COMPUTER SCIENCE

9TH GRADE

Unit-wise Heading, Sub-heading, SLO & Teaching-Method Plan | Based on National Curriculum of Pakistan 2022-23 (NBF Model Textbook)

Unit no	CONTENT (Heading / Sub-heading)	SLO	METHOD (How to Teach)	RESPONSE
Unit 1 **COMPUTER SYSTEMS** *Pg. 8-52*	**1.0 Introduction to Computer Systems**	01	Lecture method	
	1.1 Brief History of Computer Systems and Generations of Computers	02	Storytelling method	
	1.1.1 Early Computing Devices (Abacus, Napier's Bones, Pascaline, Stepped Reckoner, Difference & Analytical Engine, Tabulating Machine, Mark I)	03	Storytelling method	
	1.1.2 Computer Generations (1st Vacuum Tubes, 2nd Transistors, 3rd ICs, 4th Microprocessors, 5th AI-based)	04	Timeline/Discussion method	
	1.2 Understanding Systems and their Types	05	Lecture method	
	1.2.1 What is a System? (definition, components)	06	Question answer method	
	1.2.2 Types of Systems (open/closed)	07	Discussion method	
	1.2.3 Computer as a System	08	Demonstration method	
	1.2.4 Natural and Artificial Systems	09	Compare & contrast method	
	1.3 Core Components of a Computer System	10	Demonstration method	
	1.3.1 Input Devices (keyboard, mouse, scanner, etc.)	11	Demonstration method	
	1.3.2 System Unit (CPU, motherboard, ALU, CU, registers)	12	Lecture with diagram method	
	1.3.3 Storage Devices (primary/secondary, examples)	13	Demonstration method	

	1.3.4 Output Devices (monitor, printer, speaker, etc.)	14	Demonstration method	
	1.3.5 Ports, Expansion Slots and Expansion Cards	15	Hands-on/Practical method	
	1.4 Von Neumann Architecture	16	Lecture with diagram method	
	1.5 Data Transmission within a Computer System (buses: data, address, control)	17	Demonstration method	
	1.6 Types and Hierarchy of Computer Memory	18	Lecture method	
	1.6.1 Memory Terminology (bit, byte, word, capacity)	19	Drill and practice method	
	1.6.2 Memory Build-up and Retention Power (volatile/non-volatile)	20	Discussion method	
	1.6.3 Types and Hierarchy of Computer Memory (register, cache, RAM, ROM, secondary)	21	Demonstration with diagram method	
	1.7 Software Engineering and Hardware Engineering	22	Discussion method	
	1.8 Computer Software	23	Lecture method	
	1.8.1 System Software (OS, utility, device drivers)	24	Demonstration method	
	1.8.2 Application Software (general purpose, specific purpose)	25	Hands-on/Practical method	
	1.8.3 Programming Languages (low-level, high-level, translators)	26	Lecture method	
	1.9 Data Communication	27	Lecture with diagram method	
	1.9.1 Network Communication Components (sender, receiver, medium, message, protocol)	28	Demonstration method	
	1.9.2 Modes of Network Communication (simplex, half-duplex, full-duplex)	29	Demonstration method	
	1.9.3 Communication Devices (modem, hub, switch, router, etc.)	30	Demonstration method	
	1.9.4 Network Architecture (client-server, peer-to-peer)	31	Discussion method	

	1.9.5 Types of Networks (LAN, MAN, WAN, PAN)	32	Compare & contrast method	
	1.9.6 Wireless Networks (Wi-Fi, Bluetooth, satellite)	33	Demonstration method	
	1.9.7 Network Topologies (bus, star, ring, mesh)	34	Demonstration with diagram method	
	1.9.8 Packet Switching and Circuit Switching	35	Compare & contrast method	
	1.9.9 Data Communication Standards	36	Lecture method	
	1.9.10 OSI Model (seven layers)	37	Lecture with diagram method	
	1.9.11 Data Communication Protocols (TCP/IP, HTTP, FTP, etc.)	38	Lecture method	
	1.9.12 The Internet (history, working, uses)	39	Discussion method	
Unit 2 **COMPUTATIONAL THINKING & ALGORITHMS** *Pg. 54-76*	**2.1 Problems (definition, types of problems)**	01	Question answer method	
	2.2 Identifying a Computing Problem	02	Problem solving method	
	2.3 Problem Solving (steps/stages)	03	Problem solving method	
	2.4 Input-Processing-Output (I-P-O) Model	04	Demonstration with diagram method	
	2.5 Input-Processing-Output (I-P-O) Chart	05	Activity based method	
	2.6 Computational Thinking (concept)	06	Lecture method	
	2.6.1 Importance of Computational Thinking	07	Discussion method	
	2.6.2 Properties of Computational Thinking (decomposition, pattern recognition, abstraction, algorithm design)	08	Activity based method	
	2.7 Principles of Computational Thinking	09	Lecture method	
	2.7.1 Logical Thinking	10	Problem solving method	
	2.7.2 Algorithmic Thinking	11	Problem solving method	
	2.8 Methods to Design a Solution	12	Demonstration method	

	2.8.1 Flowcharts (symbols, rules, examples)	13	Practical/drawing method	
	2.8.2 Concept Maps / Pseudocode & Algorithms	14	Activity based method	
Unit 3 **PROGRAMMING FUNDAMENTALS** *Pg. 77-112*	**3.1 Introduction (to web development)**	01	Lecture method	
	3.1.1 Web and Website (definitions)	02	Question answer method	
	3.1.2 Web Application	03	Discussion method	
	3.1.3 Website Development (process overview)	04	Lecture method	
	3.1.4 Static Website vs Dynamic Website	05	Compare & contrast method	
	3.1.5 Front-End and Back-End overview	06	Discussion method	
	3.1.6 Front-End Development (HTML, CSS, JavaScript, GUI)	07	Hands-on/Practical method	
	3.1.7 Back-End Development (server-side languages, databases)	08	Hands-on/Practical method	
	3.2 HTML (Hyper Text Markup Language)	09	Hands-on/Lab method	
	3.2.1 HTML Document Object Model (DOM)	10	Demonstration method	
	3.2.2 Basic Structure of an HTML Document	11	Hands-on/Practical method	
	3.2.3 Tags in HTML (headings, paragraph, formatting, lists, links, tables)	12	Hands-on/Practical (coding lab) method	
	3.2.4 Manipulating Data with Tables	13	Hands-on/Practical method	
	3.2.5 Links to Resources (hyperlinks, images, external files)	14	Hands-on/Practical method	
	3.3 Cascading Style Sheets (CSS)	15	Hands-on/Lab method	
	3.3.1 Decorating Tables with CSS	16	Hands-on/Practical method	
	3.3.2 Homepage Decor (colors, fonts, backgrounds)	17	Hands-on/Practical method	

	3.3.3 CSS Selectors and Properties	18	Hands-on/Practical method	
	3.3.4 Ways to Use CSS in HTML (inline, internal, external)	19	Demonstration method	
	3.4 JavaScript	20	Hands-on/Lab method	
	3.4.1 Let's Meet JavaScript (introduction, syntax)	21	Lecture method	
	3.4.2 Variables (declaration, data types)	22	Hands-on/Practical method	
	3.4.3 Operators (arithmetic, comparison, logical)	23	Drill and practice method	
	3.4.4 Conditional Statements (if, else, switch)	24	Problem solving method	
	3.4.5 Iterative Statements (for, while loops)	25	Problem solving method	
	3.4.6 Nested Loops	26	Problem solving method	
	3.4.7 Arrays	27	Hands-on/Practical method	
	3.4.8 Functions (definition, calling, reuse)	28	Hands-on/Practical method	
	3.5 Debug the Code (types of errors, debugging techniques)	29	Problem solving/Lab method	
	3.6 Create a Dynamic Website (project task)	30	Project based/Hands-on method	
Unit 4 **DATA AND ANALYSIS** *Pg. 113-131*	**4.1 Data and Analysis (introduction)**	01	Lecture method	
	4.1.1 Data Science (definition)	02	Lecture method	
	4.1.2 Concepts of Data Science (data, information, knowledge)	03	Discussion method	
	4.1.3 Scope and Applications of Data Science	04	Discussion method	
	4.1.4 Business Problems and Data Science	05	Case study method	
	4.2 Data Types in Data Science	06	Lecture method	
	4.2.1 Sources of Data (primary, secondary)	07	Discussion method	

	4.2.2 Dataset and Database	08	Demonstration method	
	4.2.3 Role of Database in Data Science	09	Discussion method	
	4.2.4 Data Collection in Data Science (methods/tools)	10	Activity based method	
	4.2.5 Data Storage	11	Demonstration method	
	4.2.6 Data Visualization (charts, graphs)	12	Hands-on/Practical method	
	4.2.7 Summary Statistics (mean, median, mode)	13	Problem solving method	
	4.2.8 Requirement of Summary Statistics	14	Discussion method	
	4.3 Big Data	15	Lecture method	
	4.3.1 The History of Big Data	16	Storytelling method	
	4.3.2 Advantages and Benefits of Big Data	17	Discussion method	
	4.3.3 Big Data Challenges (volume, velocity, variety, veracity)	18	Discussion method	
	4.3.4 Application of Big Data in Business	19	Case study method	
Unit 5 **APPLICATIONS OF COMPUTER SCIENCE** *Pg. 132-153*	**5.1 Artificial Intelligence and Machine Learning**	01	Lecture method	
	5.1.1 Artificial Intelligence (definition, history)	02	Lecture method	
	5.1.2 Machine Learning (concept, relation to AI)	03	Discussion method	
	5.1.3 Usage of AI for Benefiting People	04	Discussion method	
	5.1.4 Ethical Issues in Using Popular AI Tools (bias, job loss, privacy)	05	Debate method	
	5.2 Different Areas of AI	06	Lecture method	
	5.2.1 Speech Recognition	07	Demonstration method	
	5.2.2 Computer Vision	08	Demonstration method	
	5.2.3 Natural Language Processing	09	Demonstration method	
	5.2.4 Expert Systems (concept)	10	Lecture method	
	5.2.5 Development of Expert System	11	Discussion method	

	5.2.6 Astronomy (AI application)	12	Discussion method	
	5.2.7 Cybersecurity (AI application)	13	Discussion method	
	5.2.8 GPS Navigation (AI application)	14	Demonstration method	
	5.3 Applications of AI	15	Discussion method	
	5.3.1 Robotics	16	Demonstration method	
	5.3.2 Healthcare	17	Discussion method	
	5.3.3 Education	18	Discussion method	
	5.3.4 Gaming	19	Discussion method	
	5.3.5 Agriculture	20	Discussion method	
	5.3.6 AI in our Daily Life	21	Brainstorming method	
	5.3.7 Self-driving Cars	22	Discussion method	
	5.3.8 Business	23	Discussion method	
	5.3.9 Defense	24	Discussion method	
	5.3.10 Chatbots	25	Demonstration method	
	5.4 Cloud Computing	26	Lecture method	
	5.4.1 What is Cloud Computing?	27	Question answer method	
	5.4.2 Types of Cloud Computing (IaaS, PaaS, SaaS; public/private/hybrid)	28	Demonstration method	
Unit 6 **IMPACTS OF COMPUTING** *Pg. 154-176*	**6.1 Safe and Responsible Use of Computer**	01	Discussion method	
	6.1.1 Keep Your System Updated	02	Demonstration method	
	6.1.2 Use Strong and Unique Passwords	03	Demonstration method	
	6.1.3 Beware of Phishing Attacks	04	Case study method	
	6.1.4 Backup your Data	05	Demonstration method	
	6.1.5 Use Secure Wi-Fi Connection	06	Discussion method	

	6.1.6 Be Careful What You Download	07	Discussion method	
	6.1.7 Privacy Settings	08	Demonstration method	
	6.1.8 Be Mindful of Public Wi-Fi	09	Discussion method	
	6.2 Responsible Use of Hardware and Software	10	Discussion method	
	6.2.1 Responsible Hardware Use	11	Discussion method	
	6.2.2 Appropriate and Responsible Use of Software	12	Discussion method	
	6.2.3 Irresponsible Use of Software (piracy, misuse)	13	Debate method	
	6.3 Safe Use of Digital Platforms	14	Discussion method	
	6.3.1 Safe Use of Data Searches	15	Demonstration method	
	6.3.2 Safe Use of Social Networking	16	Discussion method	
	6.4 Laws to Protect User Privacy and Intellectual Property	17	Lecture method	
	6.4.1 Protection of Individual Rights	18	Discussion method	
	6.4.2 Prevention of Unauthorized Use	19	Discussion method	
	6.5 Computing Innovation	20	Lecture method	
	6.5.1 Benefits of Computing Innovation	21	Discussion method	
	6.6 Malicious Software and Key Concepts (virus, worm, trojan, spyware, ransomware)	22	Demonstration/Discussion method	
	6.7 Information Privacy, System Security, and Usability Trade-offs	23	Discussion method	
	6.8 Disinformation and Fake News	24	Debate method	
	6.9 Social Networking	25	Discussion method	
	6.9.1 Social Networking Harmful Effects	26	Discussion method	
	6.9.2 Social Networking and Fake News	27	Debate method	
	6.10 Approaches to Computing Effects	28	Discussion method	
	6.10.1 Personal Impact	29	Discussion method	

	6.10.2 Ethical Impact	30	Discussion method	
	6.10.3 Social Impact	31	Discussion method	
	6.10.4 Economic Impact	32	Discussion method	
	6.10.5 Cultural Impact	33	Discussion method	
	6.10.6 Impact on Globalization	34	Discussion method	
	6.10.7 Impact on E-commerce	35	Discussion method	
	6.11 Intellectual Property Protection Key Terms (copyright, patent, trademark)	36	Lecture method	
Unit 7 **ENTREPRENEURSHIP** *Pg. 177-194*	**7.1 You Will be Your Own Boss!**	01	Discussion method	
	7.1.1 The Concept of Entrepreneurship	02	Lecture method	
	7.1.2 What is an Entrepreneur?	03	Discussion method	
	7.1.3 What is Design Thinking?	04	Activity based method	
	7.1.4 Developing a Business Plan	05	Project based method	
	7.1.5 My Entrepreneurial Skills (self-assessment)	06	Activity based method	
	7.1.6 My Ideas for Small Business	07	Brainstorming method	
	7.1.7 My Market (target market/customers)	08	Activity based method	
	7.1.8 Setting My Price	09	Problem solving method	
	7.2 Cost of Production	10	Problem solving method	
	7.2.1 Cost of Production and Overheads	11	Problem solving method	
	7.2.2 Profits (Cost + Overheads + Profit = Selling Price)	12	Problem solving method	
	7.3 Devising a Business Plan	13	Project based method	
	7.3.1 Executive Summary	14	Activity based method	