



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.*

Version No.			
0	0	0	0
1	1	1	1
2	2	2	2
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Invigilator Sign.

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

Sr#	Question	A	B	C	D	A	B	C	D		
i.	Which is an example of a usability-security tradeoff?	Short passwords for convenience	Strong passwords with auto-login	Complex passwords boost security but hinder recall.	Weak passwords with auto-login	☐	☐	☐	☐		
ii.	How can a company improve website usability?	More ads for revenue	Usability testing and design improvements	Requiring user accounts for access	Removing multimedia content	☐	☐	☐	☐		
iii.	What is the main advantage of a binary search over a linear search?	Binary search works on both sorted and unsorted data	Binary search has a time complexity of O(n)	Binary search reduces the search space by half at each step	Binary search does not require comparisons	☐	☐	☐	☐		
iv.	A binary search tree (BST) contains the numbers 50, 30, 70, 20, 40, 60, and 80 . What will be the output of an in-order traversal?	50, 30, 20, 40, 70, 60, 80	20, 30, 40, 50, 60, 70, 80	50, 70, 30, 60, 80, 20, 40	30, 20, 40, 50, 70, 60, 80	☐	☐	☐	☐		
v.	Which of the following is a primary benefit of Object-Oriented Programming (OOP)?	It avoids the use of functions	It encourages reusable and modular code	It eliminates the need for variables	It runs faster than all other paradigms	☐	☐	☐	☐		
vi.	What is a significance level (α) in hypothesis testing?	The probability of rejecting the null hypothesis when it is true	The probability of accepting the null hypothesis when it is false	The sample size used in the test	The standard deviation of the population	☐	☐	☐	☐		
vii.	What will be the precision of a trained machine learning model having the following confusion matrix?	90%	75%	70%	60%	☐	☐	☐	☐		
										Predicted Positive	Predicted Negative
	Actual Positive									90	10
	Actual Negative									30	70

viii.	Why is it essential for businesses to implement data protection policies?	To ensure all business data is kept offline	To prevent data breaches and unauthorized access	To allow unrestricted data access for all employees	To eliminate the need for user authentication	☐ ☐ ☐ ☐
ix.	What actions should be taken to enhance the model's performance?	Increase the number of hidden layers in the neural network	Use blockchain for storing patient records	Limit training to only a small number of images	Avoid using labeled datasets	☐ ☐ ☐ ☐
x.	Which security method is commonly used to protect sensitive online transactions?	Biometric authentication	HTTP protocol	Plain text storage of passwords	Open access networks	☐ ☐ ☐ ☐
xi.	Which of the following is a key step in conducting an advanced online search?	Entering a single-word search term	Using Boolean operators like AND, OR, and NOT	Clicking on the first link that appears in a search engine	Relying only on social media for research	☐ ☐ ☐ ☐
xii.	How do digital tools enhance the communication of research findings?	They help present data visually and improve clarity	They eliminate the need for research validation	They restrict access to findings	They replace the need for critical analysis	☐ ☐ ☐ ☐
xiii.	What role does the "riskiest assumption" play in refining an MVP?	To create a product without any flaws	To validate the most critical factor that could impact the business model's success	To minimize production costs	To increase marketing efforts	☐ ☐ ☐ ☐



Federal Board HSSC-II Examination

Computer Science Model Question Paper

(Curriculum 2022-23) Scheme of Studies 2006

Time allowed: 2.40 hours

Total Marks: 62

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 42)

Q.2	Question	Marks		Question	Marks																																																												
i.	What is usability testing, and how does it help improve user experience?	1+2	OR	What is the purpose of train-test split in machine learning model building?	3																																																												
ii.	How is the binary search algorithm useful in searching large datasets efficiently? Give any three (03) key points.	3	OR	What is phishing, and how can users protect themselves from phishing attacks?	1+2																																																												
iii.	Perform the In-order traversal and write the correct sequence of node visits for the following tree: 	3	OR	A corporate office restricts work to company devices for security, but employees find it limiting. What alternative measures can balance security and flexibility?	1.5+ 1.5																																																												
iv.	What is feature engineering, and why is it important in machine learning?	1+2	OR	What is the purpose of cryptography in data security? Enlist any two (02) commonly used ciphers.	1+2																																																												
v.	Why is human-computer interaction (HCI) important in software and device design? Justify your answer with three (03) valid reasons	3	OR	How online sharing of sensitive information can lead to identity theft? Support your answer with a real-world example.	1+2																																																												
vi.	Convert the following table from Second Normal Form (2NF) to Third Normal Form (3NF). <table border="1"><thead><tr><th>OrderID</th><th>CustomerName</th><th>CustomerCity</th><th>ProductID</th><th>ProductName</th><th>Quantity</th></tr></thead><tbody><tr><td>101</td><td>Ahmed Khan</td><td>Karachi</td><td>P001</td><td>Laptop</td><td>2</td></tr><tr><td>101</td><td>Ahmed Khan</td><td>Karachi</td><td>P002</td><td>Mouse</td><td>1</td></tr><tr><td>102</td><td>Sana Baloch</td><td>Lahore</td><td>P001</td><td>Laptop</td><td>1</td></tr><tr><td>103</td><td>Bilal Ahmed</td><td>Islamabad</td><td>P003</td><td>Keyboard</td><td>3</td></tr></tbody></table>	OrderID	CustomerName	CustomerCity	ProductID	ProductName	Quantity	101	Ahmed Khan	Karachi	P001	Laptop	2	101	Ahmed Khan	Karachi	P002	Mouse	1	102	Sana Baloch	Lahore	P001	Laptop	1	103	Bilal Ahmed	Islamabad	P003	Keyboard	3	3	OR	Consider the following table and write the output of the following SQL queries: a) SELECT * FROM employees WHERE department = 'IT'; b) SELECT AVG(salary) AS average_salary FROM employees; <table border="1"><thead><tr><th>E_id</th><th>name</th><th>D_id</th><th>department</th><th>salary</th></tr></thead><tbody><tr><td>1</td><td>Ali</td><td>100</td><td>IT</td><td>80000</td></tr><tr><td>2</td><td>Sara</td><td>101</td><td>HR</td><td>60000</td></tr><tr><td>3</td><td>Ahmed</td><td>102</td><td>Finance</td><td>90000</td></tr><tr><td>4</td><td>Ayesha</td><td>100</td><td>IT</td><td>85000</td></tr><tr><td>5</td><td>Bilal</td><td>103</td><td>Marketing</td><td>70000</td></tr></tbody></table>	E_id	name	D_id	department	salary	1	Ali	100	IT	80000	2	Sara	101	HR	60000	3	Ahmed	102	Finance	90000	4	Ayesha	100	IT	85000	5	Bilal	103	Marketing	70000	1.5+ 1.5
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vii.	What are three important factors to consider when implementing cyber security measures?	3	OR	What are the key steps involved in building a machine-learning model?	3																																																												
viii.	How can a balance between usability and security be maintained in digital devices?	1.5+1.5	OR	How do we assess the effectiveness of a computational solution?	3																																																												
ix.	A company needs to store hierarchical employee data. Which data structure would you recommend, and how would you apply it?	1+2		Here is the sample data in table format: <table border="1"><thead><tr><th>Student ID</th><th>Name</th><th>Grade</th></tr></thead><tbody><tr><td>101</td><td>Ali</td><td>85</td></tr><tr><td>102</td><td>Babar</td><td>90</td></tr><tr><td>103</td><td>Sana</td><td>78</td></tr></tbody></table> Use this data to compare storage and retrieval using a nested list and a dictionary in context to Python.	Student ID	Name	Grade	101	Ali	85	102	Babar	90	103	Sana	78	1.5+ 1.5																																																
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102	Babar	90																																																															
103	Sana	78																																																															
x.	Give a real-world example of how tree data structures are used in computing.	3	OR	A team is working on a research project and wants to visually present their conclusions. Which digital tool could they use, and why?	1+2																																																												
xi.	How can collaboration improve the design of computing applications for diverse users? Provide any three (03)	3	OR	A search engine needs to quickly find a keyword from a sorted list of millions of	1+2																																																												

	reasons.			words. Which algorithm would be most efficient, and how does it work?	
xii.	How can digital tools help in effectively communicating research findings? Provide one (01) example.	2+1	OR	What challenges do companies face when ensuring both data security and user privacy? (any three 03)	3
xiii.	What is deep learning and traditional machine learning?	1.5+1.5		Write down any three (03) benefits of data visualization in making data-driven decisions?	3
xiv.	A university is offering online courses to students worldwide. How can cloud computing enhance accessibility and performance?	3	OR	A visually impaired user struggles to navigate a website due to small text and poor contrast. How can improving usability and accessibility make the website more user-friendly?	3

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	Briefly explain Human Computer Interaction (HCI) in terms of: a) Usability b) Common Problems c) Methods for Improvement d) Ethical and Social impacts e) Economic and Environmental Implications Provide relevant examples for each aspect.	1x5	OR	Explain the concept of: Minimum Viable Product (MVP) and its role in business validation with an example.	3+2
Q.4	A researcher is studying the effect of a new study technique on student performance. a) In the above context define Null Hypothesis and Alternative Hypothesis. b) Explain the role of P-values in hypothesis testing. c) Communicate your findings using data visuals.	2+2+1	OR	Why security methods are important for protecting data? Explain the role of the following methods in securing information and preventing identity theft. a) Two-factor authentication (2FA) b) Biometric verification c) Cryptography	2+3
Q.5	Emerging technologies are shaping the future of Pakistan’s digital landscape. a) Why IoT is important for smart cities or smart agriculture in Pakistan? (Three points) b) Give two (02) suggestions that how a Blockchain-based system could improve security in Pakistan.	3+2	OR	Students are conducting research on the benefits of artificial intelligence in education. a) Explain two methods they can use to evaluate the credibility of online sources. b) Give significance of two (02) digital platforms they can use to present their findings in an interactive way. c) Why is it important to verify information before including it in research?	2+2+1
Q.6	Design a Vehicle Management System using Object-Oriented Programming (OOP) in Python. Requirements: a) Create a Vehicle class with attributes: type, brand, model, and mileage.	2+2+1		A company manages its organizational hierarchy using a tree/graph data structure as provided. The company wants to find a specific 	3+2

	b) Implement a constructor to initialize these attributes. Also add methods to update mileage and display details. c) Create two vehicle objects, update their mileage, and display their details.			employee (node) using an efficient search algorithm. a) Search the Security department using Depth-First Search (DFS) and Breadth-First Search (BFS). b) Outline the sequence of node visits in the selected search method.	
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