Jamia Hamdard
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SYLLABUS OF Bachelor of Computer Applications (BCA)

BCAD 101 - INTRODUCTION TO 'C' PROGRAMMING

Unit 1: Basic Concepts of Programming
Programming Fundamentals: Algorithms and Flowcharts, problem solving techniques, stepwise refinement; Programming in C: features of 'C', tokens, data type, operators, expression.

Unit 2: Branching and Looping
Branching Constructs: if-else, switch, conditional operator & goto statements; looping Constructs: white, do-while, for and Jumping statements.

Unit 3: Arrays and Functions
Arrays, string processing, Functions: categories of functions, recursion.

Unit 4: Pointers, Structures, and Unions
Pointers: operations on pointers, pointers & structures; Structures and Unions.

Unit 5: Debugging and File Handling
Development of efficient programs; Debugging, verification and testing of programs. File Management: Defining & opening a file, closing a file, input operations.

BCAD 102 - COMPUTER SYSTEM ARCHITECTURE

Unit 1: Introduction
Logic gates, Boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexers, registers, counters and memory units.

Unit 2: Data Representation and Basic Computer Arithmetic
Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison, and multiplication and division algorithms for integers.

Unit 3: Basic Computer Organization and Design
Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer.

Unit 4: Central Processing Unit

Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures, pipelining and parallel architecture.

Unit 5: Memory and I/O Organization

Cache memory, Associative memory, mapping; Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.

BCAD 103 - MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Unit 1: Algebra of Matrices

Matrix Algebra including rank, inverse, linear system of equation, Eigen value & Caley Hamilton Theorem; Team working and management.

Unit 2: Introduction to Differential Calculus

Differentiation and partial differentiation, derivative of sum, dot product and cross product of two vectors, gradient, divergence and curl.

Unit 3: Successive and Partial Differentiations

Successive differentiation, libneitz theorem, partial differentiation.

Unit 4: Differential Calculus for curvatures

Curvature, asymptotes, singular points, concavity, points of inflexion and tracing of Cartesian curve, Differential equation of first order.

Unit 5: Coordinate Geometry

System of circles, standard equations and properties of parabola and Ellipse; General equation of second degree in two variables, tracing of conic sections, sphere.

BCAD 104 - COMMUNICATION SKILLS

Unit 1: Grammar, Dictionary, and Thesaurus

Review of English Grammar; Written and Spoken language; Common Errors in language; Punctuation (purpose, role, importance and use); Effective use of dictionary, thesaurus, encyclopedia, OED; Figures of speech.

Unit 2: Language, Phonetics, and Writing

Language Skills (listening, Speaking, Reading, Writing); Meaning what you mean; Listening: Effective and efficient listening in various situations (discussions, lectures, news, seminars, speech, telephone calls etc.); Speaking: Phonetics, intonation, accent, usage; strategies for a good rhetoric; Reading: Purpose; Comprehension; Tactics and strategies for good reading; Writing: Guidelines for good writing; various writing styles (General and technical writing styles).

Unit 3: Effectiveness and Efficiency in Communication

Communication (purpose, role importance, elements); Effective and efficient communication; role of content, context and language; Spoken and written communication Presentation and delivery; Role of speaker and audience.

Unit 4: Presentation Skills

Style and body language; Discussion and presentation skills of conferences meeting, seminars.

Unit 5: Drafting the Documents

General and Technical documents (correspondence applications, letter, resumes, CV), drafts, essays, memos; minutes, notes, proposals , précis, reports, summary, synopsis, references, table of contents, acknowledgements, prologue, epilogue, revision; Use of Audio-Visual Aids: OHP, Slides, Charts, Computers etc.

BCAD 105 - MEDIA AND INFORMATION LITERACY COMMUNICATION

Unit 1: Media Education and Literacy

Introduction to Media Education, History of Media Education; Perspectives on Media Education: The Inoculation Model, the Demystification Model, the Creative Participation Model.

Unit 2: Information Literacy

Introduction to Information Literacy, The politics of Information Literacy; The fellow Travelers to Information Literacy, Key moments in the History of Information Literacy.

Unit 3: Leveraging the Power of Computing

Introduction to the History of the Delivery of Computing Power; The Closeness of Computing technology, Mainframes, Micro and Personal Computers; Luggable Computers, Portable Computers, and the Laptop; Pocket Computers, Phones, and the Tablet; Wearable Computing and Augmented Reality Devices.

Unit 4: Digital Media Content

Introduction to Digital Media Content; the nature of Digital Media content; Participatory Culture; Trans media; Converged Content.

Unit 5: Digital Divides

Introduction to Digital Divides; First-Order Digital Devides – Access; Second-Order Digital Devides – Skills; Third-Order Digital Devides – Participation and Outcomes.

BCAD 201 - INTRODUCTION TO DATA STRUCTURES

Unit 1: Data Representation

Representation of data, Data types, ADTs and Data Structures, linear and non – linear data structures.

Unit 2: Arrays, Structures, and Lists

Single and multidimensional arrays, Structures, Static and Dynamic implementation of arrays, Creation, insertion and deletion of linked list, doubly list, circular list etc.

Unit 3: Stack and its operations

Stacks and its application: Definition and examples, Implementing Push and Pop operations, Stack using dynamic memory allocation, Use of stack in problem solving, infix, prefix and postfix notations and conversions, Recursion using stack.

Unit 4: Queues

Queues: Definition and examples, Sequential and dynamic implementation, Implementation of Insert and remove operations.

Unit 5: Tree, Graph, Searching and Sorting

Introduction to tree and graph, Searching techniques: Linear Search, Binary Search, Sorting: Bubble Sort, Quick Sort, Merge Sort, Insertion Sort, Selection Sort.

BCAD 202 - DATA COMMUNICATION AND COMPUTER NETWORKS BASICS

Unit 1: Introduction to Computer Networks

Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite;

Unit 2: Introduction to Data Communication

Analog and digital signal; data-ratelimits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.

Unit 3: Arrays and Functions

Circuit switching; packetswitching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.

Unit 4: Data Link Layer and Multiple Access Protocols

Error detection and error correction techniques;data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet; Routing: routing algorithms; network layer protocolof Internet- IP protocol, Internet control protocols.

Unit 5: Transport and Application Layer Functions and Protocols

Transport services- error and flow control,Connection establishment and release- three way handshake; Overview of DNS protocol; overview of WWW &HTTP protocol.

BCAD 203 - FUNDAMENTAL CONCEPTS OF OPERATING SYSTEMS

Unit 1: Introduction to Operating Systems

Overview of Operating System: Computer System Structure, Operating Systems Structure, Operating System functions; Computing Environments: Traditional Computing, Client-Server Computing, Peer-to-Peer Computing, Web based Computing, and Mobile Computing.

Unit 2: Process Management

Process Management: Process Concept, Process Scheduling, Inter Process Communication, Multithreading; Scheduling Algorithms: FCFS, SJF, RR, and Priority.

Unit 3: Deadlocks and Synchronization

Deadlocks: introduction, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock; Process Synchronization

Unit 4: Memory Management

Memory management: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation; Virtual Memory Management: Demand Paging, Page Replacement Algorithms, Thrashing.

Unit 5: Storage Management

Storage Management: File System, File Concept, Access Method, Directory and Disk Structure, File Sharing; Secondary-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling; I/0 Systems: Overview, I/O Hardware, Application I/O Interface.

BCAD 204 - ELEMENTARY PHYSICS

Unit 1: Mechanics

Units and dimensions; Newton's laws; Conservation of linear momentum; Conservative and non-conservative force; Concept of potential energy; Work energy theorem; Periodic and oscillatory motion; Simple harmonic motion: Time period, Frequency, Phase and phase constant, Energy in simple harmonic motion.

Unit 2: Electromagnetism

Coulomb's law; Superposition principle; Concept of electric field and electric potential: Gauss's law, Simple applications of Gauss's law; Electric Current and current density: Ohm's law, Combination of resistors in series and parallel; Salient features of electromagnetic spectrum.

Unit 3: LASER

Conventional sources of light and LASER, Spontaneous emission, Stimulated Emission, Population inversion, Principle of LASER, Einstein's coefficients, Working of helium-neon and Ruby lasers.

Unit 4: Fiber Optics

Total internal reflection, Introduction of fiber optics, Numerical aperture, Step index and graded index fibers, Attenuation and dispersion mechanism, Application of optical fibers.

Unit 5: Elementary Ideas of Semiconductors

Classification of semiconductors: intrinsic and extrinsic semiconductors, Doping, P-type and N-type semiconductors; Band gap: Classification of materials on the basis of band gap, Formation of P-N junction, Depletion width, Forward biased and reverse biased P-N junction, I-V characteristics; Working of Light Emitting Diode (LED) and solar cell.

BCAD 301 - INTRODUCTION TO OBJECT ORIENTED PROGRAMMING

Unit – I: Principles of Object Oriented Programming (OOP)
Concepts of structured and object oriented programming; advantage of OOP methodologies.

Unit – II: Characteristics of OOP languages
Objects, classes, Data Abstraction, Encapsulation, inheritance, reusability, polymorphism and operator overloading, function overloading.

Unit – III: Introduction to C++
Keywords, Data types, Constants, Variables, Expressions and statements, Operators; Control Structures: if, if… else, switch; Repetitive Statements: for, while, do… while; Pointers, arrays and strings.

Unit – IV: Functions in C++
Parameter passing, Friend Functions, Inline Functions, Function Overloading, Operator overloading; Classes and Objects; Constructors and Destructors.

Unit – V: Inheritance
Single Inheritance, Multilevel inheritance, Multiple inheritance, Hierarchical Inheritance, Hybrid Inheritance; Pointers, Virtual Functions and Polymorphism.

BCAD 302 - INTRODUCTION TO DATABASE MANAGEMENT SYSTEM

Unit – I: Introduction & Database System Architecture
Overview of Database Management System, DBMS architecture, Characteristics of database approach, Various views of data, data models, Schemes, data independence, Advantages of DBMS over file processing systems, Responsibility of database administrator, Introduction to Database Languages & Environments.

Unit – II: E-R Modeling
Entity types, Entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, Sub classes; Super classes, inheritance, specialization and generalization.

Unit – III: Relational Data Model
Relational model concepts, relational constraints, relational algebra SQL: SQL queries, programming using SQL. EER and ER to relational mapping: Data base design using EER to relational language.

Unit – IV: Transaction Processing Concepts

Transaction system, testing of serializability, Serializability of schedules, Conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, Checkpoints, deadlock handling.

Unit – V: Data Normalization

Functional Dependencies, Normal form up to 3rd normal form. Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi-version Schemes, Recovery with concurrent transaction.

BCAD 303 - DISCRETE STRUCTURES

Unit – I: Introduction to prepositional calculus

Introduction to prepositional calculus: Statements, logical operations; truth tables of logical identities, Equivalence of logical identities, Tautologies and contradiction, Negation and De Morgan's law, Conditional and biconditional; Introduction to Boolean algebra: Basic definition and theorems, Boolean expressions, Sum-Of-Products form.

Unit – II: Sets and related operations

Cardinality, Union, Intersection, Complement, Difference, Symmetric Difference, Cartesian Product, subset, superset , power set , Venn diagram , Algebra of Sets, Duality; Properties of operators: commutative, associative, distributive; De Morgan's law, Standard sets.

Unit – III: Relations and their properties

Properties of relation: reflexive, irreflexive, symmetric, asymmetric, antisymmetric, transitive; Matrix of relations, relations represented as digraph, Equivalence relation, partition and equivalence class.

Unit – IV: Functions and its properties

Types of functions: One-to-one, onto, into, everywhere defined, Domain and range, Invertible functions, Composition of functions.

Unit – V: Introduction to recurrence relation

Homogeneous and non-homogeneous recurrence relations, Order and degree of a recurrence relation, Formulation of recurrence relations, Characteristic relation, Solution of recurrence relations.

BCAD 401 - FUNDAMENTALS OF PROBABILITY AND STATISTICS

Unit – I: Overview of Probability
Introduction, Events & Different Types of Events, Addition & Multiplication Law, Conditional Probability, Bayes' Theorem.

***Unit – II:* Probability Distribution**
Random Variables, Expectation of Discrete Random Variables & Its Properties Continuous & Discrete Probability Function, Binomial, Poison & Normal Distribution.

Unit – III: Measures of Central Tendency
Definition, Function & Scope of Statistics, Arithmetic Mean, Weighted A.M., Median, Mode, Geometric & Harmonic Mean and Their Merits & Demerits.

Unit – IV: Measures of Variation
Measures of Variation: Range, The Interquartile Range or Quartile Deviation, Average (Mean), Deviation Standard Deviation, Coefficient of Variation, Skew ness, Moments & Kurtosis.

Unit – V: Correlation and Regression Analysis
Introduction, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient, Regression Analysis: Difference Between Correlation & Regression, Regression Lines, Regression Equations, Regressions Coefficient.

BCAD 402 - INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Unit – I: Overview of Artificial Intelligence
Introduction to AI, Importance of AI, AI and its related field, AI techniques, Criteria for success; Scope of Artificial Intelligence, intelligent agents; Expert systems.

Unit – II: Problem Solving
Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem, Solving Problems by Searching, heuristic search techniques, constraint satisfaction problems, stochastic search methods.

Unit – III: Game Playing and Knowledge
Minimax, alpha-beta pruning; Knowledge: Definition and importance of knowledge, Knowledge representation, Various approaches used in knowledge representation, Issues in knowledge representation.

Unit – IV: Knowledge Representation and Reasoning
Building a Knowledge Base: Propositional logic, first order logic, situation calculus, theorem proving in First Order Logic; Planning, partial order planning; Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks.

Unit – V: Learning

Overview of different forms of learning, Learning Decision Trees, Neural Networks; Introduction to Natural Language Processing.

BCAD 501 - FUNDAMENTALS OF SOFTWARE ENGINEERING

Unit – I: Software and Software Engineering

The Evolving Role of Software, Software Characteristics, Changing Nature of Software, Software Engineering as a Layered Technology, Software Process Framework, Framework and Umbrella Activities, Process Models, Capability Maturity Model Integration (CMMI)

Unit – II: Software Requirement Analysis

Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques, Flow Oriented Modeling, Need for SRS, Characteristics and Components of SRS.

Unit – III: Software Development Management

Estimation in Project Planning Process, Project Scheduling, Software Risks, Risk Identification, Risk Projection and Risk Refinement, RMMM Plan, Quality Concepts, Software Quality Assurance, Software Reviews, Metrics for Process and Projects.

Unit – IV: Design Engineering

Design Concepts, Architectural Design Elements, Software Architecture, Data Design at the Architectural Level and Component Level.

Unit – V: Software Testing Strategies & Tactics

Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System testing, Black-Box Testing, White-Box Testing and their type.

BCAD PE311 (INTRODUCTION TO WIRELESS COMMUNICATION)

Unit – I: Introduction to Basic Principles

Liberalization of communications Industry, Digitalization of content, changes in spectrum management, cellular reuse, drive towards broadband, Evolution of mobile communications, mobile radio systems- Examples, trends in cellular radio and personal communications.

Unit – II: Cellular Concept

Frequency reuse, channel assignment, hand off, Interference and system capacity, tracking and grade of service, Improving Coverage and capacity in Cellular systems. Cellular telephony: frequency reuse principle, transmitting, receiving, roaming, GSM network architecture, GSM channel structure, GPRS.

Unit – III: Mobile radio propagation

Free space propagation model, reflection, diffraction, scattering, link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse model, Small scale Multipath measurements, parameters of Mobile multipath channels, types of small scale fading, statistical models for multipath fading channels.

Unit – IV: Second Generation and Third Generation Wireless Networks and Standards

WLL, Bluetooth. AMPS, GSM, IS-95 and DECT Satellite networks: orbits, footprint, categories of satellites. Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, Capacity of Cellular CDMA and SDMA.

Unit – V: Introducing the Mobile Internet

Key Services for the mobile Internet, Business opportunities. WAP: the Mobile Internet Standard: Challenges and Pitfalls, Overview of the Wireless Application Protocol, Implementing WAP Services: The Wireless Markup Language, Enhanced WML: WML Script and WTAI,

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BCAD PE312 (INTRODUCTION TO MOBILE COMPUTING)

Unit – I: Mobile communication Introduction

Mobile computing devices mobile computing function, mobile computing architecture, evaluation of wireless technology (1G, 2G, 3G, 4G technology).

Unit – II: PCS and GSM

PCS Architecture**,** GSM architecture, Location tracking and call setup, Mobility management: Handover Security-GSM, SMS, International roaming for GSM.

Unit – III: GPRS and Packet Data Network

GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Limitations of GPRS, Spread Spectrum technology, Third Generation Networks, Applications on 3G.

Unit – IV: Wireless Networks

Wireless LAN: IEEE 802.11, Standards, Architecture, Services, Mobile Ad hoc Networks: WiFi and WiMAX, Wireless Local Loop, Bluetooth.

Unit – V: Emerging Mobile Communication Technology

Mobile IP, Cellular IP, VoIP, SIP, LTE, 4G goal and architecture.

BCAD PE313 (WEB & E-COMMERCE TECHNOLOGIES)

Unit – I: An introduction to Electronic commerce

What is E-Commerce (Introduction And Definition), Main activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, Electronic Commerce and Electronic Business(C2C)(C2G,G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C).

Unit – II: The Internet and WWW

Evolution of Internet, Domain Names and Internet Organization (.edu, .com, .mil, .gov, .net etc.) , Types of Network, Internet Service Provider, World Wide Web, Internet & Extranet, Role of Internet in B2B Application, building own website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Baner, Exchange, Shopping Bots.

Unit – III: Internet Security

Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime (Laws, Types of Crimes), Threats, Attack on Computer System, Software Packages for privacy, Hacking, Computer Virus (How it spreads, Virus problem, virus protection, Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Authorisation and Authentication, Firewall, Digital Signature (How it Works).

Unit – IV: Electronic Data Exchange

Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model, Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash.

Unit – V: Planning for Electronic Commerce and Internet Marketing

Planning Electronic Commerce initiates, Linking objectives to business strategies, Measuring cost objectives, Comparing benefits to Costs, Strategies for developing electronic commerce web sites; Internet Marketing: The PROS and CONS of online shopping, The cons of online shopping, Justify an Internet business, Internet marketing techniques, The E-cycle of Internet marketing, Personalization e-commerce.

BCAD PE521 (INTRODUCTION TO DATA MINING)

Unit – I: Data Mining Concepts

Data mining primitives, Basics of data mining, Data Mining Functionalities, Classification of Data Mining Systems, Architectures of data mining system.

Unit – II: Association Rules In Large Databases

Association Rule Mining, Mining Single Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases.

Unit – III: Classification And Prediction

Issues Regarding Classification and Prediction, Classification by Decision Tree Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction.

Unit – IV: Cluster Analysis In Data Mining

Types of Data in Cluster Analysis. A Categorization of Major Clustering Methods, Partitioning Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Outlier Analysis.

Unit – V: Data Warehousing and various Issues in Data Mining :

Introduction to Data Warehouse, Data warehousing and its characteristics, Online analytical processing (OLAP), characteristics of OLAP system, Scalability and data management issues in data mining algorithms, measures of interestingness

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BCAD PE522 (INTRODUCTION TO CLOUD COMPUTING)

Unit – I: Introduction to Cloud Computing

Recent trends in Computing, Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, History of Cloud Computing, Cloud service providers, Benefits and limitations of Cloud Computing.

Unit – II: Cloud Computing Architecture

Comparison with traditional computing architecture (client/server), Services provided at various levels, Service Models- Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), How Cloud Computing Works, Deployment Models such as Public cloud, Private cloud, Hybrid cloud, Community cloud,

Unit – III: Case Studies

Case study of NIST architecture, Case study of Service model using Google App Engine, Microsoft Azure, Amazon EC2, Eucalyptus.

Unit – IV: Service Management in Cloud Computing

Service Level Agreements (SLAs), Billing & Accounting, Comparing Scaling Hardware such as Traditional vs. Cloud, Economics of scaling.

Unit – V: Cloud Security

Network level security, Host level security, Application level security, Data security and Storage- Data privacy and security Issues, Jurisdictional issues raised by Data location, Authentication in cloud computing.

BCAD PE523 (INTRODUCTION TO DATA SCIENCE AND BIG DATA)

Unit – I: Understanding Big Data

What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing fraud and big data, risk and big data ,credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data mobile business intelligence, Crowd sourcing analytics ,inter and trans firewall analytics

Unit – II: NoSQL Data Management

Introduction to NoSQL , aggregate data models ,aggregates ,key-value and document data models, relationships, graph databases, schema less databases ,materialized views, distribution models, sharding , master-slave replication , peer-peer replication, sharding and replication, consistency , relaxing consistency , version stamps , mapreduce, partitioning and combining , composing map-reduce calculations

Unit – III: Basics Of Hadoop

Data format , analyzing data with Hadoop , scaling out , Hadoop streaming, Hadoop pipes, design of Hadoop distributed file system (HDFS), HDFS concepts, Java interface , data flow, Hadoop I/O, data integrity, compression, serialization, Avro file-based data structures.

Unit – IV: Map Reduce Applications

Map Reduce workflows, unit tests with MRUnit , test data and local tests – anatomy of Map Reduce job run, classic Map-reduce , YARN , failures in classic Map-reduce and YARN, job scheduling , shuffle and sort , task execution, MapReduce types , input formats, output formats.

Unit – V: Hadoop Related Tools

Hbase, data model and implementations, Hbase clients, Hbase examples– praxis.Cassandra ,cassandra data model , cassandra examples , cassandra clients, Hadoop integration. Pig , Grunt , pig data model , Pig Latin , developing and testing Pig Latin scripts. Hive , data types and file formats , HiveQL data definition , HiveQL data manipulation – HiveQL queries

BCAD SEE411 (INTERNET AND WEB TECHNOLOGY)

Unit 1: Introduction to Internet and WWW

Introduction to Internet: History of World Wide Web; Protocols governing the web; Understanding the Internet: syntax of URLs, web page and browsers, search engine; Introduction to Cyber Laws in India.

Unit 2: Internet Applications

Internet applications: FTP, Telnet, Email, Chat; Internet addressing: identification of each computer using domain name and IP addresses, DNS.

Unit 3: Formatting Web Pages

Introduction to HTML, XML, DHTML and CSS; Formatting Web Pages with the help of different HTML tags, HTML table, HTML form; using CSS for formatting different objects; using DHTML for dynamic designing of web page.

Unit 4: JavaScript

Introduction to Javascript: Advantages of Javascript, Javascript Syntax, documents, forms, Datatype, Variable, Array, Operator and Expression, Looping Constructor, Event Handling, cookies.

Unit 5: E-Commerce and emerging trends

E-Commerce and security issues; Emerging trends: Internet telephony, virtual reality over the web, etc.; Intranet and extranet; firewall design issues.

BCAD SEE412 (PROGRAMMING IN VISUAL BASIC)

Unit – I: Introduction to VB

Visual & Non-Visual programming, Procedural, Object-Oriented, Object-Based and Event-Driven Programming Languages, VB as Even-Driven and Object-Based Language, VB Environment: Menu bar, Toolbar, Project explorer, Toolbox, Properties Window, Form Designer, Form Layout, Immediate window, Default Controls in Tool Box Visual Development and Event Driven programming.

Unit – II: Basics of Programming

Variables: Declaring Variables, Types of variables, Converting Variables Types, User Defined Data Types, Forcing Variable Declaration, Scope & Lifetime of Variables; Constants: Named & Intrinsic, Operators: Arithmetic, Relational & Logic.

Unit – III: Decision Statements in VB

If statement, if-then-else, select-case; Looping Statements in VB: do-loop, for-next, while-wend; Exit statement, Nested Control Structure; Arrays: Declaring and using Arrays, One-dimensional, Two-dimensional and Multi-dimensional Arrays, Static and Dynamic arrays, Array of Arrays.

Unit – IV: Procedures

General & Event Procedures, Subroutines, Functions, Calling Procedures, Arguments - Passing Mechanisms, Optional Arguments, Named Arguments, Functions Returning Custom Data Types Simple Program Development in VB such as Sum of Numbers, Greatest among Numbers, Checking Even/Odd Number, HCF of Two Numbers, Generate Prime Numbers, Generate Fibonacci Series, Factorial of a Number, Searching, Sorting, etc.

Unit – V: VB Objects and Monitoring Mouse Activity

Dialog Boxes, Common Controls, Menus, MDI Forms, Testing, Debugging and Optimization – Working with Graphics.

Monitoring Mouse Activity: File handling, File system controls, File system objects, DLL Servers.

BCAD SEE413 (FUNDAMENTAL CONCEPTS OF MICROPROCESSOR AND ARDUINO PROGRAMMING)

Unit – I: Fundamentals of Microprocessor

Fundamentals of Architecture: 8 & 16 bit Microprocessor and Microcontroller and its comparison, Embedded System & its Characterization. 8051 Architecture Family: Block Diagrams, CPU, ALU, Family of Bus, Registers, Pointers. Timing Diagrams and Execution Cycles, Overview of Microprocessor Family, I/O Interfacing.

Unit – II: Instruction Set and programming

Addressing modes: Introduction, Instruction syntax, Data types, Subroutine, Types of Addressing. 8051 Instruction set, Instruction timings, Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction. Assembly language programs, C language programs, Assemblers and compilers.

Unit – III: Introduction to Arduino

Fundamentals of Arduino, Serial Monitoring, Digital and Analog Inputs, Understanding variables, If-Else Statement, comparison Operators and Conditions, While statement, Analog I/O and Serial Communications.

Unit – IV: Programming using Arduino

Arduino Environment, C Programming used for Arduino, ArduinoToolchain, Cross-Compilation, Arduino Sketches, Classes, Pins, Input and Outputs, Debugging, UART protocol, UART parity and Stop.

Unit – V: Applications

Microprocessor: LED, LCD and keyboard interfacing. Stepper motor interfacing, DC Motor interfacing, sensor interfacing.
Arduino: Traffic Light Count Down Timer, Parking Lot Counter, Weighing Machines, Emergency Light for railways, Security Systems.

BCAD SEE521 (INTRODUCTION TO JAVA PROGRAMMING)

Unit – I: Introduction to Java

Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods).

Unit – II: Arrays, Strings and I/O

Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System out and the Scanner class, Byte and Character streams, Reading/Writing from console and files.

Unit – III: Object-Oriented Programming Overview

Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.

Unit – IV: Exception Handling, Threading, Networking and Database Connectivity

Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.

Unit – V: Applets and Event Handling

Java Applets:Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms,Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels, buttons, textfields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts. Overview of servlets

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BCAD SEE522 (FUNDAMENTALS OF NET PROGRAMMING)

Unit – I: Introduction to .NET Framework and C#

.NET framework, MSIL, CLR, CLS, CTS, Namespaces, Assemblies The Common Language Implementation, Assemblies, Garbage Collection, The End to DLL Hell - Managed Execution, Name Spaces - Constructor and Destructors, Function Overloading & Inheritance, Operator Overloading, Modifiers - Property and Indexers , Attributes & Reflection API, When to use Console Applications - Generating Console Output, Processing Console Input.

Unit – II: C#.NET and ADO.NET:

Creating Language Features and Creating .NET Projects, Namespaces Classes and Inheritance -, Namespaces Classes and Inheritance -, C, Exploring the Base Class Library -, Debugging and Error Handling -, Data Types -, Exploring Assemblies and Namespaces, String Manipulation ,Files and I/O ,Collections.

Unit – III: Windows Forms and Controls in details

The Windows Forms Model, Creating Windows Forms Windows Forms Properties and Events, Windows Form Controls, Menus - Dialogs – ToolTips, Apply Inheritance techniques to Forms, Creating Base Forms, Programming Derived Forms, Printing - Handling Multiple Events, GDI+, Creating Windows Forms Controls

Unit – IV: Connectivity ASP.NET - Themes and Master Pages:

Introduction to ASP.NET, Working with Web and HTML Controls, Using Rich Server Controls, Login controls, Overview of ASP.NETValidation Controls, Using the Simple Validations, Using the Complex Validators Accessing Data using ADO.NET.

Unit – V: Managing State:

Preserving State in Web Applications and Page-Level State, Using Cookies to Preserve State, ASP.NET Session State ,Storing Objects in Session State, Configuring Session State, Setting Up an Outof-Process State Server, Storing Session State in SQL Server.

BCAD SEE523 (PHP Programming)

Unit – I: Introduction to PHP

Java PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.), PHP with other, technologies, scope of PHP, Basic Syntax, PHP variables and constants, Types of data in PHP , Expressions, scopes of a variable (local, global), PHP Operators : Arithmetic, Assignment, Relational , Logical operators, Bitwise , ternary and MOD operator. PHP operator Precedence and associativity

Unit – II: Handling HTML form with PHP

Capturing Form Data, GET and POST form methods Dealing with multi value fields, Redirecting a form after submission. PHP conditional events and Loops: PHP IF Else conditional statements (Nested IF and Else), Switch case, while, For, and Do While Loop, Goto, Break, Continue and exit.

Unit – III: PHP Functions

Function, Need of Function, declaration and calling of a function, PHP Function with arguments, Default Arguments in Function, Function argument with call by value, call by reference, Scope of Function Global and Local.

Unit – IV: ConnectivityString Manipulation and Regular Expression

Creating and accessing String , Searching & Replacing String, Formatting, joining and splitting String , String Related Library functions, Use and advantage of regular expression over inbuilt function, Use of preg_match(), preg_replace(), preg_split() functions in regular expression.

Unit – V: Array

Anatomy of an Array ,Creating index based and Associative array, Accessing array, Looping with Index based array, with associative array using each() and foreach(), Some useful Library function.

BCAD OE411 (ORGANIZATION BEHAVIOR)

Unit – I: Overview of Organization Behavior

Nature, Scope, Definition and Goals of organizational Behaviour, Fundamental Concepts of Organizational Behaviour, Models of Organizational Behaviour, essential attributes, Psychological dimensions and relevance in the emerging society.

Unit – II: Learning

Styles and principles, Skinner, Thorndike and Piaget theories, Conditions of learning; Memory: Short term and long term; Efficient and effective ways in respect of thinking, problem solving and decision making.

Unit – III: Effects of employee attitudes

Personal and Organizational Values, Job Satisfaction, Nature and Importance of Motivation, Achievement Motive, Theories of Work Motivation: Maslow's Need Hierarchy Theory, Mc Gregcrs's Theory 'X' and Theory 'Y.

Unit – IV: Personality and Stress

Models of personality, factors and desirable features of a healthy personality; Basic Needs and their hierarchy: Mallow model and self actualizing personalities; Work stress: Meaning and definition of Stress, Symptoms of Stress, Sources of Stress, Stress management.

Unit – V: Conflict in organization

Nature of Conflict, Process of Conflict, Levels of Conflict - Intrapersonal, Interpersonal, Sources of Conflict, Effect of Conflict, Conflict Resolution, Meaning and types of Grievances & Process of Grievances Handling.

BCAD OE412 (FINANCIAL ACCOUNTING)

Unit – I: Overview of Financial Accounting

Meaning and Nature of Financial Accounting, Scope of Financial Accounting, Financial Accounting & Management Accounting, Accounting concepts & convention, Accounting standards in India.

Unit – II: Basics of accounting

Capital & Revenue items, Application of Computer in Accounting Double Entry System, Introduction to Journal, Ledger and Procedure for Recording and Posting, Introduction to Trail Balance, Preparation of Final Account, Profit & Loss Account and related concepts, Balance Sheet and related concept.

Unit – III: Financial statement analysis

Ratio analysis, Funds flow analysis, concepts, uses, Preparation of funds flow statement, simple problem, Cash flow analysis, Concepts, uses, preparation of cash flow statement, simple problem, Break – even analysis.

Unit – IV: Definition nature and Objective of Financial Management

Long Term Sources of Finance, Introductory idea about capitalization, Capital Structure, Concept of Cost of Capital, introduction, importance, explicit & implicit cost, Measurement of cost of capital, cost of debt.

Unit – V: Concept & Components of working Capital

Factors Influencing the Composition of working Capital, Objectives of working Capital Management – Liquidity Vs. Profitability and working capital policies. Theory of working capital: Nature and concepts. Cash Management, Inventory Management and Receivables Management.

BCAD OE413 (CYBER CRIMES & CYBER LAWS)

Unit – I: Introduction to IT laws & Cyber Crimes

Internet, Hacking, Cracking, Viruses, Virus Attacks, Software Piracy.

Unit – II: E-Mail Investigation

E-Mail Tracking, IP Tracking, E-Mail Recovery, Encryption and Decryption methods, Search and Seizure of Computers.

Unit – III: Introduction to Cyber Crime Investigation

Cyber Forensics, Investigation Tools, e-Discovery, Digital Evidence Collection, Evidence Preservation, Forensics Tools and Softwares, Recovering deleted evidences, Password Cracking, Cyber Security.

Unit – IV: Intellectual property, Legal System of Information Technology

Social Engineering, Mail Bombs, Bug Exploits, Law of Intellectual Property: Copy Right Act, Trade and Merchandise Act, Patent Act, Domain Name Disputes, Cyber-Squatting.

Unit – V: International Perspective of Cyber Law

Electronic Data Interchange, EDI: Concept and legal Issues. Electronic Signature Law's of Major Countries, Cryptography Laws, Cyber Law's of Major Countries.

BCAD OE511 (STARTUP ENTREPRENEURSHIP)

Unit – I: Introduction to Entrepreneurship

Meaning and concept of entrepreneurship, the history of entrepreneurship development, role of entrepreneurship in economic development, agencies in entrepreneurship management and future of entrepreneurship, Meaning of entrepreneur, the skills required to be an entrepreneur, the entrepreneurial decision process, and role models, mentors and support system.

Unit – II: Business Opportunity Identification and Planning

Capturing Business ideas, methods of generating ideas, and opportunity recognition, Preparing a Business Plan: Meaning and significance of a business plan, components of a business plan, and feasibility study

Unit – III: Financing the New Venture

Importance of new venture financing, types of ownership securities, venture capital, types of debt securities, determining ideal debt-equity mix, and financial institutions and banks

Unit – IV: Launching and Managing the New Venture

Choosing the legal form of new venture, protection of intellectual property, and marketing the new venture, Characteristics of high growth new ventures, strategies for growth, and building the new venture capital

Unit – V: Harvesting Rewards

Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy

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BCAD OE 512 (CONCEPTS of E-GOVERNANCE AND SMART CITY)

Unit – I

E-Government– OVERVIEW,E-Governance and E-Government , E-Governance Definitions E-Government Definitions ,Framework for e-Government versus e-Governance,
E-Government Services,G2G – Government to Government,, Government to Constituents (E-Democracy), E-Government around the World

Unit – II

Government, Governance and Democracy, E-Governance Projects in India, Measures to be considered before going for E-Governance

Unit – III

Smart City overview, Introduction, meaning, features, Concept of Smart Community, Smart Transportation,City typologies, -Sustainable cities,Liveable cities, Intelligent cities.
Smart Building and Home Device , Smart Health, Smart Government, Smart Energy and Water
Cyber security, Safety, and Privacy, Internet of Things, Block chain, Artificial Intelligence, Alternate Reality, Virtual Reality

Unit – IV

International smart cities-European: Copenhagen, Asian: Singapore
UK smart cities initiatives, Initiatives, Birmingham initiatives, London initiatives, Smart Birmingham vs. smart London

Unit – V

Phases, Stages of Project & their Approval Status, Work Breakdown Structure, Project Organization Structure, Planning, Scheduling & CPM,Smart Cities –Global Standards and Performance, Benchmarks, Practice Code, Smart City Planning and Development, Case Studies on PM of Smart Cities

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BCAD OE513 (DIGITAL MARKETING AND E-COMMERCE)

Unit – I: History, Nature and Impact of E-Commerce

Internet and E-Commerce, The Nature of E-Commerce, Retailing on the Internet, Global E-Commerce, Doing Business on the Internet

Unit – III: E-Commerce Essentials

Distribution in E-Commerce, Customer Service and Web Site Personalization, Advertising for E-Commerce.

Unit – III: Marketing management

Marketing Information Management, Conducting Marketing Research, Creating a Web Site, Fundamentals of Internet Marketing.

Unit – IV: Business Structures and the Business Plan in E-Commerce

Business Structures and Economics in E-Commerce, Revenue Models and the Business Plan in E-Commerce

Unit – V: Marketing Entrepreneurship

Building a Career in E-Commerce, Ethical, Legal, and Social Responsibilities in E-Commerce Risk Management, Financing the Business.

BCAD - EVS (ENVIRONMENTAL SCIENCES)

Unit-I

Introduction: components of the environment, environmental degradation. Ecology-Elements of Ecology: Ecological balance and consequences of change, principles of environmental impact assessment.

Unit-II

Air Pollution and Control: Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures,

Unit-III

Water Pollution and Control: Hydrosphere, natural water, pollutants their origin and effects, river, lake/ground water pollution, standards and control,

Unit-IV

Land Pollution: Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardours solid wastes): their origin and effects, collection and disposal of solid waste, recovery and conversion methods.

Unit-V

Noise Pollution: Sources, effects, standards and Control.