Nalbari College, Nalbari

Teaching Plan for the Session: 2022-23

Name of the Teacher: DHRUBA JYOTI MISHRA

Department: Computer Science Semester: IV

Paper Name: COMPUTER ORGANIZATION AND ARCHETECTURE Paper Code: BCA-HC-4016

Learning Objectives:

This Paper is intended to teach the basics involved in data representation and digital logic circuits used in the computer system. This includes the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design. This will also expose students to the basic architecture of processing, memory and i/o organization in a computer system.

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	Functional units of a computer, basic instructions	Reference books, e-books etc.	PPT is used for mathematical Computation and illustrations using lecture Methods	Practical , Home assignments, Seminar presentations etc.	Class Test, Solving critical Problems etc.
2	interconnection of functional units				
3	bus structure				
4	memory locations, memory addresses, memory operations				

5	instruction and instruction sequencing (straight Line sequencing and branching)				
6	addressing modes				
7	introduction to assembly language, stack, subroutine, I/O instructions				
8	Introduction, inter register transfer				
9	arithmetic microoperation, logic microoperation,				
10	shift microoperation, Conditional control statements,				
11	fixed point binary data, instruction code				
12	design of a simple computer				
13	Processor organization, design of arithmetic and logic unit				
14	status register, design of accumulator				

15	Hardware control, microprogrammed control block diagram				
16	symbolic microprogram, microprogrammed CPU organization				
17	Program controlled I/O				
18	Interrupts: enabling and disabling interrupts, handling interrupts from multiple sources				
19	DMA, structure and working of hard disk				
20	CDROM, printer, Semiconductor memory				
21	SRAM, DRAM, ROM, speed size and cost, Cache memory				
22	,Mapping functions				
23	Semiconductor memory: RAM, RAM Family				
24	replacement algorithms				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: DHRUBA JYOTI MISHRA

Department: COMPUTER SCIENCE

Semester: VI

Paper Name: COMPUTER NETWORKS

Paper Code: BCA-HC-6026

Learning Objectives:

1. Describe various communications networks and their main components.
2. Identify the advantages and disadvantages of a network.
3. Define the terminology associated with computer networks.
4. Identify the components associated with computer networks.
5. Develop a networking plan for yourself or a client.

Sl. No of Lecture	**Topic/Subtopic**	**Learning Resources**	**Mode of Teaching & ICT Tools**	**Experiential/Participating Learning Used**	**Mode of Assessment for CIE**
1	Data communications: components, Network criteria, physical structures, network models, categories of networks, interconnection of networks, inter	Reference books, e-books etc.	PPT is used for mathematical Computation	Practical , Home assignments, Seminar presentations etc.	Class Test, Solving critical Problems

	network Protocols and standards:		and		etc.
2	protocols-standards-standards organizations- internet standards Network models: Layered tasks, OSI model, layers in the OSI model, TCP/IP protocol suite.		illustrations using lecture Methods		
3	Digital to digital conversion: Line coding, line coding schemes, block coding - analog to digital conversion, PCM, transmission modes: serial transmission, parallel transmission,				
4	Analog Transmission: Digital to analog conversion: FSK-ASK-PSK, Analog to Analog conversion: Amplitude modulation, Frequency modulation,				
5	phase modulation, Multiplexing: Frequency division multiplexing, Time division multiplexing,				
6	Transmission Media Guided media: Twisted pair cable, coaxial cable, fiber optic cable Unguided media: radio waves – microwaves-infrared.				
7	Error correction and detection: Introduction, block coding, linear block code, cyclic codes checksum, Data link Control: protocols, simplest protocol, stop and wait protocol,				

8	stop and wait automatic repeat request, go back n automatic repeat request, selective repeat, automatic repeat request, piggybacking,				
9	Multiple Access: Random access, Aloha, CSMA, CSMA/CD, CSMA/CA Controlled access: reservation, polling,				
10	token passing, Channelization:FDMA,TDMA,CDMA.				
11	Wired LANs: Ethernet: IEEE standards, standard Ethernet- fast Ethernet, Wireless LANS: IEEE 802.11 architecture, MAC sublayer addressing mechanism, physical layer-Bluetooth				
12	architecture Bluetooth layers-radio layer- baseband layer-L2CAP-other upper layers.				
13	Network Layer: IPV4 addresses, IPV6 Addresses, Internet Protocol: IPv4 &IPv6 Address mapping protocols: ARP – RARP.				
14	Routing protocols: Unicast routing protocols: distance vector routing, Link State routing, Multicast Routing protocols (Any two) Transport Layer				
15	Process to process delivery, UDP/ TCP, Congestion				

	control and QOS: Data traffic, congestion, congestion control, quality of service techniques to improve quality of service.				
16	DNS: Name space, domain name space, distribution of name space, Electronic mail Architecture, FILE transfer: FTP WWW and HTTP				
17	Architecture, web documents, HTTP, Network Security: Introduction, definitions, two categories, symmetric key cryptography				
18	traditional ciphers, asymmetric key cryptography				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: DHRUBA JYOTI MISHRA

Department: COMPUTER SCIENCE

Semester: I

Paper Name: OFFICE AUTOMATION

Paper Code: BCA-HG-1026

Learning Objectives:

1. To perform documentation
2. To perform presentation skills
3. To perform accounting operations

Sl. No of Lecture	**Topic/Subtopic**	**Learning Resources**	**Mode of Teaching & ICT Tools**	**Experiential/Participating Learning Used**	**Mode of Assessment for CIE**
1	Introduction to Word Processing , Features	Reference books, e-books etc.	PPT is used for mathematical Computation and illustrations using lecture Methods	Practical , Home assignments, Seminar presentations etc.	Class Test, Solving critical Problems etc.
2	Learning document window, Creating , Saving & Closing a document, Opening an Existing document , Editing a Document				
3	Formatting Features (Paragraph Formats, Aligning text & paragraph, Border and				

	Shading, Header & Footers, Bullet & Numbering)				
4	Inserting & Editing a Table , Inserting Picture				
5	Checking & Spelling Correction, Page Setup , Print Preview , Printing a document				
6	Mail Merge , Document Template & Wizards				
7	Introduction to Spreadsheet, creating, saving and editing a workbook				
8	Inserting, deleting Worksheets, Opening & Moving around in existing worksheets				
9	working with Formula & Cell referencing, Functions, working with ranges - creating, editing and selecting ranges				
10	Format Feature: AutoFormat Feature, Changing alignment, Character styles, Date Format, Border & Colors etc. Previewing & Printing a worksheet				
11	Creating Charts & Graphs. Database in worksheet, macro, linking and embedding				

12	Creating & saving presentations , Opening an existing Presentation				
13	Working in different views, Working with slides, Adding and Formatting Text, Formatting Paragraphs				
14	Checking Spelling and correcting typing mistakes , Adding clip art and other pictures				
15	Inserting Animation, Designing slide shows, Running and controlling slide show, Printing Presentation.				
16	Portable Document Format: storing, creation, conversion.				
17	Local language pack in Office Packages: installation and use				
18	Document design using any DTP package, Graphics design and manipulation using any currently available package				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: DHRUBA JYOTI MISHRA

Department: COMPUTER SCIENCE Semester: II

Paper Name: DIGITAL LOGIC FUNDAMENTALS Paper Code: BCA-HC-2026

Learning Objectives:

1. Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
2. To understand and examine the structure of various number systems and its application in digital design.
3. The ability to understand, analyze and design various combinational and sequential circuits.
4. Ability to identify basic requirements for a design application and propose a cost effective solution.
5. The ability to identify and prevent various hazards and timing problems in a digital design.
6. To develop skill to build, and troubleshoot digital circuits.

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	Axiomatic definition of Boolean algebra, Rules (postulates and basic theorems) of Boolean algebra	Reference books, e-books etc.	PPT is used for mathematical Computation and illustrations using lecture	Practical , Home assignments, Seminar presentations etc.	Class Test, Solving critical Problems etc.
2	dual and complement of Boolean expression, Canonical				

	form and Standard form		Methods		
3	Sum of product and product of sum form, Conversion between Boolean expression and truth table				
4	Karnaugh map method (upto four variable kmap), Don't care condition				
5	Quine Mc Cluskey method, Different types of gates, Implementation of logic expression with logic gates				
6	Adder: half adder, full adder				
7	Subtractors: half subtractor and full subtractor				
8	Magnitude comparator, Decoder, Encoder, Application examples of decoder and encoder				
9	Multiplexer, Demultiplexer, Application examples of multiplexer and Demultiplexer				
10	Simple RS flip-flop or latch				
11	Clocked RS flip-flop, D flip-flop				
12	JK flip-flop, T flip-flop				
13	Analysis of Clocked Sequential circuits, State Reduction and				

	Assignment				
14	Flip –Flop Excitation tables, Design Procedure for sequential circuits.				
15	Ripple counters: Binary Ripple Counter				
16	BCD Ripple Counter, and Synchronous Counters				
17	Binary Counter, Binary Up and down Counter, BCD Counter				
18	Counter design using state diagram, state table and state equation.				
19	Registers: Shift registers				
20	serial in serial out, serial in parallel out				
21	parallel in serial out, parallel in parallel out				
22	Registers with parallel Load				
23	Bidirectional shift register with parallel load.				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: DHRUBA JYOTI MISHRA

Department: COMPUTER SCIENCE | Semester: V

Paper Name: PROGRAMMING IN PYTHON | Paper Code: BCA-HE-5046

Learning Objectives:

After completion of the paper the students will be able to-

1. Define identifiers, keywords, operators and expressions.
2. Use different operators, expressions and variables available in python.
3. Build complex expressions using operators.
4. Determine the data type of value.
5. Build basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions
6. Work with user input to create fun and interactive programs
7. Create simple games with images, animations, and audio using our custom beginner-friendly programming library, Wizardlib.

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	Concept of problem solving, Problem definition	Reference books, e-books etc.	PPT is used for mathematical Computation and	Practical , Home assignments, Seminar presentations etc.	Class Test, Solving critical Problems etc.
2	Program design, Debugging				
3	Types of errors in programming				

4	Documentation		illustrations using lecture Methods		
5	Flowcharting				
6	decision table, algorithms				
7	Structured programming concepts				
8	Programming methodologies viz. top-down				
9	bottom-up programming				
10	Structure of a Python Program				
11	Elements of Python				
12	Python Interpreter, Using Python as calculator				
13	Python shell, Indentation Atoms, Identifiers and keywords				
14	Literals, Strings, Operators: Arithmetic operator, Relational operator				
15	Logical or Boolean operator, Assignment				
16	Operator, Ternary operator, Bit wise operator, Increment or Decrement operator				
17	Input and Output Statements, Control statements				
18	Branching, Looping,				

	Conditional Statement, Exit function				
19	Difference between break, continue and pass				
20	Defining Functions, default arguments, Errors and Exceptions				
21	Conditional execution, Alternative execution				
22	Nested conditionals, the return statement				
23	Recursion, Stack diagrams for recursive functions				
24	Multiple assignment, the while statement				
25	Tables, Two-dimensional tables				
26	String as a compound data type, Length				
27	Traversal and the for loop, String slices, String comparison				
28	A find function, Looping and counting				
29	List values, Accessing elements, List length, List membership				
30	Lists and for loops, List				

	operations				
31	List deletion. Cloning lists, Nested lists				
32	Introduction to Classes				
33	Objects and Methods				
34	Standard Libraries				
35	Arrays				
36	list				
37	set				
38	stacks				
39	Queues.				
40	Linear and Binary Search				
41	Bubble sort				
42	Selection sort				
43	Insertion sort				

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Teaching Plan for the Session: 2022-2023

Name of the Teacher: ANKUR BAISHYA

Department: COMPUTER SCIENCE | Semester: I

Paper Name: INTRODUCTION TO C PROGRAMMING | Paper BCA-HC-1016

Learning Objectives:

- Be familiar with fundamental programming concepts and methodology (variables, assignments, conditions, branches, loops, functions, recursions, structures).
- Be familiar with and appreciate good programming practice, and apply it to follow-up courses.
- Be able to apply problem-solving knowledge and skills to write small, well-documented, effective C programs.
- Be able to appreciate the use of simple data structure such as array, know their limitations to pave way for more complex data structures in the next course.
- Know the responsibilities of an ethical programmer.

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	Importance of C, sample C program, C program structure, executing C program.system	Reference books, e-books etc.	Blackboard, Lab and PPT is used for illustrations and lecture Methods	Practical , Home assignment etc.	Class test, presentation
2	Variables, Data Types				
3	Constants: integer constant, real constant, character constant, string constant				
4	Character set, C tokens, keywords and identifiers				
5	variables declaration, Assigning values to variables---Assignment statement,				
6	declaring a variable as constant, as volatile.				
7	Operators and Expression: Categories of operator- Arithmetic, Relational, logical, assignment, increment, decrement, conditional, bitwise and special operators				
8	arithmetic expressions, precedence				

	and associatively of operators				
9	type conversions, mathematical functions Managing Input and Output Operators: Reading and writing a character, formatted input, formatted output.				
10	*if* statement, *if…..else* statement, nested *if….* *else* statement, *switch.…case* statement,				
11	*goto* statement. Decision Making and Looping: Definition of loop, categories of loops, *for* loop *while* loop, *do-while* loop, *break* statement, *continue* statemen				
12	Declaration and accessing of one & two-dimensional arrays				
13	initializing two-dimensional arrays, multidimensional arrays.				
14	The form of C functions, Return values and types, return statement				

15	calling a function, categories of functions, Nested functions, Recursion,				
16	functions with arrays, call by value, call by reference, storage classes, Macro substitution, file inclusion.				
17	Defining, giving values to members, initialization and comparison of structure variables				
18	array of structure, array within structure, structure within structure, structures and functions, unions.				
19	Definition of pointer, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions				
20	pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.				

21	Opening, closing and I/O operations on files, random access to files, command line arguments.				

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Teaching Plan for the Session: 2022-2023

Name of the Teacher: ANKUR BAISHYA

Department: COMPUTER SCIENCE Semester: I

Paper Name: COMPUTER FUNDAMENTAL & ICT HARDWARE Paper Code: BCA-HC-1026

Learning Objectives:

1. Students will be able to use and differentiate between basic concepts of computer hardware and software.
2. Students will be able to use data representation for the fundamental data types and perform conversions between binary-hexadecimal-decimal representations.
3. Define computer terminology.
4. Analyze and design efficient algorithms for problem solving.
   Test the performance of hardware component of some specific program.

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	Evolution of Computer system, Classification of Computer, Modern	Reference books, e-books etc.	Blackboard, PPT is used for mathematical	Practical , Home assignments, Seminar presentations etc.	Class Test.

	Computer.		Computation and illustrations using lecture Methods		
2	Hardware and Software, Major components of a Digital Computer (A brief introduction of CPU, Main memory, Secondary memory devices and I/O devices) Keyboard, monitor, mouse, printers,				
3	Secondary storage devices (floppy disks, hard disks and optical disks), backup system and why it is needed? Bootstrapping a Computer,				
4	Number System: Representation of numbers (only a brief introduction to be given) and characters in computer, Binary, Hexadecimal, Octal,				
5	BCD, ASCII, EDCDIC and Gray codes, Conversion of bases, Representation of signed integers,				
6	Sign and magnitude, 1's				

	complement and 2's complement representation. Arithmetic operations using 2's complement representation and conditions for overflow/underflow and its detection,				
7	Assembler, Compiler, Interpreter, Linker and Loader				
8	Definition and concepts of algorithm and its different implementations-pseudo code, flowchart and Computer programs.				
9	Hard Disk Drive: logical structure and file system, FAT, NTFS. Hard disk tools				
10	Disk cleanup, error checking, de fragmentation, scanning for virus, formatting, installing additional HDD, New trends in HDD, Floppy Disk Drive.				
11	Optical Media, CDROM,				

	theory of operation, drive speed, buffer, cache,				
12	CD-R, CD-RW, DVD ROM, DVD technology, preventive maintenance for DVD and CD drives, Driver installation,				
13	Writing-cleaning CD and DVD.				
14	Processor: Intel processor family. Latest trends in processor, Motherboard, Sockets and slots,				
15	power connectors, Peripheral connectors. Bus slots, USB, pin connectors, Different kinds of motherboards				
16	RAM, different kinds of RAM. RAM up gradation, Cache and Virtual Memory concept.				
17	SMPS, BIOS, Network Interface Card, network cabling, I/O Box				
18	Switches, RJ 45				

	connectors, Patch panel, Patch cord, racks, IP address.				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: ANKUR BAISHYA

Department: COMPUTER SCIENCE Semester: II

Paper Name: INTRODUCTION TO BIO INFORMATICS Paper Code: BCA-HG-2026

Learning Objectives:

- Manage health, medical, and bio-informatics information using best practices in data stewardship; data science and data analytics; and human-centered design and systems.
- Define and successfully address a tractable research question or real-world problem in health, medical, and bio-informatics using the appropriate scientific and/or research methods.
- Accurately convey the implications of analytical results (in both oral and written modalities) to diverse stakeholders.
- Maintain the highest level of ethical standards.
- Apply best practices for providing value, leadership and team building in health, medical, and bio-informatics.
- Stay up-to-date by learning how to read, analyze, discuss, synthesize, and critique advances reported in the health, medical, and bio-informatics research literature.

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	Definition and History of Bioinformatics.	Reference books, e-books etc.	Blackboard, PPT is used for illustrations using lecture Methods	Home assignments, Seminar presentations etc.	Class Test
2	Internet and Bioinformatics				
3	Applications of Bioinformatics				
4	Sequence and structural with special emphasis on NCBI,				
5	DDBJ, PDB and SwissProt				
6	Needleman-Wunsch and Smith-Waterman methods of global				
7	local alignments between sequences				
8	Properties and types of phylogenetic trees with special emphasis on tree building methods				
9	(UPGMA, Neighbour joining, Maximum parsimony, Maximum likelihood)				
10	Introduction to softwares				

	and tools for sequence analysis and assembly				
11	(BLAST, FASTA, CLUSTAL W, MEGA), 2D gels and NMR and Crystallographic data				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: ANKUR BAISHYA

Department: COMPUTER SCIENCE Semester: III

Paper Name: SOFTWARE ENGINEERING Paper Code: BCA-HC-3016

Learning Objectives:

1. How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
2. An ability to work in one or more significant application domains
3. Work as an individual and as part of a multidisciplinary team to develop and deliver quality software
4. Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
5. Demonstrate an ability to use the techniques and tools necessary for engineering practice

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	Software Processes & Characteristics, Software life cycle, Models - Waterfall, Prototype, Evolutionary and Spiral Models.	Reference books, e-books etc.	Blackboard, PPT is used for mathematical Computation and illustrations	Practical , Home assignments, Seminar presentations etc.	Class Test.
2	Requirement engineering, requirement, elicitation				

	techniques like FAST, QFD,		using lecture Methods		
3	requirements analysis using DFD, Data dictionaries				
4	Requirements documentation				
5	Nature of SRS, Characteristics & organization of SRS.				
6	Size Estimation like lines of Code & Function Count				
7	Cost Estimation Models, COCOMO,				
8	Risk Management.				
9	Data design**,** Architectural design**,** Interface design,				
10	Function Oriented Design, Object Oriented Design				
11	Cohesion & Coupling, Classification of Cohesiveness & Coupling,				
12	Software Metrics:				

	different types of project matrics.				
13	Testing Process, Design of Test Cases, Types of Testing				
14	Functional Testing, Structural Testing, Test Activities, Unit Testing, Integration Testing and System Testing.				
15	Software Maintenance: Management of Maintenance, Maintenance Process,				
16	Reverse Engineering, Software Re-engineering,				
17	Configuration Management, Documentation. Software quality Assurance.				
18	CASE tools--- Analysis tools, design tools, SQA tools, software testing tools.				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: ANKUR BAISHYA

Department: COMPUTER SCIENCE Semester: III

Paper Name: DATABASE MANAGEMENT SYSTEM Paper Code: BCA-HC-3036

Learning Objectives:

1. Describe the fundamental elements of relational database management systems
2. Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
3. Design ER-models to represent simple database application scenarios
4. Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
5. Improve the database design by normalization.

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	Record storage and primary file organization: memory hierarchies and storage devices, Storage of Databases,	Reference books, e-books etc.	Blackboard, PPT is used for mathematical Computation and illustrations using lecture	Practical , Home assignments, Seminar presentations etc.	Class Test.
2	Placing file records on disks: Records and its Types, Files, Fixed length records and				

	variable length records,		Methods		
3	Record Blocking, allocating file blocks on disks, operation on files				
4	Issues in Physical Design: Concept of indexes				
5	Definition of Database, Traditional File Approach vs. DBMS approach, Characteristics of the Data Base Approach,				
6	DBMS user, Role of a DBA, Advantage of using DBMS, DBMS architecture,				
7	Data independence, ANSI/SPARC 3 level architecture.				
8	Fundamental integrity rules: entity integrity, referential integrity, Relational algebra (Select , Project, Cross ,Product , theta join, equi join, natural join, outer join),				
9	Set Operation, ANSI SQL – 92 Standard : DDL,				

	DML, SQL constructs(Select .. From… Where… Group by ….. Having… Order by….)				
10	Insert, Delete, Update, View, Definition and use, nested quires,				
11	Constraints considers(NOT NULL , UNIQUE, Check Primary key, Foreign key)				
12	Conceptual model, logical model, physical model, ER model as a tool for conceptual designentities, attributes and relationships				
13	weak and strong entities, conversion of ER model into relational schema. DFD, Normalization: informal design guidelines for relational schemas (overview level),				
14	functional dependencies, different types of keys, Normal forms (first, second, third, BCNF),				
15	Functional dependency diagram and design of relational database from				

	it. Database connectivity using JDBC.				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: ANKUR BAISHYA

Department: COMPUTER SCIENCE

Semester: V

Paper Name: DATA MINING AND WAREHOUSING

Paper Code: BCA-HE-5026

Learning Objectives:

1. Identify the scope and necessity of Data Mining & Warehousing for the society
2. Describe the designing of Data Warehousing so that it can be able to solve the root problems.
3. To understand various tools of Data Mining and their techniques to solve the real time problems. .
4. To develop ability to design various algorithms based on data mining tools.
5. To develop further interest in research and design of new Data Mining techniques

Sl. No of Lecture	**Topic/Subtopic**	**Learning Resources**	**Mode of Teaching & ICT Tools**	**Experiential/Participating Learning Used**	**Mode of Assessment for CIE**
1	Need for Data Warehousing, Basic elements of Data	Reference books, e-books	Blackboard, PPT is used for	Practical , Home assignments, Seminar	Class Test.

	Warehousing, differences between Database Systems and Data Warehouse. Data Warehouse Architecture and its components	etc.	mathematical Computation and illustrations using lecture Methods	presentations etc.	
2	Infrastructure and metadata. Data Design and Data Representation - Principles of dimensional modelling, advanced topics- data extraction, transformation and loading, data quality,				
3	OLAP in Data Warehouse, Data warehousing and the web. Implementation and Maintenance: Physical design process, Data Warehouse deployment, growth and maintenance.				
4	Basics of data mining, Different definitions of Data Mining and related concepts, Data mining process, Data preparation,				
5	data cleaning and data visualization. KDD process, Data mining				

	techniques: Clustering, Association rules and Decision trees.				
6	Concept of Similarity and distance, Euclidean distance, Manhattan distance, Cosine similarity, Jaccard coefficient, Partitional versus Hierarchical Clustering				
7	different types of data in clustering, Partitional clustering methods – k-means, k-medoids, PAM, CLARA, CLARANS.				
8	Hierarchical clustering methods – BIRCH, CURE, Density based clustering methods-DBSCAN.				
9	What is an association rule? Mining association rules, frequent sets and border sets,				
10	Introduction, Clustering versus Classification, decision tree construction principle				

11	decision tree generation algorithms – CART, ID3.				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: ANKUR BAISHYA

Department: COMPUTER SCIENCE Semester: IV

Paper Name: INFORMATION SECURITY AND CYBER LAWS Paper Code: BCA-HG-4026

Learning Objectives:

1) Analyze and evaluate the cyber security needs of an organization.

2) Determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation.

3) Measure the performance and troubleshoot cyber security systems.

4) Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.

5) Comprehend and execute risk management processes, risk treatment methods, and key risk and performance indicators

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	Computer network as a threat, hardware vulnerability,	Reference books, e-books etc.	Blackboard, PPT is used for mathematical Computation	Practical , Home assignments, Seminar presentations etc.	Class Test.
2	software vulnerability, importance of data				

	security		and		
3	Overview of digital crime, criminology of computer crime		illustrations using lecture Methods		
4	Tools of the attacker, information and cyber warfare, scanning and spoofing, password cracking, malicious software, session hijacking				
5	Risk analysis, process, key principles of conventional computer security, security policies, authentication, data protection, access control,				
6	internal vs external threat, security assurance, passwords, authentication and access control, computer forensics and incident response				
7	Important terms, Threat, Flaw, Vulnerability, Exploit, Attack, Ciphers, Codes, Substitution Cipher (Caeser), Transposition				

	Cipher (Rail-Fence),				
8	Public key cryptography (Definitions only), Private key cryptography (Definition and Example), Cyber forensics, Steganography				
9	Firewalls, logging and intrusion detection systems, Windows and windows XP / NT security				
10	Unix/Linux security, ethics of hacking and cracking				
11	Cyber laws to be covered as per IT 2008 (10 Lectures) • Chapter 1: Definitions • Chapter 2: Digital Signature and Electronic Signature • [Section 43] Penalty and Compensation for damage to computer, computer □□[Section 65] Tampering with Computer Source				
12.	• [Section 66 A] Punishment for sending offensive messages through communication				

	service etc. • [Section 66 B] Punishments for dishonestly receiving stolen computer resource or communication device • [Section 66C] Punishment for identity theft • [Section 66D] Punishment for cheating by personating by using computer resource				
13.	• [Section 66E] Punishment for violation of privacy • [Section 66F] Punishment for cyber terrorism • [Section 67] Punishment for publishing or transmitting obscene material in electronic form • [Section 67A] Punishment for publishing or transmitting of material containing sexually explicit act, etc. in electronic form[Section 67B] Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form				

	• [Section 72] Breach of confidentiality and privacy				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: HIRAKJYOTI BARMAN

Department: Computer Science

Semester: V

Paper Name: OPERATING SYSTEM

Paper Code: BCA-HC-5026

Learning Objectives:

1. Know the basic components of operating system.
2. Comprehend how an operating system virtualizes CPU and memory.
3. Discuss various swapping and scheduling policies.
4. Learn about different deadlock situations.
5. Visualize different file system workings with Operating Systems.

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	Basics of Operating Systems	Reference books, e-books etc, Online Education Websites.	Blackboard and PPT is used for lecture Methods	Home assignment, Seminar etc	Class Test, Quiz
2	Generations of OSs				
3	Types of Oss: Mainframe, Batch, Multiprocessor, Distributed, Multitasking, Real Time, Parallel and Time Sharing.				

4	Process: Process States, Creation, Termination, Context Switching				
5	Thread: Concepts, Design issues of thread, Types of thread, Benefits of threads. Basic Concepts of Multiprogramming.				
6	Basic Concept of Inter-Process Communication, Race Condition, Critical Section, Mutual Exclusion, Semaphore, Mutex				
7	Disabling Interrupts, Test Set Lock				
8	Peterson's Solution using semaphore				
9	Different IPC Problems				
10	Basic Concepts of scheduling, Pre-emptive and Non Pre Emptive scheduling				
11	Scheduling Criteria, CPU Utilization, Throughput, Turnaround Time,				

	Waiting Time, Response Time				
12	Scheduling Algorithms, FCFS, SJF, RR, Priority Scheduling				
13	Goals of scheduling algorithm				
14	Deadlock definition, Characteristics,				
15	Deadlock prevention				
16	Deadlock detection and recovery				
17	Deadlock avoidance using banker's algorithm				
18	Memory management, swapping, virtual memory, Logical vs Physical address space				
19	Paging, segmentation, page fault, page table, demand paging, TLB				
20	Page replacement algorithm, LRU, Optimal, NRU, FIFO, Second Chance, Clock, NFU, Working Set				
21	File System, Types,				

	attributes, operations, Acces methods				
22	Directory in Unix, Relative path and absolute path, Disk layout, Disk block allocation				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: HIRAKJYOTI BARMAN

Department: Computer Science Semester: VI

Paper Name: SYSTEM ADMINISTRATION USING LINUX Paper Code: BCA-HC-6016

Learning Objectives:

1. Understand the architecture of a Linux system
2. Install and maintain a Linux workstation, including X11 and setup it up as a network client
3. Work at the Linux command line, including common GNU and Unix commands
4. Handle files and access permissions as well as system security

Sl. No of Lecture	**Topic/Subtopic**	**Learning Resources**	**Mode of Teaching & ICT Tools**	**Experiential/Participating Learning Used**	**Mode of Assessment for CIE**
1	Introduction to System Administration, Role and power of System Administrator, Basic Features of the Linux operating system, A brief Overview of the most popular Linux	Reference books, e-books etc.	PPT is used for mathematical Computation and illustrations	Practical , Home assignments, Seminar presentations etc.	Class Test, Solving critical Problems etc.

	Distributions - Red Hat Enterprise Linux (RHEL), Ubuntu, Debian,		using lecture Methods		
2	Fedora, SUSE), Installation Requirements, Partitioning the Hard drive in Linux, Installing the Linux system, Installing and Configuring software in linux, Linux kernel and device drivers				
3	System Startup and Shutdown. Standard I/O, Standard error, Redirection and Piping				
4	Basics of Linux file system - File system types (ext3, ext4, xfs, jfs, ReiserFS, iso9660 etc.), three basic types of files (ordinary or regular, special or device and directory),				
5	I-nodes and file attributes, Absolute and Relative path names. File system Mounting and Unmounting, Organization of the file				

	tree, Standard directories and their contents.				
6	Files and Directory handling Commands - ls, cd, cp, mv, rm, mkdir, rmdir, Commands for Creating and Viewing ordinary files – cat, more, pg				
7	Filter Commands – wc, head, tail, cut, tr, grep (with regular expressions), Setting user and group ownership of files and Access permissions – chmod, chown, chgrp commands				
8	Study of different Linux Shells (sh, bash, csh, zsh), Environment variables, Shell script basics (examples of some simple shell programming).				
9	Basic commands for starting and stopping processes, Basic process attributes and their role in Access control, Examining the list of running processes on the system and understand the data				

	presented there, Background process,				
10	Job control, Cron tab file format, Backup and Restore procedure, Submit a print job, check the status of a print job, cancel a print job				
11	Configuring the Print Queue, Selecting the Print Driver, Editing the Printer configuration.				
12	Understanding the „root„ account, Becoming a Superuser (su), A limited su (sudo) Managing user accounts - Adding a new user, Modifying and Removing User accounts				
13	Changing Password, System monitoring and logging, Monitoring memory usage, disk space usage and I/Oactivity.				
14	The rules governing IP address classes and netmasks, Network Address, Netmask and Gateway,				

	configuring Interface with ifconfig, ping, netstat,				
15	traceroute, telnet. Understanding the significance of the /etc/services file and well known port numbers, Basics of configuring				
16	NFS, NIS, DNS, FTP, Squid Proxy, DHCP server, iptables and firewall, Basic Network SecurityIssues				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: HIRAKJYOTI BARMAN

Department: Computer Science Semester: VI

Paper Name: AUTOMATA THEORY AND LANGUAGES Paper Code: BCA-HE-6016

Learning Objectives:

1. Study various automata, such as deterministic and nondeterministic finite-state machines, pushdown automata, and Turing machines.
2. Study formal languages of different kinds, such as regular and context-free languages.
3. Understand the connections between languages and automata, and related algorithms for transformations.
4. Understand the basic results on computability, including undecidable problems such as the halting and Post correspondence problems, and their significance.
5. Study the basics of intractability, including NP-completeness and related topics.

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	DFA, NFA, NFA with ε-moves, Equivalence of DFA and NFA, Reduction of the number of states	Reference books, e-books	PPT is used for mathematical	Practical , Home assignments, Seminar	Class Test, Solving critical

	in finite automata	etc.	Computation and illustrations using lecture Methods	presentations etc.	Problems etc.
2	Concept of languages and grammar, Regular expressions, Connection between regular expressions and regular languages,				
3	Regular grammars, Right and Left-Linear Grammars, Equivalence between Regular languages and Regular grammars.				
4	Closure under simple set operations- union, intersection, concatenation, complementation and star closure, Decision algorithms for emptiness, finiteness and infiniteness				
5	equality, Proof of non regularity using Pigeonhole principle and using pumping lemma for regular languages.				
6	Context-free grammars, leftmost and rightmost derivations, derivation trees, Parsing and Ambiguity in grammars and				

	languages				
7	Simplification of Context free Grammars- removing useless productions				
8	empty-productions and unit-productions. Normal forms- Chomsky and Greibach normal forms, Pumping Lemma for CFL				
9	Using Pumping Lemma to show that certain languages are not Context free				
10	Definition and language accepted (acceptance by empty stack and final state and their equivalence),				
11	Pushdown Automata and Context free languages. Deterministic PDA and Deterministic Context free				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: HIRAKJYOTI BARMAN

Department: Computer Science Semester: VI

Paper Name: MICROPOROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING Paper Code: BCA-HE-6056

Learning Objectives:

1. To introduce students with the architecture and operation of typical microprocessors and microcontrollers.
2. To familiarize the students with the programming and interfacing of microprocessors and microcontrollers.
3. To provide strong foundation for designing real world applications using microprocessors and microcontrollers

Sl. No of Lecture	**Topic/Subtopic**	**Learning Resources**	**Mode of Teaching & ICT Tools**	**Experiential/Participating Learning Used**	**Mode of Assessment for CIE**
1	User Programmable registers, PC, SP, accumulator, flags, data bus, address bus, control bus, instruction word size	Reference books, e-books etc.	PPT is used for mathematical Computation and illustrations	Practical , Home assignments, Seminar presentations etc.	Class Test, Solving critical Problems etc.
2	opcode format, data				

	format, memory addressing		using lecture Methods		
3	I/O addressing, address decoding for memory and I/O.				
4	Pinout of 8085A microprocessor, multiplexed address/data bus,				
5	control and status signal, demultiplexing of control signals, other signals, bus timings,				
6	fetch decode and execute cycle, timing diagram for opcode fetch memory read and memory write,				
7	interfacing memory and I/O.				
8	Complete instruction set in detail, programming examples, logic operation,				
9	counters and time delays, stack and subroutine, processing arrays, bit manipulation.				
10	In and OUT instruction,				

	decoding addresses, Interfacing LED				
11	relay, seven segment display, switch, keyboard				
12	Vectored interrupts, interrupt priorities, general purpose programmable peripheral devices, 8255A control and status registers				
13	programming 8255A, introduction to 8279, 8254 and 8237 (block diagrams and basic functions).				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: PRANJAL DUTTA

Department: COMPUTER SCIENCE Semester: III

Paper Name: DATA STRUCTURE AND ALGORITHM Paper Code: BCA-HC-3026

Learning Objectives:

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.
3. To develop skills to apply appropriate data structures in problem solving.

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	Concept of Data Types, elementary structure, words and their interpretations, packed words	Reference books, e-books etc.	Blackboard, Lab and PPT is used for illustrations and lecture Methods	Practical , Home assignment, seminar etc.	Laboratory work for practice , Quizzes, class tests
2	Types, memory representation, address translation functions for one & two dimensional				

	arrays, different examples				
3	Singly and doubly linked list, circular and non circular				
4	list manipulation with pointers, example involving insertion and deletion of elements and their comparative studies with implementations using array structure				
5	Stacks and Queues definitions, representation using array and linked list structure				
6	Application of stack and queues in simulation				
7	Postfix conversion and evolution of arithmetic expressions				
8	Binary Trees definition, quantitative properties, memory representation				
9	Trees traversal algorithms (recursive				

	and non-recursive)				
10	Threaded trees, BFS and DFS				
11	Sorting and Searching : Linear and binary search algorithms, performance and complexity				
12	Binary search trees (construction, insertion, deletion and search) Concept of optimal binary search trees.				
13	Terminology, performance evaluation, sorting algorithms (non recursive, recursive description, Complexity, advantages and disadvantage, implementation)				
14	Creating & saving Presentations , Opening an existing Presentation, Working in different views,				
15	Bubble sort, insertion sort, selection sort				

16	Heap sort, quick sort, merge sort				
17	Radix sort, External Sorting				
18	Analysis of Algorithm: Time and Space complexity of algorithms, average case and worst case analysis, asymptotic notation as a measure of algorithm complexity, O and notations.				
19	Analysis of sorting algorithms- Selection sort, Bubble sort, Insertion sort, Heap sort, Quick sort and analysis of searching algorithms – linear search and binary search.				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: PRANJAL DUTTA

Department: Computer Science Semester: IV

Paper Name: OBJECT ORIENTED PROGRAMMING IN C++ Paper Code: BCA-HC-4036

Learning Objectives:

1. To understand how C++ improves C with object-oriented features.
2. To learn how to write inline functions for efficiency and performance.
3. To learn the syntax and semantics of the C++ programming language.
4. To learn how to design C++ classes for code reuse.
5. To learn how to implement copy constructors and class member functions.
6. To understand the concept of data abstraction and encapsulation.

Sl. No of Lecture	**Topic/Subtopic**	**Learning Resources**	**Mode of Teaching & ICT Tools**	**Experiential/Participating Learning Used**	**Mode of Assessment for CIE**
1	Origins of C++, Basic Concepts of Object Oriented Programming, Benefits of OOP, Applications of OOP, Introduction to C++, Structure of a Simple C++	Reference books, e-books etc.	PPT is used for mathematical Computation and	Practical , Home assignments, Seminar presentations etc.	Class Test, Solving critical Problems etc.

	program, Output operator, Input operator		illustrations using lecture Methods		
2	Cascading of I/O operators, Tokens-keyword, identifiers, constants, strings and operators. Basic data types, User defined data types, Dynamic initialization of variables, Reference variables, Operators in C++,				
3	Scope resolution operator & applications, Member dereferencing operators, Memory Management operators, new and delete, Control Structures-simple if, if else, nested if, switch, while do				
4	break and continue statements, Introduction to Functions-Function Prototyping, Call by reference, Return by reference, Inline functions, Default arguments, Const arguments.				
5	Introduction - Defining a class-Class Vs structures, Creating objects, Accessing class members, Defining member functions-Outside the class				

	definition, Inside the class definition,				
6	Outside functions as inline, Nesting of member functions, Private member functions, Memory allocation for objects, Array-Declaring an array-accessing elements of an array, Array of objects,				
7	Friendly functions, Constructors and destructors, Basic Concepts of constructors, Default constructor, Parameterized constructor, Multiple constructors in a class,				
8	Constructor with default arguments, Dynamic initialization of objects, Copy constructor, Dynamic constructors,Destructors				
9	Overloading Concepts Function Overloading: Functions with different sets of parameters, default and constant parameters, Rules for overloading operators,				

	Defining operator overloading,				
10	Overloading Unary operators, Prefix and Postfix operators overloading, Overloading Binary operators, Overloading relational operators,				
11	Overloading using friend functions, Overloading subscript operator, Pitfalls of operator overloading, Type conversion-Basic to Class, Class to Basic				
12	Introduction-Defining derived classes, Types of inheritances, Making a private member inheritable, multilevel inheritance, multiple inheritance, Hierarchical inheritance, Hybrid inheritance,				
13	Virtual base classes, Abstract classes, Constructors in derived classes, nesting of classes, polymorphism- Compile time and Runtime polymorphism, Pointers to objects,				
14	this pointer, Pointer to derived classes,				

	Virtual functions, Rules for virtual functions, Pure virtual functions.				
15	C++ stream classes-put() and get() functions, getline() and write() functions, Overloading << and >>operators, Formatted Console I/O operations, ios class functions-width(), precision(), fill(),				
16	setf() and unsetf(), Formatting flags, Manipulators, User defined manipulators.				
17	Introduction-Stream classes for files, Opening files using constructor, Opening files using open(), File modes, Detecting end of file-eof()				
18	Sequential input and output-put() and get()-Reading and writing objects-read() and write()-Random Access files-Manipulating file.				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: PRANJAL DUTTA

Department: Computer Science | Semester: III

Paper Name: WEB TECHNOLOGY | Paper Code: BCA-SE-3014

Learning Objectives:

1. Students are able to develop a dynamic webpage by the use of java script and Students will be able to connect a java program to a DBMS and perform insert.
2. Students will be able to write a well formed / valid XML document.
3. DHTML. Students will be able to write a server side java application called Servlet to catch
4. update and delete operations on DBMS table. Students will be able to write a server side java application called JSP to catch form

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	A brief history of TCP/IP and the Internet, Internet services-email, telnet, ftp	Reference books, e-books etc.	PPT is used for mathematical Computation and illustrations using lecture Methods	Practical , Home assignments, Seminar presentations etc.	Class Test, Solving critical Problems etc.
2	Web browser helper applications, Introduction to web servers and their architecture, Review of some popular web servers like Apache,				

3	Nginx, Litespeed, Tomcat etc.				
4	Firewall, proxy server, overview of intranet security, web server security, username/password authentication,				
5	COM, DCOM, CORBA, JDBC, ODBC- CGI, ASP and PHP, Dynamic page creation and advantages				
6	Basic HTML, HTML tags, creating list in HTML, hyperlinks, multimedia, HTML forms, tables in HTML, frames in HTML				
7	image maps, style sheets in HTML. DHTML, XML- Introduction, syntax, DTD				
8	Client side Scripting languages				
9	Creating interactive documents using JavaScript				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: PRANJAL DUTTA

Department: Computer Science

Semester: IV

Paper Name: ADVANCE WEB TECHNOLOGY

Paper Code: BCA-SE-4034

Learning Objectives:

1. DHTML. Students will be able to write a server side java application called Servlet to catch
2. update and delete operations on DBMS table. Students will be able to write a server side java application called JSP to catch form
3. form data sent from client, process it and store it on database. data sent from client and store it on database.
4. Students are able to develop a dynamic webpage by the use of java script and Students will be able to connect a java program to a DBMS and perform insert.
5. Students will be able to write a well formed / valid XML document.

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	A brief history of TCP/IP and the Internet, Internet services-email, telnet, ftp	Reference books, e-books etc.	PPT is used for mathematical Computation and	Practical , Home assignments, Seminar presentations etc.	Class Test, Solving critical Problems etc.
2	Integrating PHP in HTML and vice-versa,				

	understanding popular libraries like Date-Time, Math, String etc., Working with PHP superglobals, PHP-HTML form handling, Session & Cookies, File Handling in PHP		illustrations using lecture Methods		
3	Connection of PHP to MySQL DB, PHP CRUD operation with MySQL DB, **Server Side Scripting with JSP:** Brief overview of Java				
4	JSP Fundamentals – Environment Setup, Syntax, Architecture, Lifecycle, Debugging etc., JSP Form Processing and File Handling,				
5	Working with JDBC, Java Beans, **Intermediate Web Development Techniques:** Understanding AJAX,				
6	Working with XML Documents using PHP & JSP, Understanding JSON, JSON parsing and serialization using PHP, JSP and JavaScript				
7	Understanding Popular				

	Architecture Paradigms – MVC, MVP and MVVM, their components and their utilization, Introduction to popular PHP based web Content Management Systems				
8	Wordpress and Drupal(7+),				
9	Introduction to MVC paradigm using any open-source PHP framework like Symfony, Laravel etc, Introduction to Server Side JavaScript with NodeJS				

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Teaching Plan for the Session: 2022-23

Name of the Teacher: PRANJAL DUTTA

Department: Computer Science

Semester: V

Paper Name: JAVA PROGRAMMING

Paper Code: BCA-HC-5016

Learning Objective:

1. Codes basic programs in Java programming language.
2. Prints to the screen in Java language.
3. Makes relational operations in Java.
4. Constructs loops in Java.
5. Defines arrays in Java and uses them.
6. Uses objects and classes.
7. Declares objects and classes.
8. Distinguishes classes and objects.

Sl. No of Lecture	Topic/Subtopic	Learning Resources	Mode of Teaching & ICT Tools	Experiential/Participating Learning Used	Mode of Assessment for CIE
1	Basic features, Java virtual machine concepts Creation of JAVA	Reference books, e-books	PPT is used for mathematical	Practical , Home assignments, Seminar	Class Test, Solving critical

2	executing a java program using command line arguments, The primitive data types and Variables	etc.	Computation and illustrations using lecture Methods	presentations etc.	Problems etc.
3	Java Key words, integer and floating point data type, character and Boolean types, declaring and initialization variables, Type conversion and casting				
4	Java operators - Arithmetic operators, Bitwise operators, Relational operators, Boolean logical operators, Assignment operator, Conditional operator				
5	if and switch statements, iteration statements, jump statements				
6	Class fundamentals, Objects, Constructors				
7	this keyword, finalize () method, Overloading methods, garbage collection				
8	Returning objects, introducing access control, understanding static				
9	introducing final, introducing nested and inner classes, String operations, Character Extraction, Comparing,				

	Searching & Modifying the strings				
10	Data conversion using valueOf(), StringBuffer				
11	Inheritance basics, using super, creating a multilevel hierarchy				
12	method overriding, dynamic method dispatch, using abstract classes				
13	using final with inheritance Packages and interfaces Packages, access protection, importing packages				
14	interfaces Multithread programming, The JAVA thread model, creating a thread, creating a multiple thread				
15	Using is Alive() and join (), Inter thread communication, suspending, resuming and stopping threads, using multithreading				
16	Exception handling fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses				
17	nested try statements, throw, throws, finally, Java's built-in Exceptions				
18	Input/output: Java I/O classes and interfaces, file, the stream classes, byte streams, character streams				
19	Console class. Applet class: Applet basics, applet				

	architecture, simple applet skeleton, applet displaying methods				
20	Event handling: Two event handling mechanisms, delegation event model, event classes, source of events, event listener interface				

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