As per NEP 2020

BCA (Bachelor of Computer Application)

(Effective from Academic Year 2024-2025 onwards)

शेखावाटी विश्वविद्यालय
Shekhawati University

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(CBCS) As per the NEP 2020 (Semester I to IV)
W.e.f.theAcademicSession2024-25
Discipline: BCA
Faculty: Computer Science

Course title	Credits	Course Code	Credit distribution of the course			Eligibility criteria
			Lecture	Tutorial	Practical/ Practice	
Semester I						10+2 from any recognized Board
Programming in C	DSC(4)	24BCA5101T	3	0	0	
Programming in C Lab	DSC(2)	24BCA5101P	0	0	1	
Web Application Development	DSC(4)	24BCA5102T	3	0	0	
Web Application Development Lab	DSC(2)	24BCA5102P	0	0	1	
Computer Fundamentals& Office Management Tools	DSC(4)	24BCA5103T	3	0	0	
Office Management Tools Lab	DSC(2)	24BCA5103P	0	0	1	
Semester II						
Operating Systems	DSC(4)	24BCA5201T	3	0	0	
Operating Systems Lab	DSC(2)	24BCA5201P	0	0	1	
Database Management Systems	DSC(4)	24BCA5202T	3	0	0	
DBMS Lab	DSC(2)	24BCA5202P	0	0	1	
Computer Organization & Architecture	DSC(6)	24BCA5203T	4	0	0	
Semester III						
Data Structures and Algorithms	DSC(4)	24BCA6301T	3	0	0	
Data Structures Lab Using C/C++	DSC(2)	24BCA6301P	0	0	1	
Object Oriented Programming Through C++	DSC(4)	24BCA6302T	3	0	0	
OOP Lab	DSC(2)	24BCA6302P	0	0	1	
Networking Technologies	DSC(6)	24BCA6303T	4	0	0	
Semester IV						
PHP Programming	DSC(4)	24BCA6401T	3	0	0	
PHP Lab	DSC(2)	24BCA6401P	0	0	1	
Object Oriented Concepts Using Java Programming	DSC(4)	24BCA6402T	3	0	0	
Java Lab	DSC(2)	24BCA6402P	0	0	1	
Mathematics & Statistics	DSC(6)	24BCA6403T	4	0	0	

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Semester I

Course Title:	Programming in C	Course Code: 24BCA5101T
Unit I	Basic concepts of Programming languages, Programming Domains, Language Evaluation criteria and language categories, Evolution of major programming languages. Describing syntax and semantics, formal methods of describing syntax, Pseudo code, Design of Algorithm & Flowchart.	10
Unit II	**Fundamentals of C:** History and importance of C, basic structure and execution of C programs, constants, variables, and data types, Various type of declarations, operators types and expressions, evaluation of expressions, operator precedence and associability. Managing input and output operations, decision making and branching. **Iteration:** while, do...while, for loop, nested loops, break & continue, go to statements.	10
Unit III	**Array and String:** One-dimensional array and their declaration and initialization, two-dimensional arrays and their initializations, character arrays (One and Two dimensional), reading and writing strings, string - handling functions. **Functions:** Need and elements for user –defined functions, definition of functions, return values and their types, function calls and declaration, recursion, parameter passing, passing arrays and strings to functions, the scope, visibility and life time of variables.	10
Unit IV	**Understanding Pointers:** Accessing the address of a variable, declaration and initialization of pointer variables, accessing a variable through its pointer, pointers and arrays, pointers and function arguments, functions returning pointers. **Structures and Unions:** Defining structure, declaring structure variable and accessing structure members, initialization of structure, operation on individual members, and array of structures, union, size of structure.	9

Reference Books:	
1	Balagurusamy E; Programming in ANSI C;FifthEdn; Mc Graw Hill,2011.
2	KanetkarY.; LET US C; X Edition, BPB,2010.
3	Deitel HM & Deitel JP; C How to program; 5thEdn; Pearson Pub
4	GottfriedB; Programming with C: SchaumQutlines; Mc Graw Hill Edition.

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Course Title:	Programming in C Lab	Course Code: 24BCA5101P
	Content : Recommended exercises 1. Part A: 2. Program to read radius of a circle and to find area and circumference 3. Program to read three numbers and find the biggest of three 4. Program to demonstrate library functions in math.h 5. Program to check for prime 6. Program to generate n primes 7. Program to read a number, find the sum of the digits, reverse the number and check it for palindrome 8. Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers 9. Program to read percentage of marks and to display appropriate message (Demonstration of else-if ladder) 10. Program to find the roots of quadratic equation (demonstration of switch Case statement) 11. Program to read marks scored by n students and find the average of marks (Demonstration of single dimensional array) 12. Program to remove Duplicate Element in a single dimensional Array 13. Program to perform addition and subtraction of Matrices 14. Part B: 15. Program to find the length of a string without using built in function 16. Program to demonstrate string functions. 17. Program to demonstrate pointers in C 18. Program to check a number for prime by defining isprime( ) function 19. Program to read, display and to find the trace of a square matrix 20. Program to read, display and add two m x n matrices using functions 21. Program to read, display and multiply two m x n matrices using functions 22. Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters. 23. Program to Reverse a String using Pointer 24. Program to Swap Two Numbers using Pointers 25. Program to demonstrate student structure to read & display records of n students. 26. Program to demonstrate the difference between structure & union.	

Course Title:	Web Application Development	Course Code: 24BCA5102T
Unit I	**The Internet** – Basic of internet, file transfer, telnet, usenet, gopher, wais, Archie and veronica. Introduction to Internet Protocols-, HTTP, FTP, SMTP protocols. **World Wide Web** : Elements of the Web, Web browser and its architecture, The web server, the proxy server, Microsoft internet explorer, viewing pages with a browser, using a browser for Mail, News and chat, Security and Privacy issues (cookies, firewalls, Data Security, executable Applets and scripts, blocking system).	10

Unit II	**HTML Fundamentals:** Introduction to HTML, HTML Elements, HTML Semantics, HTML 5 Doc Types, New Structure Tags, Section, Nav, Article, Aside, Header, Footer, HTML Attributes, Headings, Paragraphs, Styles, Quotations, Blocks, Classes, Layout, Iframes, Creating HTML Pages, incorporating Horizontal Rules and Graphical Elements, Hyper-links, Creating HTML Tables, Creating HTML Forms, HTML and Image Techniques, HTML and Page, Development of Website and Webpage (Planning, Navigation and Themes, Elements of a Web page, steps of creating a site, publishing and publicizing site structuring web site.	**10**
Unit III	**Cascading Style Sheets:** Understanding Style Sheets, CSS Syntax and Applying Style Sheets to HTML document, Developing Style Sheets: inline, internal and external. CSS Selectors, <DIV> tag, Using class and ID, Styling Backgrounds, Styling borders, Styling Text, Styling Fonts, Styling Links, Styling Lists, Styling Tables, Margin, Flex and Grids. **Bootstrap & Web page design:** CMS, Banks of CMS, Joomla/wordpress-Installation, Design and development of websites.	**9**
Unit IV	**Java script**: Introduction to scripting language, Client Side Scripting, memory concepts, arithmetic decision making. Java script control structures, Java script functions, JS Popup Boxes, events, program modules in java script, function definitions duration of identifiers, scope rules, Controlling Programming Flow, recursion java script global functions. Arrays handling in Java script, The Java Script Object Model, Developing Interactive Forms, Validation of Forms, Cookies and Java Script Security Controlling Frames in Java Script, Client – Side Java Script Custom.	**10**

Reference Books:

1	The Colete eference: HTML & XHTML; ThomasA.Powel, 4thEdn
2	Mastering HTML 4.0 by DeborahS.Ray an EricJ.Ray From BPB
3	Mastering Java Script, BPB publication.
4	Internet and web technology by Raj Kamal, TMH Publication 2. StevenHolzner,
5	The Complete Reference Java Scripts,, TataMcGraw – Hill,3rdEdn.

Course Title:	**Web Application Development Lab**	**Course Code: 24BCA5102P**
	HTML: 1. Basics Elements & Attributes, HTML Formatting tags, Links, 2. Images, Tables, Forms Elements 3. HTML5 Audio and Video, HTML5 Input Types & Attributes 4. CSS Syntax, CSS Attribute Selectors 5. CSS properties: Fonts, Background, Colors, Links, Lists, 6. CSS Box Model, Display, Opacity, Float, Clear 7. CSS Layout, CSS Navigation Bar, 8. CSS Rounded Corners, CSS Border Images, CSS Animations	

	JavaScript: 1. Displaying Output, DeclaringVariables, Operators, Arithmetic, Data Types, Assignment, 2. JavaScript Functions, Booleans, Comparisons, Conditional 3. JavaScript Switch, Loops, Break, Type, 4. JavaScript Objects, Scope, 5. Strings and String Methods 6. Numbers and Number Methods, Math, JavaScript Dates: Formats and Methods 7. JavaScript Events, JavaScript, JavaScript Forms (API and Validation), Objects, JavaScript Functions, JavaScript DOM, JavaScript Validation, Browser BOM

Course Title:	Computer Fundamentals & Office Management Tools	Course Code: 24BCA5103T
Unit I	**Introduction to Computers**: Characteristics of computers, Evolution of computers, generation of computers, Block diagram of computer & role of each block, classification of computers. Input and Output Devices **Primary and Secondary Memory**: Memory hierarchy, Random access memory (RAM), types of RAM, Read only memory (ROM), types of ROM. Classification of secondary storage devices, magnetic tape, magnetic disk, optical disk. **Number Systems**: Introduction to number system, Binary, Octal, Hexadecimal, conversion between number bases, Arithmetic operations on binary numbers, Alphanumeric- BCD, EBCDIC, ASCII, Unicode.	10
Unit II	Computer Software: software categories, system software, application software, utility software. Classification of system software, Computer Languages: Introduction, classification of programming languages, generations of programming languages, features of a good programming language. Internet Basics: Introduction,, Features of Internet, Internet applications, Services of Internet, Logical and Physical addresses, Internet Service Providers, Domain Name System. Web Basics : Introduction to Web, Web browsers, http/https, URL	10
Unit III	**MS Word:** Word processing, MS-Word features, creating saving and opening documents in Word, interface, toolbars, ruler, menus, keyboard shortcut, editing, previewing, printing & formatting a document, advance features of MS Word, find & replace, using thesaurus, mail merge, handling graphics, tables, converting a Word document into various formats like-text, rich text format, Word perfect, etc. **MS Excel:** Worksheet basics, creating worksheet, entering data	9

	into worksheet, data, text, dates, alphanumeric values saving & quitting worksheet, opening and moving around in an existing worksheet, Toolbars and menus, Keyboard shortcuts, working with single and multiple workbook, working with formula & cell referencing, Auto sum, coping formulas, absolute and relative addressing, formatting of worksheet, previewing & printing worksheet, Graphs and Charts, Database, macros, multiple worksheets- concepts.	
Unit IV	**Power Point:** Creating and viewing a presentation, managing Slide Shows, navigating through a presentation, using hyperlinks, advanced navigation with action setting and action buttons, organizing formats with MasterSlides, applying and modifying designs, adding graphics, multimedia and special effects. **Microsoft Access:** Planning a database (tables, queries, forms, reports), creating and editing database, customizing tables, linking tables, designing and using forms, modifying database structure, Sorting and Indexing database, querying a database and generating reports.	10

Reference Books:

1	SanjaySaxena; A First Course in Computers 2003 Edition; VikasPub.
2	Computer Fundamentals by P.K.Sinha, BPB Publication.
3	Computer Fundamentals and Programming in, Reema Thareja, OXFORD University Press.
4	Microsoft; 2007/2010 Microsoft Office System; PHI.
5	Microsoft; Microsoft Office 2007/2010: Plain & Simple; PHI.
6	MS-Office , Dr.S.S.Shrivastava, Published by Laxmi Publication.
7	Office 2019:In Easy Steps,MichalPrice ,BPB Publication.

Course Title:	Office Management Tools Lab	Course Code: 24BCA5103P
	Content: Recommended exercises based on Word, Excel, Power Point and Access.	

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Semester II

Course Title:	Operating Systems	Course Code: 24BCA5201T
Unit I	**Concepts**: Operation System & its need, functions of OS, Types of OS: Simple Batch Systems, Multiprogrammed Batched Systems, Time-Sharing Systems, Parallel Systems, Distributed Systems and Real-Time Systems. **Operating-System Structures:** System Components, Operating System Services, System Calls, System Structure, Virtual Machines, Process Management.	11
Unit II	**CPU Scheduling Algorithms: Basic** Concepts, Scheduling Criteria, FCFS, SJF, Priority, Round-Robin, Multilevel Queue, Multilevel Feedback Queue, Multiple-Processor Scheduling. **Process Synchronization & Deadlocks**: The Critical section problem, synchronization hardware semaphores, Classical problems of synchronization, Critical regions, System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.	11
Unit III	**Memory Management**: Background, Logical versus Physical Address space, Swapping, Contiguous allocation (fragmentation), Paging, Segmentation. Virtual Memory, Demand Paging, Page-replacement Algorithms (FIFO, Optimal, LRU, Counting). **File Management**: File Concepts (Operations & Attributes), Access Methods, Directory Structure, File System Structure, Allocation Methods (Contiguous Allocation, Linked Allocation, Indexed Allocation). **Device Management**: General device characteristics, device controllers, device drivers, Interrupts Driven I/O, Memory Mapped I/O, Direct Memory.	10
Unit IV	Introduction to Linux , Evolution of Linux, Linux Architecture, Linux file system (inode, Super block, Mounting and Unmounting), Essential Linux Commands and Shell Scripts (Internal and External Commands), Kernel, Process Management in Linux.	7
Reference Books:		
1	A. Silbersachatz and P. Galvin, "Operating System Concepts", Addison-Wesley, 5th Ed., 2001.	
2	Gary Nutt: Operating Systems-A Modern Perspective (Second Edition), Pearson Education, 2000.	
3	Tanenbaum A.S., Modern Operating Systems, PHI Publ.	

4	PetersonRichard, " The Complete Reference Linux " Tata McGraw Hill.
5	SimitabhaDas, "Unix/Linux Concepts & Applications". Tata McGraw Hill
6	AchyutS.Godbole: Operating Systems, Tata Mc-Graw Hill Publishing Company Limited, 2000.
7	HarveyM.Deitel, Operating Systems, Pearson Education, 2001

Course Title:	Operating Systems Lab	Course Code: 24BCA5201P
Teaching Hr./ Week :4		
	Content : Recommended exercises 1. Settings and configurations of Linux. 2. To learn directory navigation in Linux-like systems. 3. To practice Linux commands. 4. Practice pattern matching commands. 5. Practice file editing with vi/nano. 6. Shell script to demonstrate application programs.	

Course Title:	Database Management Systems	Course Code: 24BCA5202T
Unit I	Database System Concepts & Architecture: Overview of DBMS, Basic DBMS terminology, data base system v/s file system, Advantages and dis-advantages of DBMS, Coded rules, data independence. Architecture of a DBMS, Schemas, Instances, Database Languages, Database Administrator, Data Models.	**8**
Unit II	**Data Modeling:** Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation. **Relational Model :** Concepts, Constraints, Languages, Relational database design by ER & EER mapping, Relational algebra relational calculus. Relational Algebra, Fundamental operations of Relational Algebra.	**11**
Unit III	**Database Design:** Functional dependencies, loss less decomposition, Normalization : 1-NF, 2-NF,3-NF and BCNF. **Transaction Management :** Transactions: Concepts, ACID Properties, States Of Transaction, Serializaibility, Isolation, Checkpoints, Deadlock Handling. **Recovery System & Security :** Failure Classifications, Recovery & Atomicity, Log Base Recovery, Recovery with Concurrent Transactions, Introduction to Security & Authorization.	**12**

Unit IV	**Introduction to SQL**: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, insert, update and delete operations, Joins, Unions, Intersection, Minus in SQL.	8

Reference Books:

1	KorthHF and SilberschatazA, System Concepts, Sixth Edition; McGraw Hill,2010 Leon, and Leon, SQL Tata McGraw Hill Pub. Co. Ltd.
2	IvanBayross; SQL/PL 4thEdn: BPB,2009
3	NavatheS.B.ElmasriR,; Fundamentals of Database Systems, Fifth Edition, Pearson 2011.
4	Ramakrishan and Gharke, Database Management Systems, 3rdEd, Tata McGraw Hill, 2007.
5	Leon, and Leon, SQL Tata McGraw Hill Pub. Co. Ltd.
6	Singh S.K.; Database Systems; I Edition; Pearson, 2006.

Course Title:	DBMS Lab	Course Code: 24BCA5202P

Course Contents : Recommended exercises

1. Analyze the organization and identify the entities, attributes and relationships in it.
2. Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.
3. Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any).
4. Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion.
5. Apply the First, Second and Third Normalization levels on the database designed for the organization
6. Practicing DDL commands.
7. Creating databases, how to create tables, altering the database, dropping tables and databases if not required. Try truncate, rename commands etc.
8. Practicing DML commands on the Database created for the example organization
9. DML commands are used to for managing data within schema objects. Some examples: SELECT, INSERT, UPDATE, DELETE
10. Practice queries (along with sub queries) involving ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.
11. Practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

Course Title:	Computer Organization & Architecture	Course Code: 24BCA5203T
Unit I	**Boolean Algebra and Logic Gates**: Logic Gates, Basic laws of Boolean algebra, Simplification of Boolean algebra. **Combinatorial Logic:** Multiplexers, Decoders, Encoders, Adder & Subtracters, Parallel Binary Adder, Parallel binary Subtractor	10
Unit II	**Sequential Logic**: Sequential circuits: Flip-flops, S-R, D, J-K, T, Clocked Flip-flop, Race around condition, Master slave Flip-Flop. **Register Transfer and Micro Operations**: Register Transfer Language, Register transfer, Bus and Memory transfer, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit.	14
Unit III	**Basic Computer Organization and Design:** Instruction Codes, Computer Registers; Common bus system; Computer Instructions; Instruction formats; Instruction Cycle; Fetch and Decode, Flowchart for Instruction cycle; Register reference instructions, Addressing Modes. **CPU Design**: Specifying a CPU, design and implementation of a simple CPU (fetching instructions from memory, decoding and executing instructions, establishing required data paths).	14
Unit IV	**Input-Output Organization:** Input-output Interfaces, Asynchronous Data Transfer, Mode of Transfer - Programmed I/O, Interrupt I/O, Direct Memory access(DMA). **Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory. I/O Interrupt, types of Interrupts, Priority Interrupts, Direct Memory Access (DMA).	14

Reference Books:

1	M, Morris Mano; Computer System Architectures; III Edition, Prentice Hall of India,2008
2	Andrew S. Tanenbaum , Structured Computer Organization, Printice Hall
3	WilliamStallings, Computer Organization and Architecture, Sixth Edition, Pearson
4	JohnD. Carpinelli: Computer Systems Organization & Architecture; 3rd Edition; Person Education Asia,2008
5	MalvinoB; Digital Computer Electronics III Edition; TMHL.

Semester-III

Course Title:	Data Structures and Algorithms	Course Code: 24BCA6301T
Unit I	**Introduction to Algorithm Design**: Algorithm, its characteristics, efficiency of algorithms, analyzing Algorithms and problems. **Linear Structure:** Arrays, records, stack, operation on stack, implementation of stack as an array, queue, types of queues, operations on queue, implementation of queue.	8
Unit II	**Linked Structure:** List representation, Polish notations, operations on linked list - get node and free node operation, implementing the list operation, inserting into an ordered linked list, deleting, circular linked list. **Tree Structure :** Concept and terminology, Types of trees, Binary search tree, inserting, deleting and searching into binary search tree, tree traversals	13
Unit III	**Graph Structure:** Graph representation - Adjacency matrix, adjacency list, Warshall's algorithm, adjacency multilist representation. Orthogonal representation of graph. Graph traversals - BFS and DFS. Shortest path, transitive closure.	10
Unit IV	**Searching and sorting:** Searching - sequential searching, binary searching, hashing. **Sorting** - selection sort, bubble sort, quick sort, heap sort, merge sort, and insertion sort, efficiency considerations.	8
Reference Books:		
1	S.Lioschutz: Data Structures, Mc Graw Hill International Edition.	
2	A.V.Aho., J.E.Hopcroft, and J.D.Ullman, Data Structures and Algorithms, Pearson.	
3	A. MichaelBerman: Data Structures via C++, OxfordUniversity Press.	
4	SaraBaase and AllenVan Gelder: Computer Algorithms, Pearson Education Asia.	

Course Title:	Data Structures Lab Using C/C++	Course Code: 24BCA6301P
	Content : Recommended exercises : 1. Given {4,7,3,2,1,7,9,0} find the location of 7 using Linear and Binary search and also display its first occurrence. 2. Given {5,3,1,6,0,2,4} order the numbers in ascending order using Bubble Sort Algorithm 3. Perform the Insertion and Selection Sort on the input {75,8,1,16,48,3,7,0} and display the output in descending order. 4. Given {5,3,1,6,0,2,4} order the numbers in ascending order using Quick Sort Algorithm 5. Given {5,3,1,6,0,2,4} order the numbers in ascending order using Merge Sort Algorithm	

	6. Write a program to insert the elements {61,16,8,27} into singly linked list and delete 8,61,27 from the list. Display your list after each insertion and deletion. 7. Write a program to insert the elements {61,16,8,27} into linear queue and delete three elements from the list. Display your list after each insertion and deletion. 8. Write a program to insert the elements {61,16,8,27} into circular queue and delete 4 elements from the list. Display your list after each insertion and deletion. 9. Write a program to insert the elements {61,16,8,27} into ordered singly linked list and delete 8,61,27 from the list. Display your list after each insertion and deletion. 10. Write a program to add 6x3+10x2+0x+5 and 4x2+2x+1 using linked list. 11. Write a program to push 5,9,34,17,32 into stack and pop 3 times from the stack, also display the popped numbers. 12. Write a recursive program to find GCD of 4,6,8. 13. Write a program to inert the elements {5,7,0,6,3,9} into circular queue and delete 6,9&5 from it(using linked list implementation).. 14. Write a program to create a binary tree with the elements {18,15,40,50,30,17,41} after creation insert 45 and 19 into tree and delete 15,17 and 41 from tree. Display the tree on each insertion and deletion operation 15. Write a program to create binary search tree with the elements {2,5,1,3,9,0,6} and perform in order, preorder and post order traversal.

Course Title:	Object Oriented Programming Through C++	Course Code: 24BCA6302T
Unit I	**Introduction to Object Oriented Concepts:** Evolution of OOP, OOP Paradigm, advantages of OOP, comparison between functional programming and OOP approach, characteristics of object oriented language – objects, classes, inheritance, reusability, user defined data types, polymorphism, overloading.	**10**
Unit II	**Introduction to C++:** C++ tokens, data types, C++ operators, type conversion, variable declaration, arrays, statements, expressions, conditional statements, Jumping statements, loops, functions, pointers, structures. **Classes and Objects:** Classes, objects, defining member functions, arrays of class objects, pointers and classes,	**10**

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	passing objects, constructors, types of constructors, destructors, this pointer, access specifiers, friend functions, inline functions.	
Unit III	**Inheritance:** Introduction, Importance of Inheritance, types of inheritance, Constructor and Destructor in derived classes., member access control. **Polymorphism:** Functions Overloading, Operator Overloading, early binding polymorphism with pointers, Unary and Binary Operator Overloading, Overload Assignment Operator, Copy Constructor.	**10**
Unit IV	**Virtual Function** : Virtual Function, late binding, pure virtual functions, abstract classes, Generic Programming with Templates, Friend function, Overloaded Function Templates, Multiple Arguments function Template. **File Management:** Handling Data files (sequential and random), Opening and closing of files, stream state member functions, Operations on File, Exception Handling.	**9**

Reference Books:	
1	Deitel HM & Deitel JP; C/C++ How to program; 5thEdn; Pearson
2	Balagurusamy ; Object Oriented Programming in C++; 4th Edition TMH.
3	Mastering C++; Tata Mcgrow Hil
4	KanetkarY.: LET US C++; BPB

Course Title:	**OOP Lab**	**Course Code: 24BCA6302P**
Teaching Hr./ Week : 4		
	Course Contents : Recommended exercises 1. Simple C++ applications for understanding references to an instant of a class 2. Handling Arrays and strings in C++ 3. Inheritance applications 4. Functions overloading 5. Operators overloading 6. Use Virtual functions 7. Generic programming 8. Exception Handling 9. File operations	

Course Title:	Networking Technologies	Course Code: 24BCA6303T
Teaching Hr./ Week 4		
Unit I	**Introduction**: Network definition, Network topologies, Types of Network, Layered network architecture, Categories of Network, protocol, Standards and interface. **Network Models** :client-server, peer-to-peer, OSI reference model, Architecture and functions of layers. TCP/IP protocol suite.	12
Unit II	**Data Communication Fundamentals:** Analog and digital signal, Data-rate limits, Digital to digital & Digital to analog modulation. Guided and Unguided Transmission media **Data Link Layer and Network Devices Data link layer:** framing, error detection and Corrections, flow control, Network devices: switches, routers, bridges, etc., MAC addressing and Ethernet standards.	14
Unit III	**Networks Layer Functions and Protocols**: Routing, Routing algorithms, Network layer protocol of Internet- IP protocol. **Transport Layer Functions and Protocols**: Transport services, Berkeley socket interface overview, Transport layer protocol of Internet- UDP and TCP. Overview of Application layer protocol, DNS protocol, WWW &**HTTP** protocols.	13
Unit IV	**Circuit Switching:** Simple Circuit Switching, Circuit Switching Networks, Space Division switching, Time Division Multiplexing, Routing in Switching Networks, Control Signals & Channels. Packet Switching concepts and principles. **Network Security and Wireless Networks Network security concepts:** encryption, firewalls, VPN, Wireless networks and technologies.	13

Reference Books:	
1	BehrouzA.Forouzan, "Data Communication and Networking", 4th edition, Tata McGraw Hill.
2	A. S.Tanenbaum, "Computer Networks", Pearson Education Asia, 4th Ed..
3	WilliamStallings, "Data and computer communications", Pearson education Asia, 7th Ed.
4	"Computer Networking: A Top-Down Approach" by JamesF.Kurose and KeithW.Ross

Semester-IV

Course Title:	PHP Programming	Course Code: 24BCA6401T
Unit I	**Introduction to PHP:** Installation of PHP and MySQL, PHP configuration in IIS & Apache Web Server. Features of PHP, Writing PHP, Parsing PHP code, Embedding PHP and HTML Executing PHP and viewing in Browser.	9
Unit II	**Control Structures:** Data types, Operators, PHP variables: static and global variables, Comments in PHP, Control Structures, Condition statements, If…Else, Switch, ? operator, Loops, While, Break Statement Continue. Do…While, For, For each, Exit, Die, Return. Arrays: Numeric, Associative and Multidimensional Arrays	10
Unit III	**Strings:** Creating and accessing String, Searching & Replacing String, Formatting String, String Related Library function, Pattern matching, Replacing text, Splitting a string with a Regular Expression **Functions:** Defining a Function, Calling a Function, Parameter passing, Returning value from function **Form Data Handling:** $_GET, $_POST, $_REQUEST Variables, Cookies handling, Session Management	10
Unit IV	**Exception Handling:** Understanding Exception and error, Try, catch, throw **File Handling:** Opening and closing a file, Copying, renaming and deleting a file **Database Handling:** Connection with MySql Database or ODBC, Performing basic database, operation (Insert, Delete, Update, Select, Truncate Alias, Order By), Setting query parameter.	10

Reference Books:

1	PHP, The CompleteReference, StevenHolzner, TMH
2	Beginning PHP 5.3, MattDoyle, John Wiley & Sons
3	Core PHP Programming Leon Atkinson Pearson publishers
4	Beginning PHP 5.0 Database ChristopherScollo, Harish,Rawat, DeepakThomas,Wrox Press

Course Title:	PHP Lab	Course Code: 24BCA6401P
	Content : Recommended exercises :Exercise based on paper PHP Programming 1. Installing XAMMP 2. Variables, Data Types, Constants, Operators, Programming Loops, 3. PHP Functions, 4. Arrays 5. Strings Functions 6. PHP Form Handling, Require & Include 7. PHP with MySQL	

Course Title:	Object Oriented Concepts Using Java Programming	Course Code: 24BCA6402T
Unit I	**Java Programming :** Basic concepts of object oriented programming(Objects and Classes, Data Abstraction & Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message passing), Java features, JVM, Byte code interpretation, simple java program, command line argument, Data types, type casting, operators (Arithmetic, increment, decrement, relational, logical, bit wise, conditional) and expressions.	10
Unit II	**Decision Making and Branching:** Decision making and branching (if…else, else if, switch), looping, classes, objects and methods, visibility control, constructors, wrapper classes, nesting of methods, Arrays and strings handling. **Polymorphism:** Function overriding, Operator overloading, final classes.	10
Unit III	**Inheritance & Multithreaded Programming :** Inheritance, Types of Inheritance, Abstract class, interfaces, packages, multithreaded programming, extending thread, life cycle of thread, using thread methods, thread priority, synchronization. **Exception Handling:** Exception-Handling fundamentals, Exception types, try, catch, throw, finally, creating exception sub classes.	11
Unit IV	JSP: Introduction to JSP, Directory Structure, Lifecycle JSP, Scripting Elements. JAR files, Servlets Life cycle of servlet, JDBC connectivity.	8
Reference Books:		
1	Mastering java 2", BPB Publications. Programming with Java A Primer, E.Balagurusamy Tata McGraw Hill Companies	

2	Java Programming JohnP.FlyntThomson2nd
3	The complete reference JAVA2, Herbertschildt. TMH
4	Arnold,Gosling, " The Java Programming Professional 2000", AddisonWesley Publication

Course Title:	Java Lab	Course Code: 24BCA6402P
	Content : Recommended exercises : 1. Simple java applications for understanding references to an instant of a class 2. Handling Arrays in JAVA 3. Handling strings in JAVA 4. Implementation polymorphism 5. Package creation 6. Developing user defined packages in java 7. Use of Inheritances 8. Use of Interfaces 9. Threads, Multithreading 10. Collection handling 11. GUI/Swings applications 12. I/O Stream handling 13. Exception Handling 14. JSP 15. Servlets	

Course Title:	Mathematics & Statistics	Course Code: 24BCA6403T
Unit I	**Sets :** Definition of sets, representation of sets, type of sets, Operations on sets, Sub sets, Power set, Universal set, Complement of a set, Union and Intersection of two sets, Venn diagrams, Principles of Inclusion and Exclusion. **Relations:** Cartesian product of sets, Definition of relation, Types of relations- reflexive, symmetric, anti-symmetric, transitive, equivalence. **Functions:** Definition,Domain & Range of a functions, one to one and onto functions, Bijective functions, composite functions, inverse of functions.	14
Unit II	**Logic and Proofs:** Proposition, Conjunction, Disjunction, Negation, Compound proposition, De Morgan's laws, Tautolity and Contradiction. **Matrices**: Definition and Types of Matrices, Addition , Subtraction and Multiplication of Matrices, Non-commutatively of multiplication of matrices, Scalar	13

	Multiplication, Transpose of a Matrix. **Determinant:** Determinant of a square matrix (up to 3x3 matrices), properties of determinants, minors , cofactors, expansion of determinants, application of determinants in finding the area of a triangle. Adjoint and Inverse of a matrix, Solution of system of linear equations by Cramer's Rule.	
Unit III	**Statistics:** Data collection methods, Data classification, Frequency Distribution, Graphical representation of frequency distribution. **Measures of Central Tendency**- Mean, Median, Mode, Measures of Dispersion- Mean Deviations, Standard Deviations, Variance	**12**
Unit IV	**Correlation Analysis:** Correlation, Types of Correlations, Methods of Studying Correlations, Measure of Karl Pearson's coefficient of correlation, Rank Correlation Coefficient. **Regression Analysis**: Regression, Use of regression analysis,, Difference between Correlation and Regression Analysis, Regression Lines Equations, Properties of regression lines.	**13**

Reference Books:

1	C.L.Liu: Elements of Discrete Mathematics, Tata Mc-Graw Hill Publishing Company Ltd., 2000
2	Seymour Lipschutz; Discrete Mathematics;TMH.
3	KennethHRosen; Discrete Mathemtics& Its Applications; 6 Edition,MGH;

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