SYLLABUS, TEACHING & EXAMINATION SCHEME
For BCA (II,III YEAR) WEF FROM SESSION 2023-24

BCA - III Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BCA311	Java Programming	3	3 hrs	20	80	100
BCA312	Computer Networks	3	3 hrs	20	80	100
BCA313	Database System	3	3 hrs	20	80	100
BCA314	E-commerce and Cyber Security	3	3 hrs	20	80	100
BCA315	Digital Electronics	3	3 hrs	20	80	100
BCA321	Java Programming Lab	4	3 hrs	20	80	100
BCA322	Database Lab	4	3 hrs	20	80	100
BCA323	Digital Electronics Lab	4	3 hrs	20	80	100
	TOTAL					800
BCA - IV Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BCA411	.NET Technologies	3	3 hrs	20	80	100
BCA412	Computer Oriented Numerical & Statistical Methods	3	3 hrs	20	80	100
BCA413	Operating System	3	3 hrs	20	80	100
BCA414	Computer Graphics	3	3 hrs	20	80	100
BCA415	Computer Architecture	3	3 hrs	20	80	100
BCA421	.Net Technologies Lab	4	3 hrs	20	80	100
BCA422	Computer Graphics Lab	4	3 hrs	20	80	100
BCA423	Computer Architecture Lab	4	3 hrs	20	80	100
	TOTAL					800
BCA - V Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BCA511	Python Programming	3	3 hrs	20	80	100
BCA512	Organization Behaviour	3	3 hrs	20	80	100
BCA513	LINUX Operating System	3	3 hrs	20	80	100
BCA514	Internet Programming	3	3 hrs	20	80	100
BCA515	System Analysis and Design	3	3 hrs	20	80	100
BCA521	Python Lab	4	3 hrs	20	80	100
BCA522	LINUX Lab	4	3 hrs	20	80	100
BCA523	Internet Programming Lab	4	3 hrs	20	80	100
	TOTAL					800
BCA - VI Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BCA611	Software Engineering	3	3 hrs	20	80	100
BCA612	Information System Management	3	3 hrs	20	80	100
BCA621	Advanced Excel Lab	4	3 hrs	20	80	100
BCA622	Major Project	4	3 hrs	40	160	200
	TOTAL					500

BCA Program

BCA - III Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BCA311	Java Programming	3	3 hrs	20	80	100
BCA312	Computer Networks	3	3 hrs	20	80	100
BCA313	Database System	3	3 hrs	20	80	100
BCA314	E-commerce and Cyber Security	3	3 hrs	20	80	100
BCA315	Digital Electronics	3	3 hrs	20	80	100
BCA321	Java Programming Lab	4	3 hrs	20	80	100
BCA322	Database Lab	4	3 hrs	20	80	100
BCA323	Digital Electronics Lab	4	3 hrs	20	80	100
	TOTAL					800

Unit	BCA311: JAVA Programming
I	Object Oriented Concepts in Java, Comparison of Java and C++, Java features like security, portability, byte code, java virtual machine, object oriented, robust, multithreading, architectural neutral, distributed and dynamic. Java Source File Structure, Compilation, Execution
II	Class Fundamentals, Object & Object reference, Creating and Operating Objects, Use of Tokens, Identifiers, Keywords, Literals, Comments, Primitive Data Types, Operators-precedence and associativity, Type conversion, Command line argument, accepting input from keyboard, decision making – if, if..Else, switch; loops – for, while, do…while; special statements–return, break, continue.
III	Array – single and two dimension array. Object Life time & Garbage Collection, Access Modifiers, Constructors , Object Life time & Garbage Collection, Defining Methods, Argument Passing Mechanism, Method Overloading, Recursion, Finalize() Method, Use of this keyword
IV	Inheritance – Advantages of Inheritance in OOP, types of Inheritance, constructors in inheritance, use of super keyword, polymorphism; Interfaces - defining an interface, implementing and applying interfaces, using variables in interfaces, extending interfaces; Method overriding – use, need, advantage. Use of super, final and static keyword
V	Package - Organizing Classes and Interfaces in Packages, Package as Access Protection, defining Package, CLASSPATH Setting for Packages and Naming Convention for packages. Applets, Applet security restrictions, the class hierarchy for applets, Life cycle of applet, HTML Tags for applet. Difference between application and applet. Exception Handling: try..catch..throw..throws...finally, Throwing your known exception

Suggested Readings

- Programming with Java IV Edition – E Balagurusamy IV Edition

Unit	BCA312: Computer Networks
I	Principles of Data Communication: Evolution of computer networks, General components and tasks of a communication system, Fundamentals of signals, carrier waves, modes of transfer : simplex , half duplex ,full duplex, types of networks : LAN, WAN, MAN, SAN, PAN, CAN. serial communication, parallel communication.
II	Networking Architecture of ISO-OSI: functions of each layer and implementation. Concepts of circuit switching, packet switching and message switching. Fundamentals of datagrams. Flow and Error Control – Stop and Wait, Sliding Window, Automatic Repeat Request
III	Data communication concepts: Connecting devices, hub, switch, bridge, routers and gateways, Signal encoding techniques - Digital to Digital and Analog to Analog. Network Protocols : Communication protocol, Management Protocol and Security Protocol. LAN cabling standards.
IV	Error detection and correction codes: Parity bit, Checksum, Hamming codes, CRC, single error detection and correction. concepts of key, Caeser cipher, transposition cipher, Introduction to S-Box and P-Box, Introduction to cryptography, Aspects of network security, privacy, digital signature.
V	Transmission media - twisted pair, coaxial cable, optical-fibre. LAN topologies: STAR, BUS and RING network, LAN access techniques: ALOHA, CSMA, token ring and token bus.

Suggested Readings

- Behrouz A. Forouzan, Dara communication and Networking
- Stalling, Data & Computer Communication
- Tanenbaum, Computer Network, Pearson.Ed., Pearson
- Kurose, Computer Networking, Pearson
- Peterson, Davie; Computer Networks, Elsevier

Unit	BCA313: Database System
I	Introduction to Database: Need for DBMS, advantages of DBMS, views of data, instances and schema data independence, database administrator, database manager, database languages, overall structure of DBMS.

II	Entity Relationship Model: Entities, attributes, relationship, constraints, keys, E-R diagram. Concept of strong and weak entity sets, generalization, specialization and aggregation.
III	Relational Model: Structure of Relational Databases, Relational Databases, Modification of the Databases, Tuple Relational Calculus, Domain Relational Calculus.
IV	SQL – Basic structure – Clauses, data types, creating tables. Modification of the database – deletion, insertion, updates. Retrieving data from tables, ordering, set operations – union, intersect, except, concept of NULL values, nested subqueries – set membership, set comparison, exist and not exist operator, unique, not unique construct.
V	Joins, equi-joins, non-equi-joins, self joins, outer joins. Aggregate functions – group by and having clause. Math functions, string functions, group by clause. Indexes, views, granting and revoking permissions.

Suggested Readings

- Database Concepts, Korth, Silbertz, Sudarshan, McGraw Hill
- Fundamentals of Database Systems, Elmasri, Navathe, Addision Wesley

Unit	BCA314: E-Commerce and Cyber Security
I	E-commerce and its Technological Aspects Overview of developments in Information Technology and Defining E-Commerce: The scope of E commerce, Electronic Market, Internet Commerce, Benefits and limitations of E-Commerce, Electronic Commerce Models, Value Chains in Electronic Commerce, Generic framework for E-Commerce, Architectural framework of Electronic Commerce, Web based E Commerce Architecture. EDI, EDI technology, EDI standards, EDI communications, EDI Implementation, EDI Agreements, EDI Security
II	Electronic Payment Systems, Need of Electronic Payment System : use of Electronic Payment system and the protocols used, Electronic Fund Transfer and secure electronic transaction protocol for credit card payment. Digital economy: Identify the methods of payments on the net – Electronic Cash, cheques and credit cards on the Internet.
III	Security in E Commerce Threats in Computer Systems: Virus, Cyber Crime Network Security: Encryption, Protecting Web server with a Firewall, Firewall and the Security Policy, Network Firewalls and Application Firewalls, Proxy Server.
IV	Issues in E Commerce Understanding Ethical, Social and Political issues in E-Commerce: A model for Organizing the issues, Basic Ethical Concepts, Analyzing Ethical Dilemmas, Candidate Ethical principles.
V	Privacy and Information Rights: Information collected at E-Commerce Websites, Cyber Crimes – hacking, software piracy, Cyber Law, IT Act 2010, The Concept of Privacy, Legal protections, Intellectual Property Rights: Types of Intellectual Property protection, Governance.

Suggested Readings:

- Electronic Commerce : Pete loshin, John Vacca.

Unit	BCA315: Digital Electronics
I	Number Systems and Codes: Number Systems: Decimal Number System, Binary Number System, Octal Number System, Hexa-Decimal Number System, Inter-conversion methods. Binary Arithmetic: addition and subtraction, Binary Codes: Weighted and Non-Weighted Codes, 8421 BCD Code, Excess-3 Code, Gray Code, ASCII and EBCDIC.
II	Boolean Algebra: Introduction to Logic. Logic Operations, AND, OR, NOT. Principle of Duality, AND Law, OR Law, Law of Negation, Commutative Law, Associative Law, Distributive Law, De-Morgan's Theorem. Digital Circuits: Introduction to Combinational and Sequential Circuits, Classification of Gates: Basic Gates, Universal Gates, And Exclusive Gates. Minterms and Maxterms, Sum of Products (SOP) and Products of Sum (POS). Reduction Techniques: Need of Reduction. Reduction by Boolean Algebra, Karnaugh Maps: 2,3,4 Variable.
III	Combinational Circuits: Arithmetic Circuits: Half-Adder, Half-Subtractor, Full Adder, Full Subtractor, Parallel Adder, 2's Compliment Adder-Subtractor. Multiplexers, De-Multiplexers, Decoders, Encoders, Magnitude Comparator.
IV	Sequential Circuits: Flip-Flops: RS, D using NAND and NOR Gates, Introduction to Clock, & Timing Diagrams. Gated Flip-Flops (Latches). J-K Flip-Flop, T-Flip-Flop, J-K Master Slave Flip-Flop. Registers: Buffer register, shift register, SISO, SIPO, PISO, PIPO registers.
V	Sequential Circuits: Counters: Asynchronous and Synchronous; Ripple Up, Ripple Down Counters, Modulo Counters. Design of Synchronous Counters. Memories: Classification of memories, Volatile and Non-Volatile memories. Memory Technologies; Semiconductor, Magnetic and Optical Memories. RAM and ROM.

Suggested Readings:

- Fundamentals of Digital Circuits, Kumar Anand. A., PHI New Delhi
- Modern Digital Electronics, Jain R. P., Tata Mc Graw Hill , New Delhi
- Digital Design, Mano Morris, M. , PHI, New Delhi
- Digital Computer Fundamentals, Bartee Thomas, C., Mc Graw Hill.

BCA321: JAVA LAB
Practical Exercises
Exercises based on Input/output statements, loops, if, switch, array(1d-2d), constructors, Method Overloading, static and this and final keywords, String and its inbuilt functions, inbuilt mathematical functions, Method Overriding, Abstract Class, Runtime polymorphism, Exception Handling (User defined also), finally block, package, applet.

BCA322: DATABASE SYSTEM LAB
Practical Exercises
Exercises based on creating table, inserting data into tables, viewing data in the tables, sorting data in table, deleting tuples from table, updating the contents of a table, modifying the structure of table, applying primary key, foreign key and unique key constraints, computations on table data, oracle functions, grouping data from tables, subqueries, Joins

BCA323: DIGITAL ELECTRONICS LAB
Practical Exercises
Exercises based on Logic Gates:Verification of AND,OR,NOT,Universal Gates,Exclusive gates with 2 and more inputs, truh tables, NAND GATE as universal gate, Designing of logic circuits from equations. Boolean laws and postulates,demorgan's Theorem, Adder: Half adder, Full adder; Subtractor: Half , full subtractor; Encoder, Decoder, Multiplexer, Demultiplexer, 2-2 bit comparator, Sequential Circuits: RS latch,RS Flip flop,D latch,D flip Flop,J K Flip Flop, J K master slave flip flop with characteristic tables ad block, circuit diagrams;Registers:Buffer,Shift register, Counters: Asynchronous and Synchronous; Ripple Up, Ripple Down Counters, Modulo Counters.

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BCA414	Computer Graphics	3	3 hrs	20	80	100
BCA415	Computer Architecture	3	3 hrs	20	80	100
BCA421	.Net Technologies Lab	4	3 hrs	20	80	100
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BCA423	Computer Architecture Lab	4	3 hrs	20	80	100
	TOTAL					800

BCA411: .Net Technologies	
Unit	
I	DOT NET Framework, Overview and Base Class Library, MSIL, Common Language Run Time (CLR), Events, .NET Assemblies, Shared Assemblies, Advantages of Assemblies, Dynamic Link Library (DLL), Namespaces, Visual Studio IDE,Client Server model, IIS Web Server Difference between Windows and Web Applications.
II	VB.NET : Variables, Data types, Operators, Control Structures: if-then-else, Select Case, for-next, for Each….Next, Do loop, While…End While, Type Conversions, Functions, Subroutines, Array: Concept of 1D and 2D arrays,, Array of Arrays, Array list class along with 4 members
III	ASP.NET: How the ASP.NET works, Basics of ASP.NET, Concept of Code behind file , ASP.NET:Web forms, Web Controls categories, server Controls and Web Controls:Label, Textbox, CheckBox and CheckBoxList, RadioButton and RadioButton List, ListBox and DropDownList, Table, Image ,Hyperlink etc. RichWeb Controls: AdRotator, Calendar, TreeView, TabStrip.Debugging ASP.NET pages: Error Handling: Custom Error Page, Using Debugging Tools: Debugger and Trace Facility.
IV	ASP.NET Validation Controls: Need of Validation Control, Various Controls like Require Field, Compare, Range, RegularExpression, Custom validation , Validation Summary, Dynamic controls.ASP.NET Security: IIS security: Authentication, Authorization and Impersonation using Session State.ASP.NET Application Configuration, Web.Config, Global.asax file.
V	ASP.NET Database Programming:Basic concept of ADO.NET, ADO vs ADO.NET,ADO .NET Object Models, Connection, Command, DataReader, DataAdapter, Concept of Dataset, Datatable, Datarow, Dataacolumn. Communicating with OLEDB Data Sources Using ADO.NET

Suggested Readings

- The Visual Basic. NET Bible by Bill Evjen, Jason Beres and et al. ISBN: 0764548263
- ASP.NET Bible by mridulaParihar and et al. ISBN: 0764548166

Unit	BCA412: Computer Oriented Numerical and Statistical Method
I	Significant digits, floating point representation of numerals, arithmetic operations with normalized floating point number–addition, subtraction, multiplication and division, errors in numerical computation. Pitfalls in computing.
II	Initial approximation of roots, Descate's rule of sign, Iterative Methods - Bisection, Regula-Falsi, Newton Raphson, method of successive approximations, Concepts of roots synthetic division , value and values of derivative of a polynomial by synthetic division.
III	Solution of ordinary differential equations - Taylor's method, Euler's method, RungeKutta second and fourth order method, Picard's method, modified Euler's method. Numerical Integration - Introduction, Trapezoidal rule, Simpson's 1/3 and 3/8 rule.
IV	Solution of simultaneous linear equation: Gauss elimination method, Pivoting, ill conditioned equations, Refinement of solution, Gauss Seidal iterative method. Curve fitting - Method of least squares, fitting of straight lines, polynomials, exponential curves.
V	The basic concepts: Variables and Attributes, Statistics, Population and sample, complete enumeration vs sample surveys, probability and purposive sampling, simple random sampling Frequency distributions: Frequency distributions, histograms, Frequency polygons, frequency curves, cumulative frequency, distributions, ogives, Measure of Central Tendency, Median, mode, arithmetic mean

Suggested Readings

- Computer Oriented Numerical Methods, R S Salaria, Khanna Publication
- Computer Oriented Numerical Methods, P Thangaraj, PHI Publication
- Computer Oriented Numerical Methods, V Rajaraman, Prentice Hall India
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Unit	BCA413: Operating System
I	Introduction: Definition of Operating System, Types of operating systems: Batch Systems, Multi programming, Multiuser, Multitasking, Time–sharing, Spooling, Parallel, Distributed and Real-time systems, Operating System Concepts, Operating System Services, System calls.
II	Process Management: Process concept, Process States, Representation of process (PCB), Process Scheduling, CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Algorithm evaluation.
III	Memory Management: Contiguous, Non contiguous, Swapping, Fragmentation, Compaction, Paging, Segmentation, Virtual memory management, Demand paging, Page replacement and Virtual memory concepts, Introduction to Thrashing.
IV	The Deadlock problem, Characterization (Hold and wait, Circular Wait, No Pre-emption, No sharing of resources), Prevention, Avoidance: (RAG And Wait for Graph), Detection and Recovery from Deadlock: (Banking algorithm and detection algorithm), Concept of Fork and Join methods.
V	Process concurrency, Concept of concurrency, cooperating process, precedence graph, Critical section problem, Mutual exclusion , semaphores, classical process (Reader Writer problem, Consumer producer problem, Dining Philosopher problem),Inter Process Communication

Suggested Readings

- Operating System Concepts Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, John Wiley & Sons Inc.

Unit	BCA414: Computer Graphics
I	Introduction: fundamentals of Computer Graphics, point, dot, pixel, Resolution, Elements of graphics workstation. Video Display Devices-Raster Scan Systems Random Scan systems, aliasing problem and solution techniques, Input devices. Graphics Coordinate Representations, Concepts of video memory and frame buffer.
II	Algorithms: Line drawing algorithms- DDA Algorithm, Bresenham's Line Algorithm, Circle: Midpoint Circle Algorithm. Polygons, convex and convex polygons. Inside-Outside tests, Polygon fill algorithms: Boundary fill Algorithm, Flood fill Algorithm.
III	Graphics Primitives: Primitive Operations, The display file interpreter-Normalized Device Coordinates, Display- File structure. Display – file algorithm. Display control and Polygon representation. Attributes of output primitives: character generation, Line attributes - Line type. Line width, Pen and Brush options. Line Color. Color and gray scale levels. Color-tables. Gray scale. Area- Fill Attributes- Fill styles. Pattern fill. Soft fill. Character Attributes. Text attributes, curve attributes..

IV	Geometric Transformations: Matrices. Translation, Scaling, Rotation Transformations. Homogeneous Co-ordinates. Composite Transformation. Rotation and scaling about an arbitrary point. Other transformations: reflection and shearing. Inverse Transformations.
V	2-D Viewing- The viewing pipeline. Viewing co-ordinate, Reference Frame. Window to viewports co-ordinate transformation, 2-D Viewing functions. Clipping operations point clipping, Cohen- Sutherland Line Clipping algorithm, Sutherland Hodgmann polygon clipping algorithm.

Suggested Readings

- Computer Graphics Hearn & Baker
- Computer Graphics by Steven Herrington

Unit	BCA415: Computer Architecture
I	Register Transfer Language: Inter-register transfer; Parallel, Serial & Bus Transfer. Memory Transfer. Arithmetic, logic & shift micro-operations. Control Functions. Machine and Instruction cycles
II	I/O Architecture: I/O devices and their controllers: LED Display & Hex Keyboard. Peripheral Devices. I/O interface. Microprocessor Interface, Elementary concepts of Isolated IO and Memory mapped IO. Modes of Transfer: Asynchronous data transfer: strobe control, handshaking. DMA
III	CPU organization: Address, data & Control bus. Processor bus organization. ALU: Arithmetic and logic circuit. Stack organization. Instruction format and Addressing Modes.
IV	Microprogram control organization: control memory, Address sequencing: mapping of macro-operation, subroutines. Microprogram Example, microinstruction format. Microprogram sequencer.
V	Microprocessor system: Introduction to microcomputer system. Pins of 8085 microprocessor, Block diagram of 8085 microprocessor. Programming model of 8085. Assembly language structure of 8085.

Suggested Readings

- Computer System Architecture. Manno M. PHI
- Introduction to Microprocessors, Leventhal, L.A, Prentice Hall of India
- Introduction to Microprocessors, Mathur, A.P., Tata McGraw Hill

BCA421: .NET Technologies LAB
Practical Exercises
Exercises based on Events such as Click, Indexchangedetc, Controls like button,textbox,checkbox, etc, Control structures like for..next,while,do while etc, Arrays so as to accept the input and process the data

BCA422: COMPUTER GRAPHICS LAB
Practical Exercises
Exercises based on inbuilt graphic functions, line drawing algorithms, polygon fill algorithms, transformation(translation, scaling, rotation), simple animation

BCA423: COMPUTER ARCHITECTURE LAB
Practical Exercises
Exercises based on Data transfer group: Move, load, store, memory references, Arithmetic Group, Logical bit manipulation programs, Branch and subroutines, Stack and interrupts

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BCA521	Python Lab	4	3 hrs	20	80	100
BCA522	LINUX Lab	4	3 hrs	20	80	100
BCA523	Internet Programming Lab	4	3 hrs	20	80	100
	TOTAL					800

Unit	BCA511: PYTHON PROGRAMMING
I	Introduction to Python, versions, uses, installation, Python development environment , Python Interpreter : Shell, Execute Python Script, Indentation and blocks in Python, Python keywords , variables , data types , input and print statement, Python Operators: Arithmetic, Assignment, Comparison, Logical, Identity, Membership, slice , Bitwise operator
II	Python Conditions : if , elif , else, nested if, Python Loops : while .. else , for .. else , range , break and continue statement, Python Data structure : List , Tuple , Set , Dictionary Python Functions : User defined function , pass statement, return , positional and keyword arguments, arbitrary arguments , local and global variable , Lambda function
III	Python Class : Defining a Class. class attributes and Instance attribute , constructor , class, Methods , Inheritance in Python: Single , Multi level , Multiple , use of super() , access modifiers , polymorphism, Python Modules : creating module , importing module , built in modules - os , sys , math, json
IV	Error Handling in Python : try , except , else , finally , built-in error types, Regular expression in Python , File Handling : manipulating files and directories, Python File I/O : read and write text files , read and write CSV files.
V	Handling Database : Establishing connection with MySql database , creating table , select, insert , update and delete records Using NoSQL with Python : Establishing connection with MongoDB , create collection, insert, document, find all and find one , update and delete documents

Suggested Readings

- [O`Reilly] - Learning Python - Mark Lutz
- MySQL for Python: Database Access Made Easy by Albert Lukaszewski PhD (Author)
- MongoDB and Python by Niall O;Higgins

BCA512:Organization Behaviour	
Unit	
I	Introduction to O.B- meaning, definitions, nature and scope of O.B, objectives , importance of O.B, contributory disciplines to OB.
II	Foundation of individual behaviour - Personality-Meaning, types, Perception- definition, Meaning, Factor influencing Perception, common perceptual errors, Process, Attitudes.
III	Motivation –Meaning, Definitions, Importance, early theories of motivation, Group dynamics
IV	Leadership – Meaning and definition, characteristics, styles and Importance. Work stress, Counselling- types and importance.
V	Organizational Change- Meaning, types, Importance, Process, Resistance to change, Overcoming resistance to change.

Suggested Readings

- Management & Organization- Louis A. Allen, McGraw Hill, publications
- Management & Organization- C.B. Gupta, Sultan Chand Publications
- Management: A Global Perspective, Koontz & Weirich, McGraw Hill publications
- Management- Koontz & O' Donnel, Tata McGraw Hill publications
- Essentials of Management- Massie, Prentice Hall publications

BCA513: LINUX Operating System	
Unit	
I	Introduction to the Concept of Open Source Software, Linux Overview, History of Linux, Linux distributions, architecture, Linux file system (inode, Super block, Mounting and Unmounting) , Kernel , Introduction to Linux Processes and System calls .
II	Introduction to Shell, Various shells, shell customization, vi editor, Linux files and the file structure, listing, displaying and printing files, managing directories, File and Directory operations, Essential Linux commands, Internal and External commands, Archiving and compressing files.
III	I/O redirection and Piping, Simple filters commands – grep, head, tail, cut, paste, sort, uniq. Processes: background process, premature termination of process, process priorities, process scheduling, nohup command. Compiling C Programs in Linux Environment
IV	Shell programming: Interactive scripts. Shell variables, assigning values to variables, positional parameters, command line arguments, arithmetic in shell script, exit status of a command. sleep and wait, script termination, Taking decisions, Loop Control Structure, Shell Metacharacters,Shell Miscellany

V	File Ownerships and access permissions, changing permissions and ownerships, User and its Home directory, Booting and Shutting down, Boot Loaders, LILO, GRUB, Bootstrapping, init Process, System services,init and run levels

Suggested Readings

- Linux: The Complete Reference, Richard Petersen
- Design of the UNIX Operating System Maurice J. Bach, AT&T Bell Labs.
- Unix shell programming, Yashwant Kanetkar, BPB Publications.

Unit	**BCA514: Internet Programming**
I	Introduction to Server side Programming, Introduction to PHP, PHP and HTML, essentials of PHP, Why Use PHP, Installation of Web Server, WAMP/XAMPP Configurations, Writing simple PHP program, embedding with HTML, comments in PHP, Variables, Naming Conventions, Data types, Operators: Arithmetic, logical and comparison. Control statements (if, switch), Loops(for and while).
II	Arrays: Array – Key pair value, types of arrays and foreach loop, Array functions, ISSET, UNSET, gettype(), settype(), Strings: String Concatenation, String functions. User Defined Functions (with argument, return values), global variable, default value, Form handling: GET-POST method and its implementations, Cookies, Sessions, Include statement.
III	Php Introducing Database and MySQL: PHP with MySQL, Creating Connection and close connections, Selecting Database, Perform Database (query), MySQL functions. Use returned data. MySQL Database Integration and Query processing and Web Forms Applications.
IV	Introduction to OOPS, creating classes, creating objects, setting access to properties and methods. Constructors, destructors, Polymorphism: types: runtime and compile time, overriding of methods.
V	File handling in PHP – Opening a file, reading and writing from and to FILE. Basic file functions: file(), file_exists(), fopen(), fwrite(), fclose(), fgets(), copy(), file_get_contents(), fscanf(), fprintf(), fputs(), fseek(), ftell(), fread(), fwrite() and their implementations.

Suggested Readings

- Web Standards Programmer's Reference: Steven M. Schafer

BCA515: System Design and Analysis	
Unit	
I	System Concept: Definition, Characteristics of a System: Organization, Interaction, Interdependence, Integration, Central Objective. Elements of a System: Outputs and Inputs, Processor(S), Control, Feedback, Environment, Boundaries and Interfaces. Types of Systems: Physical or Abstract Systems, Open and Close Systems, Man-Made Information Systems.
II	System Development Life Cycle, Considerations for Candidate System: Technical Factors, Behavioral Factors, Political Considerations, Economic Factors. Planning and Control for System Success, Prototyping, Role of System Analyst.
III	Information Gathering: Various Methods, Tools of Structured Analysis: Data-flow Diagram, Decision Tree, Structured English, Decision Tables, Data Dictionary, Feasibility Study.
IV	System Design: Definition, Types of System Design: Logical and Physical Design. Design Methodologies: Structured Design, Form-Driven Methodology-IPO Charts, Structured Walkthrough. File Organization: Sequential Organization Indexed Sequential Organization, Inverted List Organization. Logical and Physical views of Data. Input Output form Design.
V	System Implementation: Need of Testing, Test Plan, Quality Assurance, Trends in Testing, Audit Trails, Post Implementation Review. Security and Recovery in System Development: System Security, Threats to System Security, Control Measures, Disaster/Recovery Plannings: Ethics in System Development.

Suggested Readings

- System Analysis and Design, Elias M Awad

BCA521: Python Lab
Practical Exercises
Exercises based on variables, data types , Operators : arithmetic, logical ,comparision, boolean operator, Control statements – if elif , Loop: while , for .. range , User Defined Function with different types of arguments, list, tuples, sets, and dictionaries, Regular Expressions, Recursive functions, local and global variables, Lambda expressions, Importing Module – os, sys , math, creating own module. Exception Handling: try, except, else, finally, File Handling: manipulating files and directories, text files: reading/writing text from/to a file; Database, Object Oriented Programming: Concept of OOP:Inheritance, and Polymorphism

BCA522: LINUX LAB

SNo	Practical Exercises
1	Assignments based on vi editor, Linux files and the file structure, listing, displaying and printing files, managing directories, File and Directory operations, Essential Linux commands, Internal and External commands, Archiving and compressing files.
2	Assignment based on Compiling and Executing C Programs in Linux Environment.
3	Assignment based on Shell programming, shell variables, assigning values to variables, positional parameters, command line arguments, arithmetic in shell script, exit status of a command, sleep and wait, script termination, Taking decisions, Loop Control Structure, Shell Metacharacters.
4	Assignment based on File Ownerships and access permissions, changing permissions and ownerships, User and its Home directory, Booting and Shutting down

BCA523: Internet Programming Lab
Practical Exercise:(PHP using WAMP/XAMPP)
Practical exercises: Programs on PHP variables, operators and its types, Loop, Arrays, GET & POST methods, functions, introduction to database connectivity.

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BCA611	Software Engineering	3	3 hrs	20	80	100
BCA612	Information System Management	3	3 hrs	20	80	100
BCA621	Advanced Excel Lab	4	3 hrs	20	80	100
BCA622	Major Project	4	3 hrs	40	160	200
	TOTAL					500

Unit	BCA611: Software Engineering
I	Introduction, Software Engineering, Software Process, Characteristics of Software Process, Development Process Models- waterfall, prototyping, iterative, spiral. Project Management Process, Inspection Process, Software Configuration Management process, Requirement Change Management process.
II	Software Requirement Specification (SRS)- Problem analysis, structuring information, Data flow diagram, entity relationship diagram and data dictionary, structured analysis, Characteristics and component of (SRS).
III	Planning a Software Project- Cost estimation, Single variable model, COCOMO model, software size estimation, Project scheduling and milestones, Verification & Validation. Software Architecture, Role views, Function oriented design – Top down and Bottom up strategies. Coupling, Cohesion. Concept of Object Oriented Analysis and Design
IV	Coding- Standard guideline for coding, Structured Programming, Object oriented programming, Information Hiding, Programming style, Internal Documentation. Testing- Level of testing, Unit testing, Black box & White box testing, Functional Testing, Structural Testing. Testing Process – level of testing, test plan, test case, defect logging and tracking.
V	Software Maintenance: Maintenance as part of software evaluation, reasons for maintenance, types of maintenance (Perceptive, adoptive, corrective), designing for maintainability, techniques for maintenance, case tools, Configuration Management.

Suggested Readings

- I.Sommerville, "Software Engineering", Addison Wesley,

BCA612: Information System Management	
Unit	
I	Overview of a Management Information System. Computers and information processor, Data, Information Systems, Information Resource Management and Decision Making, MIS structure, Structure base on management activity and organizational functions.
II	Various phases in the decision making process. Behavioral model of Decision Making and organization decision making. Decision under Psychological Stress.
III	Documentation and communication decision rules. Relevance of decision making. Age of information and application of information. Type of systems. Preventing systems entropy. System stress and system change.
IV	Concepts of organizational planning, Computational support for planning. Nature of control in organization. Information system support for control. The basic model of organizational structure. Information processing model of organization structure.
V	Introduction to Decision support system (DSS) - Structure of Decision Making, Users Introduction to Expert system (ES) – Support in Decision making process, Approaches to development of DSS, Management of Knowledge – Types of Knowledge work.

Suggested Readings

- Management Information System Gordon B.Davis, Margrethe H. Olson, Tata McGraw-Hill Publishing

BCA621: Advanced Excel Lab
Creation and writing knowledge on complex formulas, What if Analysis, sparklines, data functions and data validation rules, conditional formatting, macros, pivot tables and charts, use of queries to import external data, lookup functions, Charts and slicers

BCA622: Major Project

Software project shall be developed by the students. There shall be 3 – 4 students in one project group who will work together as a team. In extreme cases it may be 5 students with prior permission. They will work under the supervision of one of the faculty of the department. The tools which can be used to develop the project shall only be the ones which they have studied in their course.

SYLLABUS, TEACHING & EXAMINATION SCHEME
For BSc (Comp. Sc) (II,III year) WEF FROM SESSION 2023-24

BSc - III Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BSCS311	Web Design	3	3 hrs	20	80	100
BSCS312	Operating System	3	3 hrs	20	80	100
BSCS321	Web Design Lab	4	3 hrs	20	80	100
BSc - IV Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BSCS411	Database Management System	3	3 hrs	20	80	100
BSCS412	Computer Graphics	3	3 hrs	20	80	100
BSCS421	DBMS Lab	4	3 hrs	20	80	100
BSc - V Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BSCS511	Java Programming	3	3 hrs	20	80	100
BSCS512	Computer networks	3	3 hrs	20	80	100
BSCS521	Java Lab	4	3 hrs	20	80	100
BSc - VI Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BSCS611	Python Programming	3	3 hrs	20	80	100
BSCS612	E-commerce and Cyber Security	3	3 hrs	20	80	100
BSCS621	Python Lab	4	3 hrs	20	80	100

BSc - III Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BSCS311	Web Design	3	3 hrs	20	80	100
BSCS312	Operating System	3	3 hrs	20	80	100
BSCS321	Web Design Lab	4	3 hrs	20	80	100

Unit	**BSCS311: Web Design**
I	Introduction of HTML: markup language features, versions, elements of html: syntax, head and body sections, character formatting tags: B,U,I,SUB,SUP. Drawing ruler with HR tag. Creating lists: OL tag and its attributes START, TYPE and VALUE, UL tag and its attribute TYPE, LI tag. Using font: FONT tag and attributes like SIZE, COLOR and FACE, text alignment
II	Image Element: IMG tag and its attributes SRC, ALT, ALIGN, BORDER, WIDTH and HEIGHT. Presenting information in Table: Tags like TABLE, TR, TD and TH, Use of ROWSPAN and COLSPAN. Frames: Dividing window with frames using FRAME and FRAMESET tag, inline frame using IFRAME tag
III	Anchor tag A and its various attributes HREF, TITLE, NAME ACCESSKEY and TARGET, Images and Text as hyper link. Hyperlink and table elements. Forms: Use of FORM tag, understanding of widgets, <INPUT> Tag, use of Submit and Reset Buttons, Forms processing (Action and Method).
IV	Dynamic HTML: CSS: Introduction – inline styles, creating style sheets with the style element, Linking External style sheets, User Style Sheets, Conflicting styles. Introduction to JavaScript, versions, variables, let, const, datatypes, operators: Arithmetic, Logical, Comparison, Assignment, concat, Ternary.
V	Control Statements: if ... else, switch-case, Loops: for, while, do … while, break and continue statement, built-in functions-eval, parseInt, parseFloat, user-defined function, alert, prompt, confirm, document objects: document.write, document.getelementById.

Suggested Readings

- HTML complete, BPB Publication(Sybex)
- Deitel and Deitel

Unit	**BSCS312: Operating System**
I	Introduction: Definition of Operating System, Types of operating systems: Batch Systems, Multi programming, Multiuser, Multitasking, Time–sharing, Spooling, Parallel, Distributed and Real-time systems, Operating System Concepts, Operating System Services, System calls**.**
II	Process Management: Process concept, Process States, Representation of process (PCB), Process Scheduling, CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Algorithm evaluation.
III	Memory Management: Contiguous, Non contiguous, Swapping, Fragmentation, Compaction, Paging, Segmentation, Virtual memory management, Demand paging, Page replacement and Virtual memory concepts, Introduction to Thrashing.
IV	The Deadlock problem, Characterization (Hold and wait, Circular Wait, No Pre-emption, No sharing of resources), Prevention, Avoidance: (RAG And Wait for Graph), Detection and Recovery from Deadlock: (Banking algorithm and detection algorithm), Concept of Fork and Join methods.
V	Process concurrency, Concept of concurrency, cooperating process, precedence graph, Critical section problem, Mutual exclusion , semaphores, classical process (Reader Writer problem, Consumer producer problem, Dining Philosopher problem),Inter Process Communication

Suggested Readings

- Operating System Concepts Abraham Silberschatz, Peter Baer Galvin, Greg Gagne John Wiley & Sons Inc.

BSCS321:Web Design Lab
Practical Exercises
Exercises based on Events such as Click, Indexchanged etc (at least 2), Controls like button, textbox, checkbox, etc (at least 6), on Javascript control structures such as while (at least 4) javascript Arrays so as to accept the input and process the data, VBscript control structures such as while (at least 2), vbscript Arrays so as to accept the input and process the data , on DHTML objects(all and children)

BSc - IV Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BSCS411	Database management System	3	3 hrs	20	80	100
BSCS412	Computer graphics	3	3 hrs	20	80	100
BSCS421	DBMS Lab	4	3 hrs	20	80	100

Unit	BSCS411: Database Management System
I	Introduction to Database: Need for DBMS, advantages of DBMS, views of data, instances and schema data independence, database administrator, database manager, database languages, overall structure of DBMS.
II	Entity Relationship Model: Entities, attributes, relationship, constraints, keys, E-R diagram. Concept of strong and weak entity sets, generalization, specialization and aggregation.
III	Relational Model: Structure of Relational Databases, Relational Databases, Modification of the Databases, Tuple Relational Calculus, Domain Relational Calculus.
IV	SQL – Basic structure – Clauses, data types, creating tables. Modification of the database – deletion, insertion, updates. Retrieving data from tables, ordering, set operations – union, intersect, except, concept of NULL values, nested subqueries – set membership, set comparison, exist and not exist operator, unique, not unique construct.
V	Joins, equi-joins, non-equi-joins, self joins, outer joins. Aggregate functions – group by and having clause. Math functions, string functions, group by clause. Indexes, views, granting and revoking permissions.

Suggested Readings

- Database Concepts, Korth, Silbertz, Sudarshan, McGraw Hill.
- Database Management System, Suresh Fatehpuria.
- SQL/PL-SQL The Programming Language of Oracle, IVAN BAYROSS.

Unit	BSCS412: Computer Graphics
I	Introduction: fundamentals of Computer Graphics, point, dot, pixel, Resolution, Elements of graphics workstation. Video Display Devices-Raster Scan Systems Random Scan systems. Input devices. Graphics Software Coordinate Representations, Fundamental Problems in Geometry, Concepts of video memory and frame buffer.
II	Algorithms: Line drawing algorithms- DDA Algorithm, Bresenham's Line Algorithm, Circle: Midpoint Circle Algorithm. Polygons, convex and convex polygons. Inside-Outside tests, Polygon fill algorithms: Boundary fill Algorithm, Flood fill Algorithm. Character generation. Attributes of lines, curves, characters. etc.
III	Graphics Primitives: Primitive Operations, The display file interpreter-Normalized Device Coordinates, Display-File structure. Display – file algorithm. Display control and Polygon representation. Attributes of output primitives: Line attributes - Line type. Line width. Pen and Brush options. Line Color. Color and gray scale levels. Color-tables. Gray scale. Area- Fill Attributes- Fill styles. Pattern fill. Soft fill. Character Attributes. Text attributes.
IV	Geometric Transformations: Matrices. Translation, Scaling Transformations. Sine and Cos Rotation. Homogeneous Co-ordinates . Composite Transformation. Rotation and scaling about an arbitrary point. Inverse Transformations, Transformations Routines.
V	2-D Viewing- The viewing pipeline. Viewing co-ordinate, Reference Frame. Window to viewports co-ordinate transformation, 2-D Viewing functions. Clipping operations point clipping, Cohen- Sutherland Line Clipping algorithm, Sutherland Hodgmann polygon clipping algorithm

Suggested Readings

- Computer graphics Donald,Hearn, M.Pauline Baker
- Computer graphics Steven Harrington.

BSCS421:DATABASE MANAGEMENT SYSTEM LAB
Practical Exercises
Exercises based on creating table, inserting data into tables, viewing data in the tables, sorting data in table, deleting tuples from table, updating the contents of a table, modifying the structure of table, applying primary key, foreign key and unique key constraints, computations on table data, oracle functions, grouping data from tables, subqueries, Joins

BSc - V Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BSCS511	Java Programming	3	3 hrs	20	80	100
BSCS512	Computer Networks	3	3 hrs	20	80	100
BSCS521	Java Lab	4	3 hrs	20	80	100

Unit	BSCS511: Java Programming
I	Object Oriented Concepts in Java, Comparison of Java and C++, Java features like security, portability, byte code, java virtual machine, object oriented, robust, multithreading, architectural neutral, distributed and dynamic. Java Source File Structure, Compilation, Execution.
II	Class Fundamentals, Object & Object reference, Creating and Operating Objects, Use of Tokens, Identifiers, Keywords, Literals, Comments, Primitive Data Types, Operators-precedence and associativity, Type conversion, Command line argument,-decision making – if, if..Else, switch; loops – for, while, do…while; special statements– return, break, continue.
III	Array – single and two dimension array. Object Life time & Garbage Collection, Access Modifiers, Constructors , Object Life time & Garbage Collection, Defining Methods, Argument Passing Mechanism, Method Overloading, Recursion, Finalize() Method, Use of this keyword
IV	Inheritance – Advantages of Inheritance in OOP, types of Inheritance, constructors in inheritance, use of super keyword, polymorphism; Abstract Class, Interfaces - defining an interface, implementing and applying interfaces, using variables in interfaces, extending interfaces; Method overriding – use, need, advantage.
V	Use of super, final and static keyword, Package - Organizing Classes and Interfaces in Packages, Package as Access Protection, defining Package, CLASSPATH Setting for Packages and Introduction to Applet programming. Introduction to Exception Handling: try..catch..throw..throws...finally, Accepting input from keyboard

Suggested Readings

- Programming with Java -E Balaguruswamy, IV Edition.

Unit	BSCS512: Computer Networks
I	Principles of Data Communication: Evolution of computer networks, General features and tasks of a communication system, Fundamentals of signals, carrier waves. Modes of transfer : simplex , half duplex ,full duplex, types of networks : LAN, WAN, MAN.
II	Networking Architecture : ISO-OSI, TCP/IP –their functions of each layer and implementation. Concepts of circuit switching, packet switching and message switching. Fundamentals of datagrams. Flow and Error Control – Stop and Wait, Sliding Window, Automatic Repeat Request.
III	Signal encoding and decoding techniques - Amplitude Modulation, Frequency Modulation, Phase Modulation. LAN access techniques: ALOHA, CSMA, token ring and token bus.
IV	Error detection and correction codes: Parity bit, Checksum, Hamming codes, CRC, single error detection and correction. Introduction to Network security Model, concepts of key, Caeser cipher, transposition cipher.
V	Transmission media - twisted pair, coaxial cable, optical-fibre. LAN topologies: STAR, BUS and RING,TREE & MESH network. Data communication concepts: Connecting devices, hub, switch, bridge, routers and gateways.

Suggested Readings

- Stalling, Data & Computer Communication.
- Tanenbaum, Computer Network, Pearson.Ed., Pearson
- Kurose, Computer Networking, Pearson
- Peterson, Davie; Computer Networks, Elsevier

BSCS521:JAVA PROGRAMMING LAB
Practical Exercises
Exercises based on Input/output, loops, if,switch, array(1d-2d), Use of different types of constructors, Implement Method Overloading, Use of static and this and final keyword, Implement Single and Multilevel (using super), Use of String and its inbuilt functions, Use of inbuilt mathematical functions, Implement Method Overriding, Implement Abstract Class, Implement Exception Handling, Implement finally block, Implement package

BSc - VI Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
BSCS611	ASP.NET	3	3 hrs	20	80	100
BSCS612	E-commerce and cyber law	3	3 hrs	20	80	100
BSCS621	ASP.NET Lab	4	3 hrs	20	80	100

Unit	BSCS611: Python Programming
I	Introduction to Python, versions, uses, installation, Python development environment , Python Interpreter : Shell, Execute Python Script, Indentation and blocks in Python, Python keywords , variables , data types , input and print statement, Python Operators: Arithmetic, Assignment, Comparison, Logical, Identity, Membership, slice , Bitwise operator
II	Python Conditions : if , elif , else, nested if, Python Loops : while .. else , for .. else , range , break and continue statement, Python Data structure : List , Tuple , Set , Dictionary Python Functions : User defined function , pass statement, return , positional and keyword arguments, arbitrary arguments , local and global variable , Lambda function
III	Python Class : Defining a Class. class attributes and Instance attribute , constructor , class, Methods , Inheritance in Python: Single , Multi level , Multiple , use of super() , access modifiers , polymorphism, Python Modules : creating module , importing module , built in modules - os , sys , math, json
IV	Error Handling in Python : try , except , else , finally , built-in error types, Regular expression in Python , File Handling : manipulating files and directories, Python File I/O : read and write text files , read and write CSV files.
V	Handling Database : Establishing connection with MySql database , creating table , select, insert , update and delete records Using NoSQL with Python : Establishing connection with MongoDB , create collection, insert, document, find all and find one , update and delete documents

Suggested Readings:

- ASP.NET Bible
- Professional ASP.NET 4, Wiley Publication

Unit	BSCS612: Ecommerce and Cyber Security
I	E-commerce and its Technological Aspects Overview of developments in Information Technology and Defining E-Commerce: The scope of E commerce, Electronic Market, Internet Commerce, Benefits and limitations of E-Commerce, Electronic Commerce Models, Value Chains in Electronic Commerce, Generic framework for E-Commerce, Architectural framework of Electronic Commerce, Web based E Commerce Architecture. EDI, EDI technology, EDI standards, EDI communications, EDI Implementation, EDI Agreements, EDI Security.
II	Electronic Payment Systems, Need of Electronic Payment System : use of Electronic Payment system and the protocols used, Electronic Fund Transfer and secure electronic transaction protocol for credit card payment. Digital economy: Identify the methods of payments on the net – Electronic Cash, cheques and credit cards on the Internet.
III	Security in E Commerce Threats in Computer Systems: Virus, Cyber Crime Network Security: Encryption, Protecting Web server with a Firewall, Firewall and the Security Policy, Network Firewalls and Application Firewalls, Proxy Server.
IV	Issues in E Commerce Understanding Ethical, Social and Political issues in E-Commerce: A model for Organizing the issues, Basic Ethical Concepts, Analyzing Ethical Dilemmas, Candidate Ethical principles.
V	Privacy and Information Rights: Information collected at E-Commerce Websites, Cyber Crimes – hacking, software piracy, Cyber Law, IT Act 2010, The Concept of Privacy, Legal protections, Intellectual Property Rights: Types of Intellectual Property protection, Governance.

Suggested Readings

- Electronic Commerce : Pete Joshin, John Vacca.

BSCS621:Python Lab
Practical Exercises
` Exercises based on variables, data types , Operators : arithmetic, logical ,comparision, boolean operator, Control statements – if elif , Loop: while , for .. range , User Defined Function with different types of arguments, list, tuples, sets, and dictionaries, Regular Expressions, Recursive functions, local and global variables, Lambda expressions, Importing Module – os, sys , math, creating own module. Exception Handling: try, except, else, finally, File Handling: manipulating files and directories, text files: reading/writing text from/to a file; Database, Object Oriented Programming: Concept of OOP: Inheritance, and Polymorphism in Python.