercrimes, and common methods of reporting cybercrimes	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	
	[SLO CS-10-F-03] Analyze the impacts of the digital divide on access to critical information Students will understand… • Distribution of computing resources affects the way solutions are designed • Inequitable Access to information impacts human lives Students will know: • the meaning of the digital divide Students will be able to: • Design computing applications that can take into consideration accessibility of information • Strategize to alleviate the impacts of unequal access of information in creating computing solutions	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)
	• Discuss what role students can play to minimize the digital divide				
G: Digital Literacy	**[SLO CS-10-G-01]** Communicate and publish key ideas and details to a variety of audiences using appropriate digital tools and media-rich resources Students will understand… • Understand how to get information on simple topics and extract key ideas, and present them in different formats • How to identify key ideas and create appropriate copy and graphics to present an idea (e.g. communicating event information in a poster, or communicating product features in a billboard) • Appropriate use cases of social media when communicating key ideas to various audiences (e.g. using YouTube to communicate an opinion via a podcast or using Instagram to show images related to a place or a product, or Facebook to share information with a community etc.) • Best practices in reaching audiences on various digital platforms Students will be able to… • Get information on simple topics, extract key ideas, and create appropriate copy & graphics to present an idea to various audiences	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	**05**

Content Domain/ Area	SLO No./ Description	Form of Assessment	Cognitive Level (Knowledge, Understanding, Application)	Remarks	Number of Periods required (1 period= 40 minutes)
	in different formats across various social media platforms (e.g. YouTube, Facebook, Instagram, etc.)				
H: Entrepreneurship in the digital age	**[SLO EN-10-H-01]** Students will use digital tools to conduct research to collect market and customer insights for a business idea. Students will understand… • Quantitative and qualitative research methods and when to apply them. • How to design questions and collect results for various methodologies • How to interpret research results, particularly in regards to bias in sample selection and correlation vs. causation	Summative for Theory	Knowledge / Understanding	Question(s) will be asked in the Annual theory paper	**10**
	[SLO EN-10-H-02] Students will pitch a business idea. Students will understand… • How to use research to create customer profiles • Components of a successful elevator pitch • Define effective communication skills required to best articulate a business idea • Difference between a business plan and a pitch document	Summative for Practical Based Assessment	Application	Question(s) will be asked in the Annual PBA	

Federal Board SSC-II Examination
Model Question Paper Computer Science
(Curriculum 2022-23) Scheme of Studies 2009

ROLL NUMBER					
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Section - A (Marks 13)

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 the curriculum. Each part carries one mark.

Sr no.	Question	A	B	C	D	A	B	C	D
i.	Which of the following is an example of system software?	Microsoft Word	Google Chrome	Windows Operating System	Adobe Photoshop	○	○	○	○
ii.	Why does an operating system use process scheduling?	To execute multiple processes efficiently	To slow down program execution	To prevent applications from running	To increase storage space	○	○	○	○
iii.	What will be the equivalent of $(25)_{10}$ to $(?)_2$?	11001	10101	10011	11100	○	○	○	○
iv.	Which of the following logical reasoning type requires solving patterns and shapes?	Boolean Reasoning	Verbal Logical Reasoning	Nonverbal Logical Reasoning	Analytical Reasoning	○	○	○	○
v.	If a function calculates the average of three numbers but always returns zero, what type of error is likely causing this issue?	Syntax error	Logical error	Compilation error	Run-time error	○	○	○	○
vi.	Which machine learning method is used for training without labeled data?	Supervised Learning	Unsupervised Learning	Reinforcement Learning	Deep Learning	○	○	○	○
vii.	Which of the following best explains the purpose of a histogram?	It displays the frequency distribution of numerical data	It compares categorical data	It shows relationships between two variables	It visualizes a database table	○	○	○	○
viii.	Which cloud computing service model provides virtualized computing resources over the internet?	SaaS (Software as a Service)	PaaS (Platform as a Service)	IaaS (Infrastructure as a Service)	BaaS (Backend as a Service)	○	○	○	○
ix.	Which technology is used in both robotics and AI personal assistants?	Blockchain	Natural Language Processing (NLP)	3D Printing	Virtual Reality (VR)	○	○	○	○
x.	How can students help bridge the digital divide?	Promoting digital literacy	Using technology only personally	Ignoring the issue	Restricting internet access	○	○	○	○
xi.	What is the primary purpose of a data backup?	To speed up the internet	To recover lost data	To increase computer storage	To prevent hacking	○	○	○	○

xii.	How can graphics effectively convey event details?	Clear fonts, relevant images, key details	Tiny, unreadable text	Overloaded with text and images	abstract imagery without context	○ ○ ○ ○
xiii.	How does bias affect the validity of research findings?	Improves the accuracy of data	Enhances the credibility of the study	Leads to misleading results	Does not affect the validity of findings	○ ○ ○ ○

Federal Board SSC-II Examination
Computer Science Model Question Paper
(Curriculum 2022-23) Scheme of Studies 2009

Time allowed: 2.40 hours **Total Marks: 42**

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

SECTION – B (Marks 22)

Q.2	Question	Marks	Question		Marks
i.	Define deadlock with an example.	1+1	***OR***	What is the role of data visualization in the data science process?	2
ii.	A user notices slow performance when running multiple applications on their computer. What system software functions could be responsible for this issue, and what steps can be taken to optimize performance?	1+1	***OR***	A company wants to develop a system that quickly retrieves customer data from a large database. Which search algorithm would be most suitable for this task, and how does it improve efficiency?	2
iii.	Calculate the Mean Squared Error (MSE) for a given set of predicted and actual values. Actual values (Y_actual): [3, 5, 2, 8, 7] Predicted values (Y_pred): [2.5, 5.3, 1.8, 7.5, 6.8]	2	***OR***	Convert $(2F08)_{16}$ to Octal and Binary.	1+1
iv.	Enlist the scenario in which all the functionality is dealt by the frontend only.	2	***OR***	Differentiate between System and Application software with examples.	2
v.	Write down any four applications of Real-Time operating system.	2	***OR***	How does blockchain technology ensure security?	2
vi.	How does fraud detection benefit from machine learning?	2	***OR***	What are two ways students can responsibly use social media when sharing information?	2
vii.	List any TWO characteristics of an algorithm.	1+1	***OR***	Write down any TWO advantages of using an online computing platform over an offline one.	2
viii.	Why is it beneficial to break a program into smaller modules? (Give any TWO reasons)	2	***OR***	How does choosing the right research method impact decision-making in research? Provide an example.	1+1
ix.	What factors should be considered while selecting a machine learning model for data analysis? (Suggest any TWO).	2	***OR***	How does network monitoring help prevent cyber threats? Give any TWO justifications.	2
x.	How do differences in shape, center, and spread help in understanding the characteristics of a dataset?	2	***OR***	Why is email filtering important in protecting users? Provide any TWO reasons.	2
xi.	How can AI be used responsibly in law enforcement? Enlist two suggestions.	2	***OR***	What is phishing, and how does it affect users?	1+1

SECTION – C (Marks 20)

Note: Attempt all questions. Marks for each question are given. (4 x 05=20)

Q. No.	Question	Marks	Question		Marks
Q.3	Write down the significance of an operating system. Also, describe the following functions: a. File management b. Memory management	1+4	***OR***	Discuss any five components of digital literacy with one example of each.	5
Q.4	Identify the use of a searching algorithm. Compare the linear search with the binary search algorithm.	1+4	***OR***	Suggest any five effective strategies to combat online hate speech.	5
Q.5	How do IoT and Blockchain work together to improve cybersecurity? Support your answer with any five suggestions.	5	***OR***	How are HTML, CSS, JavaScript, Python, and PHP categorized into frontend and backend development?	5

<table>
<tr><td></td><td></td><td></td><td></td><td>Provide one reason for each.</td><td></td></tr>
<tr><td>Q.6</td><td>Consider the following table and write down the SQL queries:
<table><tr><th>s_id</th><th>name</th><th>age</th><th>marks</th><th>grade</th><th>city</th></tr><tr><td>1</td><td>Saima</td><td>20</td><td>85</td><td>A</td><td>Lahore</td></tr><tr><td>2</td><td>Rida</td><td>22</td><td>78</td><td>B</td><td>Quetta</td></tr><tr><td>3</td><td>Minal</td><td>21</td><td>92</td><td>A</td><td>Karachi</td></tr><tr><td>4</td><td>Nida</td><td>23</td><td>65</td><td>C</td><td>Lahore</td></tr><tr><td>5</td><td>Seema</td><td>20</td><td>89</td><td>A</td><td>Quetta</td></tr></table>a. Retrieve all students who scored more than 80 marks.
b. Find the average marks of students in the table.
c. Get the names of students from ‘Quetta’ or ‘Lahore.
d. Count the number of students in each grade.
e. Retrieve students sorted by marks in descending order.</td><td>5</td><td>O R</td><td>TechNova Solutions, a SaaS (Software as a Service) startup, projects its financial growth based on the following key assumptions:
i. Revenue Growth: 50% annual increase due to customer base expansion.
ii. Expense Growth: 30% annual increase to support operations.
Answer the following questions:
a. What strategies can TechNova Solutions implement to maintain revenue growth if customer acquisition slows down? (any three)
b. If expenses grow at a rate higher than 30% per year, what financial risks might the business face? (any two)</td><td>3+2</td></tr>
</table>

Federal Board SSC-II Examination

Computer Science Model Question Paper

(Curriculum 2022-23) Scheme of Studies 2009

Alignment of Questions with Student Learning Outcomes

SECTION A

Sr No	Section	Q. No. (Part no.)	Content Domain / Area	Student Learning Outcomes	Cognitive Level	Allocated Marks
1	A	Q1(i)	A3	Students will identify and learn common software tools such as translators, integrated development environments, online and offline computing platforms, code repositories, etc.	K	1
2	A	Q1(ii)	A2	Students will be able to explain how system software controls the flow of information between hardware components used for input, output, storage, and processing	U	1
3	A	Q1(iii)	A1	Students will be able to understand and describe number systems and encoding schemes for data representation in computer systems	A	1
4	A	Q1(iv)	B1	Students will identify common algorithms used to develop software, store, search, or sort information	U	1
5	A	Q1(v)	B2	Develop and apply abstractions to create generalized, modular solutions	U	1
6	A	Q1(vi)	D1	Students will understand and explain the scope of data science, Artificial Intelligence (AI), and Machine Learning (ML), including types of supervised and unsupervised learning models, and their applications to common real-world problems.	K	1
7	A	Q1(vii)	D2	Students will understand and explain the types, uses, and methods of data visualizations and understand the benefits of visualizing data	K	1
8	A	Q1(viii)	E1	Students will be able to describe uses and applications that are enabled by technologies like IoT, and Blockchain	K	1
9	A	Q1(ix)	E2	Students will be able to explain that AI can be applied to specific applications in areas like NLP, Robotics, Speech Recognition, etc	U	1
10	A	Q1(x)	F3	Analyze the impacts of the digital divide on access to critical information	U	1
11	A	Q1(xi)	F2	Evaluate the impact of and apply strategies to prevent cyberbullying/harassment	K	1
12	A	Q1(xii)	G1	Communicate and publish key ideas and details to a variety of audiences using appropriate digital tools and media-rich resources	U	1
13	A	Q1(xiii)	H1	Students will use digital tools to conduct research to collect market and customer insights for a business idea	U	1

Federal Board SSC-II Examination

Chemistry Model Question Paper

(Curriculum 2022-23) Scheme of Studies 2009

Alignment of Questions with Curriculum Student Learning Outcomes

SECTION B & C

Sr No	Section	Q. No. (Part no.)	Content Domain / Area	Student Learning Outcomes	Cognitive Level	*OR*	Content Domain / Area	Student Learning Outcomes	Cognitive Level	Allocated Marks
1	B	Q2(i)	A1	Students will be able to understand and describe number systems and encoding schemes for data representation in computer systems	K	***OR***	D1	Students will understand and explain the scope of data science, Artificial Intelligence (AI), and Machine Learning (ML), including types of supervised and unsupervised learning models, and their applications to common real-world problems.	K	2
2	B	Q2(ii)	A2	Students will be able to explain how system software controls the flow of information between hardware components used for input, output, storage, and processing	A	***OR***	B1	Students will identify common algorithms used to develop software, store, search, or sort information	A	2
3	B	Q2(iii)	D3	Students will be able to apply stages of the data science life cycle e.g. understanding a real-world business problem, data gathering, building model, and interpreting results).	A	***OR***	A1	Students will be able to understand and describe number systems and encoding schemes for data representation in computer systems	A	2
4	B	Q2(iv)	C1	Students should be able to differentiate between front-end development, and back-end development of a website	U	***OR***	A2	Students will be able to explain how system software controls the flow of information between hardware components used for input, output, storage, and processing	U	2
5	B	Q2(v)	A2	Students will be able to explain how system software controls the flow of information between hardware components used for input, output,	K	***OR***	E1	Students will be able to describe uses and applications that are enabled by technologies like IoT, and Blockchain	K	2

				storage, and processing						
6	B	Q2(vi)	D1	Students will understand and explain the scope of data science, Artificial Intelligence (AI), and Machine Learning (ML), including types of supervised and unsupervised learning models, and their applications to common real-world problems.	U	***OR***	G1	Communicate and publish key ideas and details to a variety of audiences using appropriate digital tools and media-rich resources	U	2
7	B	Q2(vii)	B1	Students will identify common algorithms used to develop software, store, search, or sort information	K	***OR***	A3	Students will identify and learn common software tools such as translators, integrated development environments, online and offline computing platforms, code repositories, etc.	K	2
8	B	Q2(viii)	B2	Develop and apply abstractions to create generalized, modular solutions	U	***OR***	H1	Students will use digital tools to conduct research to collect market and customer insights for a business idea	U	2
9	B	Q2(ix)	D2	Students will understand and explain the types, uses, and methods of data visualizations and understand the benefits of visualizing data	U	***OR***	F2	Evaluate the impact of and apply strategies to prevent cyberbullying/harassment	U	2
10	B	Q2(x)	D2	Students will understand and explain the types, uses, and methods of data visualizations and understand the benefits of visualizing data	U	***OR***	E2	Students will be able to explain that AI can be applied to specific applications in areas like NLP, Robotics, Speech Recognition, etc	U	2
11	B	Q2(xi)	E3	Students will be able to demonstrate the social implications of AI	U	***OR***	F1	Understand and apply safe & responsible use of the internet to prevent addiction, promote information and data security	U	2
12	C	Q3	A3	Students will identify and learn common software tools such as	K	***OR***	G1	Communicate and publish key ideas and details to a variety of audiences using	K	5

				translators, integrated development environments, online and offline computing platforms, code repositories, etc.				appropriate digital tools and media-rich resources		
13	C	Q4	B1	Students will identify common algorithms used to develop software, store, search, or sort information	U	***OR***	F2	Evaluate the impact of and apply strategies to prevent cyberbullying/harassment	U	5
14	C	Q5	E1	Students will be able to describe uses and applications that are enabled by technologies like IoT, and Block chain	U	***OR***	C1	Students should be able to differentiate between front-end development, and back-end development of a website	U	5
15	C	Q6	D2	Students will understand and explain the types, uses, and methods of data visualizations and understand the benefits of visualizing data	A	***OR***	H2	Students will pitch a business idea	A	5

*Cognitive Level
K: Knowledge
U: Understanding
A: Application

Table of Specifications

Model Paper Computer Science – Grade X (SSC-II)

Cognitive Level	Domain A: Computer Systems	Domain B: Computational Thinking & 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	Total Marks	Percentage (%)
Knowledge (K)	Q1(i)(1)			Q1(vi)(1) Q1(vii)(1)	Q1(viii)(1)	Q1(xi)(1)			27	**27.84%**
	Q2(i/f)(2) Q2(v/f)(2) Q2(vii/s)(2)	Q2(vii/f)(2)		Q2(i/s)(2)	Q2(v/s)(2)					
	Q3(f)(5)						Q3(s)(5)			
Understanding (U)	Q1(ii)(1)	Q1(iv)(1) Q1(v)(1)			Q1(ix)(1)	Q1(x)(1)	Q1(xii)(1)	Q1(xiii)(1)	51	**52.57%**
	Q2(iv/s)(2)		Q2(iv/f)(2) Q2(viii/f)(2)	Q2(vi/f)(2) Q2(ix/f)(2) Q2(x/f)(2)	Q2(xi/f)(2) Q2(x/s)(2)	Q2(ix/s)(2) Q2(xi/s)(2)	Q2(vi/s)(2)	Q2(viii/s)(2)		
		Q4(f)(5)	Q5(s)(5)		Q5(f)(5)	Q4(s)(5)				
Application (A)	Q1(iii)(1)								19	**19.59%**
	Q2(ii/f)(2) Q2(iii/s)(2)	Q2(ii/s)(2)		Q2(iii/f)(2)						
				Q6(f)(5)				Q6(s)(5)		
Total Marks	20	11	9	17	13	11	8	8	**97**	**100%**
%age	**21%**	**11%**	**9%**	**18%**	**14%**	**11%**	**8%**	**8%**	**100%**	

Note:

1 This ToS does not reflect policy, but it is specific to this model question paper.

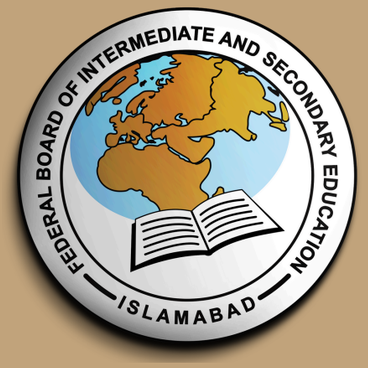
2 Proportionate/equitable representation of the content areas as per the defined ranges may be ensured.

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 the 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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