Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

DIT UNIVERSITY
Dehradun

Detailed Course Structure & Syllabus
of
BCA (ADC)

Amended by the BoS and approved by the Academic Council at its 9th Meeting held on 14.04.2018

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021
Course Structure

Year: 1ST **Semester: 1ST**

Course Category	Course Code	Course Title	L	T	P	Credit
DC	OR101	Object-Oriented Analysis and Design Using UML	2	0	2	3
DC	CA102	Programming in C	3	0	2	4
DC	CA103	Discrete Mathematics	3	1	0	3.5
DC	CA104	Operating Systems	3	1	0	3.5
HE	HS103	Professional Communication	2	0	2	3
DC	CA105	Digital Electronics	3	1	0	3.5
AC	CA106	*Colloquium*	0	0	2	0
		Total	**16**	**3**	**8**	**20.5**

Year: 1ST **Semester: 2ND**

Course Category	Course Code	Course Title	L	T	P	Credit
DC	CA111	Software Engineering	3	1	0	3.5
DC	CA112	Data Structures in C	3	0	2	4
DC	CA113	Theory of computation	3	1	0	3.5
DC	CA118	Computer Organization	3	1	0	3.5
DC	CA115	Computer Based Numerical Techniques	3	0	2	4
DC	OR116	Introduction to SQL	2	0	2	3
AC	CA117	*Soft Skills:*	0	0	2	0
		Total	18	4	6	22

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Year: 2ND **Semester: 3RD**

Course Category	Course Code	Course Title	L	T	P	Credit
DC	OR201	PL/SQL Fundamentals	1	0	2	2
DC	CA202	Design and Analysis of Algorithm	3	1	0	3.5
DC	CA203	Object Oriented Programming with C++	3	0	2	4
DC	CA204	Web Technologies	3	0	2	4
DC	CA205	Computer Networks	3	1	0	3.5
DC	CA206	Organization Behavior	3	0	0	3
AC	CA207	*Pre Project Seminar:*	0	0	2	0
AC	HS202	Aptitude & Personality Development 1	3	0	0	0
		Total	16	2	8	20

Year: 2ND **Semester: 4TH**

Course Category	Course Code	Course Title	L	T	P	Credit
DC	CA211	Management Information System	3	1	0	3.5
DC	CA212	Visual Programming with VB .Net	3	0	2	4
DC	CA213	Microprocessor	3	0	2	4
DC	CA214	Advanced Web Technologies	3	0	2	4
DC	CA215	Computer Graphics	3	0	2	4
DC	OR216	Oracle Database 11g: Administration Workshop I	2	0	2	3
PRJCT	CA217	Project-I	0	0	4	2
AC	CA218	*Industrial Tour:*	0	0	0	0
AC	HS205	*Aptitude & Personality Development 2*	3	0	0	0
		Total	17	1	16	24.5

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Course Structure& Syllabus of BCA (ADC)
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Year: 3RD **Semester: 5TH**

Course Category	Course Code	Course Title	L	T	P	Credit
DC	CA301	Multimedia and Animation	3	1	0	3.5
DC	CA302	Probability and Statistics	3	1	0	3.5
DC	CA303	Data Warehouse and Data Mining	3	1	0	3.5
DE	CA35*	Department Elective I	3	1	0	3.5
DC	CA304	Linux and System Administration	3	0	2	4
DC	OR305	Java SE 8 Programming	2	0	2	3
ST	CA307	*Industrial Training Presentation*:*	0	0	2	0
		Total	17	4	8	21.5

Department Elective I

CA351	Cryptography & Network Security
CA352	Mobile Computing
CA353	Software Testing

Year: 3RD **Semester: 6TH**

Course Category	Course Code	Course Title	L	T	P	Credit
DC	CA311	Software Project Management	3	1	0	3.5
DC	CA312	Artificial Intelligence	3	1	0	3.5
DC	CA313	Python Programming	3	0	2	4
DE	CA36*	Department Elective II	3	1	0	3.5
DC	CA314	E-commerce	3	1	0	3.5
DC	OR315	Java EE 7: Front-end Web Application Development	2	0	2	3
PRJCT	CA316	Project –II	0	0	4	2
		Total	17	4	8	23

OR

Course Category	Course Code	Course Title	L	T	P	Credit
PRJT	CA317	Industrial Project	0	0	32	16

Department Elective II

CA361	Ethical hacking & Cyber law
CA362	Cloud computing
CA363	Enterprise Resource Planning

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Summary of the Credit

Year	Semester	Credit
1	1	20.5
	2	22
2	3	20
	4	24.5
3	5	21.5
	6	23
Total		131.5

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Subject Code	OR101	Subject Title	Object Oriented Analysis and Design using UML						
LTP	2 0 2	Credit	3	Subject Category	Deptt Core	Year	1	Semester	1

Course Objective: The objective of this program is to Describe the object-oriented software development process, including object-oriented methodologies and workflows, Gather system requirements through interviews with stakeholders, Analyze system requirements to determine the use cases and domain model of the problem domain (the Requirements model), Create a system architecture (the Architecture model) supporting the nonfunctional requirements (NFRs) and development constraints, Create a system design (the Solution model) supporting the functional requirements (FRs)

Detailed Syllabus

UNIT 1:

Describe the important object-oriented (OO) concepts, Describe the fundamental OO terminology, Describe the Object-Oriented Software Development (OOSD) process, Describe how modeling supports the OOSD process, Describe the benefits of modeling software, Explain the purpose, activities, and artifacts of the following OOSD workflows (disciplines): Requirements Gathering, Justify the need for a Use Case diagram, Identify and describe the essential elements in a UML Use Case diagram, Develop a Use Case diagram for a software system based on the goals of the business owner, Develop elaborated Use Case diagrams based on the goals of all the stakeholders, Recognize and document use case dependencies using UML notation for extends, includes, and generalization, Describe how to manage the complexity of Use Case diagrams by creating UML packaged views

UNIT 2:

Identify and document scenarios for a use case, Create a Use Case form describing a summary of the scenarios in the main and alternate flows, Describe how to reference included and extending use cases., Identify and document non-functional requirements (NFRs), business rules, risks, and priorities for a use case, Identify the purpose of a Supplementary Specification Document Identify the essential elements in an Activity diagram, Model a Use Case flow of events using an Activity diagram, Identify a set of candidate key abstractions Identify the key abstractions using CRC analysis

UNIT 3:

Identify the essential elements in a UML Class diagram, Construct a Domain model using a Class diagram, Identify the essential elements in a UML Object diagram, Validate the Domain model with one or more Object diagrams, Explain the purpose and elements of the Design model, Identify the essential elements of a UML Communication diagram, Create a Communication diagram view of the Design model, Identify the essential elements of a UML Sequence diagram, Create a Sequence diagram view of the Design model, Model object state, Describe the essential elements of a UML State Machine diagram

UNIT 4:

Define the essential elements of a software pattern, Describe the Composite pattern, Describe the Strategy pattern, Describe the Observer pattern, Describe the Abstract Factory pattern, Distinguish between architecture and design, Describe tiers, layers, and systemic qualities, Describe the Architecture workflow, Describe the diagrams of the key architecture views, Select the Architecture type, Create the Architecture workflow artifacts, Describe the concepts of the Client and Presentation tiers, Describe the concepts of the Business tier, Describe the concepts of the Resource and Integration tiers, Describe the concepts of the Solution model

UNIT 5:

Refine the attributes of the Domain model, Refine the relationships of the Domain model, Refine the methods of the Domain model, Declare the constructors of the Domain model, Annotate method behavior, Create components with interfaces, Explain the best practices for OOSD methodologies, Describe the features of several common methodologies, Choose a methodology that best suits your project, Develop an iteration plan, Define a

framework, Describe the advantages and disadvantages of using frameworks, Identify several common frameworks, Understand the concept of creating your own business domain frameworks

List of Practical's:

1. Examining Object Oriented Concepts & Terminology
2. Introducing Modeling & Software Development Process
3. Creating Use Case Diagrams
4. Creating Use Case Scenarios & Forms
5. Creating Activity Diagrams
6. Determining the key abstractions
7. Constructing the Problem Domain Model
8. Transitioning from Analysis to Design using interaction diagrams
9. Modeling object state using state Machine Diagrams
10. Applying Design patterns to the Design Model
11. Introducing Architectural Concepts and Diagrams
12. Introducing Architectural Tiers
13. Refining the Class Design Model
14. Overview of Software Development Process
15. Overview of Frameworks

Learning Outcome: After studying this course, you should be able to:

- Use object-oriented technologies.
- Use Unified Modeling Language 2.2.
- Perform object-oriented analysis and design.
- Follow a software development process using an OO software project.
- Create a system design (the Solution model) supporting the functional requirements (FRs).

Text book [TB]:

1. Oracle Digital Student Books&
2. Oracle Digital Student Activity Guide.

Course Structure& Syllabus of BCA (ADC)
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Subject Code	CA102	Subject Title	Programming in C						
LTP	3 0 2	Credit	4	Subject Category	Deptt Core	Year	1	Semester	1

Course Objective: To understand computer programming and its roles in problem solving, Understand and develop well-structured programs using C language, basic file handling operation through implementing in C language.

Detailed Syllabus

UNIT 1 :

Problem analysis, need for programmed languages, introduction to algorithms, algorithmic representations, Pseudo codes flow charts and decision tables, structured programming and modular programming .

UNIT 2:

Over view of C, Constant, variables, data, types and size, variable declaration, operators and expressions, type conversion, conditional expression, special operators, precedence rules. Decision making, looping and control structures. Data input/output. Input/output: Unformatted & formatted I/O function in C, Input functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(),putch(), putchar(), puts().

UNIT 3:

Arrays and String: defining and processing an array, one dimensional arrays, multidimensional arrays, passing arrays to functions, Handling of character strings. Pointers: Declaration, operations on pointers, array of pointers, pointers to arrays. Structure and Unions: Defining and processing a structure, user defined data types, structure and Pointers, nested structure, self-referential structures, and unions

UNIT 4:

Program structure: Storage classes, automatic, external, and static variables. Data files: Opening, closing, creating, and processing and unformatted data field.

UNIT 5:

File Management in C: introduction to data files, opening & closing a file, file types, fopen, fgets, fputs, fscanf, fprintf, fclose.

List of practicals:

1. Program to find area and circumference of circle.
2. Program to find the simple interest.
3. Program to convert temperature from degree centigrade to Fahrenheit.
4. Program to calculate sum of 5 subjects & find percentage.
5. Program to show swap of two no's without using third variable.
6. Program to find that entered year is leap year or not.
7. Program to find whether given no is even or odd.
8. Program to find whether given no is a prime no or not.
9. Program to display sum of series 1+1/2+1/3+…….+1/n.
10. Program to add two number using pointer.
11. Program to show sum of 10 elements of array & show the average.
12. Program to find sum of two matrices.

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Learning Outcome:

After studying this course, you should be able to:

- Problem solving through computer programming
- Ability to use different memory allocation methods
- Ability to deal with different input/output methods
- Ability to use different file structures

Text book [TB]:

1. **Programming in ANSI C**, Balaguruswamy, Tata McGraw-Hill, 4th Edition, 2008.
2. 2. **Problem Solving and Program Design in C,**Jeri R. Hanly& Elliot P, Pearson, 7thEdition, 2013

Reference books [RB]:

1. **The C programming Language.**, Dennis Ritchie, Pearson,6th Edition,2015.
2. **2.Structured programming approach using C**,ForouzanCeilber, Thomson learning publication, 3rdEdition, 2007.
3. **3. Pointers in C** ,YashwantKanetkar, BPB Publication,3rd Edition,2003.

Course Structure& Syllabus of BCA (ADC)
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Subject Code	CA103	Subject Title	Discrete Mathematics						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	1	Semester	1

Course Objective: To understand the needs the precision of mathematical notation and techniques. Specify computational problems using mathematical objects such as sets, functions, relations, orders, and sequences.

Detailed Syllabus

UNIT 1 :

SETS: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications.

RELATIONS AND FUNCTIONS: Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions, Hashing functions, Recursive function

UNIT 2:

PARTIAL ORDER RELATIONS AND LATTICES: Partial Order Sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal Point, Glb, lub, Lattices & Algebraic Systems, Principle of Duality, Basic Properties, Sub lattices, Distributed &Complemented Lattices.

UNIT 3: Graphs: types and operations (bipartite graph. Sub graph, distance of a graph, cut-edges &cut vertices, isomorphic and homo morphic graphs), degree of graphs, adjacent and incidence matrices, path circuit(Floyd's and Warshall algorithms), hamiltonian graph, graph coloring.

UNIT 4: Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

UNIT 5: Groups and Rings: Groups -Subgroups, Generation and evaluation of process- Rings, Integral domains and fields (definitions and simple properties only)

- **Learning Outcome :** Write an argument using logical notation and determine if the argument is or is not valid.
- Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.
- Understand the basic principles of sets and operations in sets.
- Prove basic set equalities.

Text book [TB]:

1.Discrete Mathematics and its Applications, Rosen K.H, McGraw Hill, 6thEdition 2006**.**
2. Discrete Mathematical Structure, Kolman, Busby and Ross, PHI, 6th Edition 2009.

Reference Books:

1. Discrete Math, S.K. Sarkar, S. Chand & Co, 9thEdition , 2016.
2. Discrete Mathematical Structures with Applications toComputer Science, Tremblay, J.P. and Manohar, Tata McGraw Hill, 5th Edition2007.

Course Structure& Syllabus of BCA (ADC)
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Subject Code	CA104	Subject Title	Operating Systems						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	1	Semester	1

Course Objective: Understanding of operating system concepts and the role it plays, An understanding of the structure of operating systems, applications, and the relationship between them. Some knowledge of the services provided by operating systems. Exposure to some details of major OS

Detailed Syllabus

UNIT 1 : Introduction: Importance of OS, Basic concepts and terminology, types of OS, What is an OS , Functions, Structure, Types : Batch , Multiprogramming , Timesharing , Real time ,Multiprocessor system , Distributed system , OS as Resource manager , Booting process, POST.

UNIT 2: Processor Management: Functions, Process, Process states, State transition, PCB, Events related to process, Process scheduling, Scheduling objectives , Scheduling levels , Preemptive and non preemptive scheduling algorithms , Concurrent processes , Process synchronization , Mutual exclusion and critical section , Solution to mutual exclusion problem : Software , Hardware & Semaphore Solutions , Classical problems of mutual exclusion , Deadlock :Handling deadlock , Prevention , Avoidance , Detection and Recovery.

UNIT 3: Memory Management: Functions , Contiguous : State and Dynamic , Non-contiguous Segmentation and Paging , Virtual memory , Demand paging , Page replacement policies , Working Set principle .

UNIT 4: File Management: Information management: File system, Functions, File directory, File system structure, File system design: Symbolic, Basic, Logical and Physical file system layers, File organization, File allocation, free space management, File protection and security.

UNIT 5: Device Management: Disk scheduling, Disk scheduling policies, Device management: Functions, Techniques for device management: Dedicated, Shared, Virtual, Spooling, Channels and Control unit. Case Study: Introduction to Linux/UNIX.

Learning Outcome:

- Demonstrate understanding of the concepts, structure and design of operating Systems
- Demonstrate understanding of operating system design and its impact on application system design and performance
- Demonstrate competence in recognizing and using operating system features.

Text book [TB]:

1.**Operating System Concepts**, Silbersachatz and Galvin, John Wiley & Sons, 7th Ed., 2005
2. **Operating System**, Haldar, Aravind,Pearson Education, 2nd Edition, 2014.

Reference Books

1.**Modern Operating System**, Tannenbaum,PHI, 4th Edition, 2016.
2.**Operating Systems**, Nutt, Pearson Education, 3rd Edition, 2009

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Subject Code	HS103	Subject Title	Professional Communication						
LTP	2 0 2	Credit	3	Subject Category	HU Elective	Year	1	Semester	1

Course Objective: Improve the writing practices: prewriting, composing, revising, responding, editing, attending to language and style, and writing with audience and purpose in mind. recognize, evaluate, and use in their writing a variety of information sources: expert people, publications of information agencies, popular and specialized periodicals, professional journals, books, and electronic resources.

Detailed Syllabus

UNIT 1:

Communication: Definition & Process, Types of Communication: Oral, Written, General, Technical, Verbal Communication, Non Verbal Communication: Kinesics, Proxemics, Chronemics, Oculesics, Haptics, Paralinguistics, Communication Flow and Communication Network, Barriers to Communication, Overcoming strategies.

UNIT 2:

Listening skills : Importance, Objectives, Process, Types, Barriers, Methods for improving Listening skills, Listening Comprehension: identifying General & Specific information, Note taking and drawing inferences.

UNIT 3:

Reading skills: Importance, Types, Techniques of improving reading skills, Vocabulary Building: Etymology & Roots, Antonyms, Synonyms, Homophones, Homonyms, One word substitution, Reading Comprehension

UNIT 4:

Paragraph construction: Features & Types, Paragraph writing, Comprehension passages, Precis writing, Letter Writing, Job Application Letter and Resume

UNIT 5:

Types,Features, Elements Format Etc., Preparing a Technical Report, Preparing a Technical Proposal

Learning Outcome:

- Students will demonstrate competency in communication skills related to production and presentation of messages in multiple formats.
- Students will demonstrate competency in critical thinking skills related to the analysis, interpretation, and criticism of messages.

Text Books

1 **Technical Communication: Principles and Practice**,Raman,Meenakshi and Sangeeta Sharma,2nd Edition, New Delhi: Oxford University Press, 2011.

2 **Effective Technical Communication**, Rizvi, Ashraf, McGraw Hill, New Delhi. 2005.

Reference Books

1 **Introduction of English Phonetics and Phonology,**Aslam, Mohammad**,**Cambridge,2003.

2 **Basic Communication Skills,**Ford A, Ruther, Pearson Education, New Delhi,2013.

Course Structure& Syllabus of BCA (ADC)
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Subject Code	CA105	Subject Title	Digital Electronics						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	1	Semester	1

Course Objective: To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits. Prepare students to perform the analysis and design of various digital electronic circuits.

Detailed Syllabus

UNIT 1:

Introduction: Logic gates NOT, AND, OR, Universal gates- NAND, NOR. EX-OR and EX-NOR gates. Diode and Transistor as a switch Logic Families-RTL,DTL,TTL,ECL,CMOS – (Main features only - without details of circuit connections and working). Definition of- current and voltage parameters, noise margin, Concepts of Fan -in, Fan-out, Boolean algebra: Basics Laws of Boolean Algebra, Logic Gates, Simplifications of Boolean equations using K-maps.

UNIT 2:

Data and number representation- binary-complement representation BCD-ASCII, conversion of numbers form one system to the other, 2's complement representation, binary arithmetic Review of various number systems (Binary, Octal, Hexadecimal), Definition of BCD , Gray codes and Excess – 3 codes and their application (without design of code convertors), Parity generation and Checking.

UNIT 3:

Arithmetic Circuits: Adder, Subtractor, Parallel binary adder/Subtractor, binary multiplier and divider. Combinational Circuits: Multiplexers, De-Multiplexers, decoders, encoders

UNIT 4:

Flip-flops: S-R, D, J-K, T, Clocked Flip-flop, Race around condition, Master slave Flip-Flop, Realization of one flip-flop using other flip-flop. Shift Registers: Serial-in-serial-out, serial-in-parallel-out, parallel-in-serial-out and parallel-in-parallel-out, Bi-directional shift register.

UNIT 5:

Counters: Ripple counter, Synchronous Counter, Modulo Counters, Ring Counter, Twisted Ring, Memory Devices - RAM, ROM, PAL & PLA.

Learning Outcome

- Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
- To understand and examine the structure of various number systems and its application in digital design.

Text Books

1. **Digital Logic and Computer Design**, M.M. Mano, PHI, 5th Edition, 2008
2.**Digital fundamentals**, Floyd, L, Thomas, Universal Book Stall, 10th Edition, 1998

Reference Books

1. **Computer Architecture,** M.M. Mano, PHI, 3rd Edition, 1998
2. **Computer Organization,**Hamcher, Vranesic and Zaky, McGraw-Hill, Signapore, 5th Edition,2000

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Subject Code	CA111	Subject Title	Software Engineering						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	1	Semester	2

Course Objective: The program's goal is to provide a professionally guided education in software engineering that prepares graduates to transition into a broad range of career options: industry, government, computing graduate program, and professional education.

Detailed Syllabus

UNIT 1:

Introduction to Software Engineering: Definitions - Size Factors - Quality and Productivity Factors - Managerial Issues - Planning a software project: Defining the problem - Developing a Solution Strategy - Planning the Development Process - Planning an Organization structure - Other Planning Activities.

UNIT 2:

Software Cost Estimation: Software cost factors - Software Cost Estimation Techniques - Staffing-level Estimation - Estimating Software Maintenance Costs - The Software Requirements Specification - Formal Specification Techniques - Languages and Processors for Requirements Specification.

UNIT 3:

Software design: Fundamental Design Concepts - Modules and Modularization Criteria - Design Notations - Design Techniques - Detailed Design Considerations - Real-Time and Distributed System Design - Test Plans - Milestones, walkthroughs, and Inspections.

UNIT 4:

Implementation issues: Structured Coding Techniques - Coding Style - Standards and Guidelines - documentation guidelines -Type Checking - Scoping Rules - Concurrency Mechanisms.

UNIT 5:

Quality Assurance - Walkthroughs and Inspections - Static Analysis - Symbolic Execution - Unit Testing and Debugging - System Testing - Formal Verification: Enhancing Maintainability during Development - Managerial Aspects of Software Maintenance - Source Code Metrics - Other Maintenance Tools and Techniques.

Learning Outcome:

An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, manufacturability, sustainability, ethical, health and safety;

Text Books:

1. **Software engineering**, K.K.Aggarwal& Yogesh Singh, New Age International,2nd Edition,2005.
2. **Software Engineering**,I.Sommerville, Addison Wesley,10th Edition, 2006.

Reference Books

1. **Software Engineering – A Practitioner's Approach**, Roger S Pressman, McGraw Hills Publication, 8th Edition, 2012.
2.**SoftwareArchitectureIn Practice**, Len Bass, SEI Series, 3rd Edition, 2010.

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Subject Code	CA112	Subject Title	Data Structures in C						
LTP	3 2 0	Credit	4	Subject Category	Deptt Core	Year	1	Semester	2

Course Objective: The objectives of this course are

- To develop students' knowledge and understanding of the fundamental principles of data structures.
- Develop students' skills in analyzing data structures.
- Build up students' capacity to evaluate different algorithmic techniques.

Detailed Syllabus

UNIT 1:

Introduction and Overview: Definition, Elementary data organization, Data Structures, data structures operations, Abstract data types, algorithms complexity, time-space tradeoff. Preliminaries: Mathematical notations and functions, Algorithmic notations, control structures, Complexity of algorithms, asymptotic notations for complexity of algorithms. String Processing: Definition, Storing Stings, String as ADT, String operations, word/text processing, Pattern Matching algorithms.

UNIT 2:

Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory, Traversing Linear arrays, Inserting and deleting, Sorting: Bubble sort, Insertion sort, Selection sort, searching: Linear Search.

UNIT 3:

Linked list: Definition, Representation of Singly linked list in memory, Traversing a Singly linked list, Searching a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly liked list; Doubly liked list, Header liked list, Circular linked list

UNIT 4:

Stacks–Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, Arithmetic Expressions: Polish Notation, Application of Stacks, Recursion, Towers of Hanoi, Implementation of recursive procedures by stack. Queues–Definition, Array representation of queue, Linked list representation of queues Types of queue: Simple queue, Circular queue, Double ended queue, Priority queue, Operations on Queues, Applications of queues.

UNIT 5:

Graphs: Graph theory terminology, Sequential representation of Graphs: Adjacency matrix, traversing a Graph. Tree–Definitions, Binary trees, Representing binary trees in memory, Traversing, Binary Trees, Binary Search Trees, Searching, Inserting and Deleting in a Binary Search Tree

List of practicals:

1. Write a program which accept information about five student and display same Information According to ascending order of their name.
2. Write a program to implement stack.
3. Write a program to convert infix expression into postfix expression
4. Write a program to check balanced parentheses for a given infix expression
5. Write a program to evaluate postfix expression
6. Write a program to implement queue
7. Write a program to implement link list with insert, delete, search, view, and delete function
8. Write a program to create doubly link list
9. Write a program to implement tree with insert, delete and search function
10. Write a program for inorder, postorder and preorder traversal of tree
11. Write a program for bubble sort and sequential search

12. Write a program for insertion sort and quicksort

Learning Outcome: Upon successful completion of this course, the student will be able to:

- Describe the basic operations on arrays, lists, stacks and queue data structures.
- Explain the notions of hashing, trees and binary search trees.
- Describe the efficiency of algorithms with respect to the choice of data structures.
- Explain the basic concepts of object-oriented programming.

Text Books

1.**Data Structure** ,SeymourLipschutz, Tata-McGraw-Hill, 10th Edition, 2014
2. **Fundamentals of Data Structures in C**, Horowitz, Sahni& Anderson-Freed, University Press, 2nd Edition 2009
.

Reference Books

1. **An Introduction to Data Structures with Applications**. , Jean-Paul Tremblay & Paul G, Mc Graw Hill Publishing, 7th Edition, 2014.
2.**Data Structures: A Pseudo-code approach with C**, Gilberg&Forouzan, Thomson Learning, 3rd Edition 2010.

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA113	Subject Title	Theory of computation						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	1	Semester	2

Course Objective: To introduce students the basic concepts in theoretical computer science, and the formal relationships among machines, languages and grammars. Be able to construct finite state machines and the equivalent regular expressions

Detailed Syllabus

UNIT 1:
Automata: Introduction to formal proof, Additional forms of proof, Inductive proofs, Finite Automata (FA), Deterministic Finite Automata (DFA), Non-deterministic Finite Automata (NFA), Finite Automata with Epsilon transitions.

UNIT 2:
Regular Expression and Languages: Regular Expression, A and Regular Expressions, Proving languages not to be regular, Closure properties of regular languages, Equivalence and minimization of Automata.

UNIT 3:
Context-free Grammars and Languages :Context -Free Grammar (CFG),Parse Trees, Ambiguity in grammars and languages, Definition of the Pushdown automata, Languages of a Pushdown Automata, Equivalence of Pushdown automata and CFG,Deterministic Pushdown Automata.

UNIT 4:
Properties of Context-free Languages: Normal forms for CFG, Pumping Lemma for CFL, Closure Properties of CFL, Turing Machines, Programming Techniques for TM.

UNIT 5:
Undecidability: A language that is not Recursively Enumerable (RE),An undecidable problem that is RE, Undecidable problems about Turing Machine, Post's Correspondence Problem, The classes P and NP.

Learning Outcome:

Explain the basic concepts of deterministic and non-deterministic finite automata, regular language, context-free language, Turing machines, Church's thesis, halting problem, computability and complexity

Text Books

1. **Introduction to Automata Theory,Languages and Computations**, J.E. Hopcroft, R. Motwani and J.D. Ullman, Pearson Educational, 2nd Edition 2001

2. **Elements of the theory of Computation**, H.R. Lewis and C.H. Papadimitriou, Pearson Education, 2nd Edition, 2005

Reference Books:

1. **An Introduction to the Theory of Computer Science,Languages and Machines**,Thomas A. Sudkamp,Pearson Education, 3rd Edition 2008

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA118	Subject Title	Computer Organization						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	1	Semester	2

Course Objective: This course will introduce students to the fundamental concepts underlying modern computer organization and architecture. Main objective of the course is to familiarize students about hardware design including logic design.

Detailed Syllabus

UNIT 1:

Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Bus and Memory Transfer, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations.

UNIT 2:

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instruction, Timing and Control, Instruction Cycle, Memory Reference Instruction, Input-Output Interrupt, Design of Basic Computer, Design of Accumulator Logic.

UNIT 3:

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Format, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

UNIT 4:

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithm, Floating-Point Arithmetic Operation, Decimal Arithmetic Unit.

UNIT 5:

Input-Output and Memory Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Direct Memory Access, Input-Output Processor, Memory Hierarchy, Associative Memory, Cache Memory, Virtual Memory

Learning Outcomes: By the end of this course, students should be able to:

- understand the basics of computer hardware and how software interacts with computer hardware
- analyze and evaluate computer performance
- understand how computers represent and manipulate data
- use Boolean algebra as related to designing computer logic, through simple combinational and sequential logic circuits

Text Book:

1. M.Morris Mano-Computer System Architecture, 3rd Edition, Pearson Education, NewDelhi, 2006.

Reference Books:

1. W.Stallings- Computer Organization & Architecture, 7th Edition, Pearson Education,New Delhi, 2006
2. N. Carter- Computer Architecture, Schaums Outline Series, TMH, New Delhi, 2006,Pearson HigherEducation,USA,1/e,2004

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA115	Subject Title	Computer Based Numerical Techniques						
LTP	3 0 2	Credit	4	Subject Category	Deptt Core	Year	1	Semester	2

Course Objective: The objective of this course is to provide conceptual understanding of various numerical methods, in particular, with reference to numerical solution of non linear equations and system of linear equations, interpolation, numerical differentiation and integration and numerical solution of ordinary differential equations.

Detailed Syllabus

UNIT 1:

Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation. Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method

Unit 2:

Simultaneous Linear Equations: Solutions of system of Linear equations, Gauss Elimination and Gauss Jordan. Gauss Seidal iterative methods, Interpolation and approximation: Finite Differences, Difference tables. Polynomial Interpolation: Newton's forward and backward formula.Langrange's interpolation

Unit 3:

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Gaussian Quadrature Formula. Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods, Predictor-corrector method.

Unit 4

Curve fitting, Method of least squares, fitting of straight lines, polynomials, exponential curves etc Frequency Chart: Different frequency chart like Histogram, Frequency curve, Pi-chart. Regression analysis, Multiple regression

Unit 5:

Time series and forcasting: Moving averages, smoothening of curves, forecasting models and methods. Statistical Quality Controls methods. Testing of Hypothesis: Test of significance, Chi-square test, t-test, ANOVA, F-Test. Application to medicine, agriculture etc.

List of practicals:

1. WAP to find the roots of non-linear equation using Bisection method.
2. WAP to find the roots of non-linear equation using False position method.
3. WAP to find the roots of non-linear equation using Newton's Raphson method.
4. WAP to find the roots of non-linear equation using Iteration method.
5. WAP to interpolate numerically using Newton's forward difference method.
6. WAP to interpolate numerically using Newton's backward difference method.
7. WAP to interpolate numerically using Lagrange's method.
8. WAP to Integrate numerically using Trapezoidal rule.
9. WAP to Integrate numerically using Simpson's 1/3 rules.
10. WAP to Integrate numerically using Simpson's 3/8 rules.
11. WAP to find numerical solution of ordinary differential equations by Euler's method.
12. WAP to linear Curve fitting by least – square approximations.

Learning Outcomes:

The student will be able:

- To learn fundamentals and concepts of statistical and optimization methods, in particular, with reference to frequency distribution and measures of central tendency, measures of dispersion, skew ness and kurtosis,
- To solve problems on theory of probability, linear programming problems, transportation, assignment and game problems.

Text Books

1. **Applied Numerical Analyses**, C.F Gerald& Wheatley, Addison Wesley, 7th Edison, 2011.

2**. Computer Oriented Numerical Methods**,Rajaraman V., PHI, 3rd Edition, 2013.

Reference Books

1. **Numerical Methods for Scientific and Engineering Computations**, Jain, Iyengar and Jain, New Age Int, 6th Edition, 2012.

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	OR116	Subject Title	Introduction to SQL						
LTP	2 0 2	Credit	3	Subject Category	Deptt Core	Year	1	Semester	2

Course Objective: The objective of the course is to understand the basic concepts of relational databases ensure refined code by developers. Create reports of sorted and restricted data. Run data manipulation statements (DML). Control database access to specific objects. Manage schema objects. Manage objects with data dictionary views. Retrieve row and column data from tables. Control privileges at the object and system level. Create indexes and constraints; alter existing schema objects. Create and query external tables.

Detailed Syllabus

UNIT 1:

Overview of Oracle Database 12c and Related Products, Overview of relational database management concepts and terminologies, Introduction to SQL and its development environments, What is Oracle SQL Developer?, Starting, SQL*Plus from Oracle SQL Developer, The Human Resource (HR) Schema, Tables used in the Course, Introduction to Oracle Database Exadata Express Cloud Service, Accessing Cloud Database using SQL Workshop, Connecting to Exadata Express Database using Database Clients

Capabilities of the SELECT statement, Arithmetic expressions and NULL values in the SELECT statement, Column aliases, Use of concatenation operator, literal character strings, alternative quote, operator, and the DISTINCT keyword, Use of the DESCRIBE command, Limiting the Rows, Rules of precedence for operators in an expression, Substitution Variables, Using the DEFINE and VERIFY command

Unit 2:

Describe the differences between single row and multiple row functions, Manipulate strings with character function in the SELECT and WHERE clauses, Manipulate numbers with the ROUND, TRUNC and MOD functions, Perform arithmetic with date data, Manipulate dates with the date functions, Describe implicit and explicit data type conversion, Use the TO_CHAR, TO_NUMBER, and TO_DATE conversion functions, Nest multiple functions, Apply the NVL, NULLIF, and COALESCE functions to data, Use conditional IF THEN ELSE logic in a SELECT statement, Group Functions, Creating Groups of Data, Restricting Group Results, Introduction to JOINS, Types of Joins, Natural join, Self-join, Non equijoins, OUTER join

Unit 3:

Introduction to Subqueries, Single Row Subqueries, Multiple Row Subqueries, Set Operators, UNION and UNION ALL operator, INTERSECT operator, MINUS operator, Matching the SELECT statements, Using ORDER BY clause in set operations, Data Manipulation Language, Database Transactions, Data Definition Language

Unit 4:

Introduction to Data Dictionary, Describe the Data Dictionary Structure, Using the Data Dictionary views, Querying the Data Dictionary Views, Overview of sequences, Overview of synonyms, Overview of indexes, Overview of views, Managing constraints, Creating and using temporary tables, Creating and using external tables, Retrieving Data by Using a Subquery as Source, Working with Multiple-Column subqueries, Using Scalar subqueries in SQL, Correlated Subqueries, Working with the WITH clause

UNIT 5:

Using Subqueries to Manipulate Data, Inserting by Using a Subquery as a Target, Using the WITH CHECK OPTION Keyword on DML Statements, Using Correlated Subqueries to Update and Delete rows

System privileges, Creating a role, Object privileges, Revoking object privileges, Overview of the Explicit Default Feature, Using multitable INSERTs, Using the MERGE statement, Performing flashback, operations, Tracking Changes in Data, Working with CURRENT_DATE, CURRENT_TIMESTAMP,and, LOCALTIMESTAMP, Working with INTERVAL data types

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

List of Practical's:

1. Retrieving Data using SQL SELECT statement
2. Restricting & Sorting Data
3. Using Single Row Functions to Customize output
4. Using Conversion Functions and Conditional Expressions
5. Reporting Aggregated Data Using the Group Functions
6. Displaying Data from Multiple Tables using Joins
7. Using Subqueries to Solve Queries
8. Using the SET operator
9. Manipulating Data
10. Using DDL statements to create and manage Tables
11. Introduction to Data Dictionary Views
12. Creating Sequences, Synonyms and Indexes
13. Creating Views
14. Managing Schema Objects
15. Retrieving Data using Subqueries
16. Manipulating Data using Subqueries
17. Controlling User Access
18. Managing Data in Different Timezones.

Learning Outcomes:

After studying this course, you should be able to:

1. Understand the advanced features of SQL.
2. Query and manipulate data within the database,
3. Use the dictionary views to retrieve metadata and
4. Create reports about their schema objects.

Text Books

1. Oracle Digital Student Books&
2. Oracle Digital Student Activity Guide

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA117	Subject Title	Soft Skills						
LTP	0 0 2	Credit	0	Subject Category	Audit Course	Year	1	Semester	2

Course Objective:

- To introduce to students to the business & corporate environment and its expectations.
- To ensure employability of students through a perfect blend of hard & soft skills.

Detailed Syllabus

UNIT 1:

1. SWOT ANALYSIS
2. GOAL SETTING
3. INTERPERSONAL, INTRAPERSONAL COMMUNICATION & ATTITUDE

Unit 2:

1 DECISION MAKING ABILITY AND CREATIVE THINKING

2. TEAM BUILDING AND LEADERSHIP
3. BUSINESS ETIQUETTES

Unit 3:

1 CAREER PLANNING

2 SELF & TIME MANAGEMENT

3 MOTIVATION

4 INTERVIEW SKILLS

Learning Outcomes

- Students identify their goals and through enhanced soft skills work towards achieving them.
- Greater self-confidence and knowledge of life skills helps them to develop healthier interpersonal relationships.
- Prepares the students to face future challenges and excel in their personal and professional lives.

REFERENCE BOOKS

- The Seven Habits of Highly Effective People by Steven R. Covey. 2007.
- How to win Friends and influence People by Dale Carnegie. 2009.
- Soft Skills: Know Yourself & Know the World by Dr. Alex . S. Chand Publications 2001.
- The ACE of Soft Skills: Attitude, Communication and Etiquette for Success by Gopalswamy Ramesh. 2008.
- Managing Soft skills for Personality development by B. N Ghosh. 2006.
- Personality Development by Elizabeth B. Hurlock. TMH Publication. 2010.

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	OR201	Subject Title	PL/SQL Fundamentals						
LTP	1 0 2	Credit	2	Subject Category	Deptt Core	Year	2	Semester	3

Course Objective: The objective of the course is to understandthe PL/SQL programming language. In the class, students learn to create PL/SQL blocks of application code. Use various features of PL/SQL, Write anonymous blocks of code in PL/SQL, Use various PL/SQL conditional constructs and loops in program blocks, Interface the PL/SQL code with the database, Use stored procedures and functions in their program blocks, Handle Exceptions in PL/SQL code.

Detailed Syllabus

UNIT 1:

Course Objectives, Course Agenda and Class Account Information, The Human Resources (HR) Schema, Appendices Used in this Course, PL/SQL Development Environments, Understanding the benefits and structure of PL/SQ, Understanding PL/SQL Blocks, Generating output messages in PL/SQL

Unit 2:

Identifying valid and invalid identifiers, Declaring and initializing variables, Various data types, Identifying the benefits of using the %TYPE attribute, Using bind variables, Lexical Units in a PL/SQL Block, Using SQL Functions in PL/SQL, Data Type Conversion, Using Nested Blocks as Statements, Referencing an Identifier Value in a Nested Block, Qualifying an Identifier with a Label, Operators in PL/SQL, Using Sequences in PL/SQL Expressions

Unit 3:

Using SQL Statements in PL/SQL, Retrieving Data in PL/SQL with the SELECT statement, Using Naming Conventions in DML Statements and data retrieval, Manipulating Data on the Server Using PL/SQL, SQL Cursors, Using SQL Cursor Attributes to Obtain Feedback on DML, Saving and Discarding Transactions, Controlling PL/SQL Flow of Execution, Using IF and CASE Statements for conditional processing, Handling Nulls, Building Boolean Conditions with Logical Operators, Using Iterative Control with Loop Statements

Unit 4:

Composite Data Types of PL/SQL Records and Tables, Using PL/SQL Records, Inserting and Updating PL/SQL Records, Using INDEX BY Tables, Using Associative arrays, Declaring and Using VArrays, Cursors, Explicit Cursor Operations, Controlling Explicit Cursors, Using Explicit Cursors to Process Rows, Cursors and Records, Cursor FOR Loops Using Subqueries, Explicit Cursor Attributes, %NOTFOUND and %ROWCOUNT Attributes

Unit 5:

Concept of Exception, Handling Exceptions with PL/SQL, Predefined Exceptions, Trapping Predefined and Non-predefined Oracle Server Errors, Functions that Return Information on Exceptions, Usage of PRAGMA keyword, Trapping User-Defined Exceptions, Propagating Exceptions, Overview of Stored Procedures and Functions, Differentiating between anonymous blocks and subprograms, CREATE OR REPLACE PROCEDURE | FUNCTION, Understanding the Header Area of a Stored Procedure and Function, Creating Simple Procedures and Functions, Creating a Simple Procedure with an IN Parameter, Executing a Procedure and a Function

List of Practical's:

1. Introduction to PL/SQL
2. Declaring PL/SQL Variables
3. Writing Executable Statements
4. Using SQL with a PL/SQL Block
5. Writing Control Structures
6. Working with Composite Data Types
7. Using Explicit Cursors

8. Handling Exceptions
9. Introducing Stored Procedures and Functions

Learning Outcomes: After studying this course, you should be able to:

1. Create anonymous PL/SQL blocks,
2. Create procedures, functions and triggers.
3. Use explicit cursors in their program blocks.
4. Demonstrations and hands-on practice reinforce the fundamental concepts.

Text Books

1. Oracle Digital Student Books&
2. Oracle Digital Student Activity Guide

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA202	Subject Title	Design and Analysis Of Algorithm						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	2	Semester	3

Course Objective: Objective of this course is to study and analyse the algorithms. It provides us with the mathematical and technical approaches of solving problems in various ways. This course enables the students to design the algorithm to solve the problems and to find out the complexity of the program. It enables the students to check how the worst case complexity of an algorithm is defined..

Detailed Syllabus

UNIT 1:

Introduction: Algorithms, Pseudo code for expressing algorithms, Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation. Sorting: bubble

Unit 2:

Recurrences - substitution, iteration and master methods Sorting : buble sort, selection sort. Divide-and-conquer: general approach, binary search, merge sort, quick sort, Strassen's matrix multiplication

Unit 3:

Greedy algorithms -general approach, activity selection, knapsack problem, minimum-spanning tree, Diskstra's algorithm, Huffman code

Unit 4:

Dynamic Programming -General approach, matrix-chain multiplication, all-pairs shortest paths, binary search tree, traveling salesperson, 0/1 knapsack problem

Unit 5:

Branch and Bound: Traveling sales man problem, Linear programming.
Backtracking: General method, applications-n-queen problem, sum of subset problem.

Learning outcomes:

- Know the big O, omega, and theta notations and their usage to give asymptotic upper, lower, and tight bounds on time and space complexity of algorithms.
- Know how to determine the worst time complexity of algorithms
- Know how to design algorithms using the divide-and-conquer strategy, and recite algorithms that employ this strategy

Text Books

1. **Introduction to Algorithms**, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt.Ltd./ Pearson Education, India, 2nd edition, 2001.
2. **Fundamentals of Computer Algorithms**, Ellis Horowitz, SatrajSahniandRajasekharam, Galgotia publications pvt.Ltd,New Delhi India, 2nd edition, 2007

Reference Books

1. **Introduction to Design and Analysis of Algorithms A strategic approach**, .C.T.Lee, S.S.Tseng, Chang and T.Tsai, Mc GrawHill,USA, 2/e, 2007.
2. **Design and Analysis of algorithms**, Aho, Ullman and Hopcroft, Pearson education,India, 4/e, 2009
3. **Algorithms,** Richard Johnson baugh and Marcus Schaefer, Pearson Education, India, 3/e, 2006

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA203	Subject Title	Object Oriented Programming with C++						
LTP	3 0 2	Credit	4	Subject Category	Deptt Core	Year	2	Semester	3

Course Objective: Understand object oriented programming and advanced C++ concepts. Be able to explain the difference between object oriented programming and→ procedural programming. Be able to program using more advanced C++ features such as→ composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc. Be able to build C++ classes using appropriate encapsulation and design→ principles.

Detailed Syllabus

UNIT 1:

Object Oriented Programming- Object-Oriented programming features and benefits. Object Oriented features of C++, Class and Objects, Data Hiding & Encapsulation, Structures, Data members and Member functions, Static Data Members and Member Functions, Nested and Local Class, Accessing Members of Class and Structure, Preprocessor Directives, Namespace.

Unit 2:

Initialization & Cleanup- Constructors – Default, Parameterized & Copy Constructors and Default Values to Parameters, Destructors. Console I/O: Hierarchy of Console Stream Classes, Unformatted and Formatted I/O Operations, Manipulators, Arrays, array of Objects, Passing and Returning Objects to Functions, String Handling in C++. Dynamic Memory Management: Pointers, new and delete Operator, Array of Pointers to Objects, this Pointer, Passing Parameters to Functions by Reference &pointers,Friend Function, Friend Class.

Unit 3:

Inheritance- Rules of Derivations – Private, Protected and Public Derivations, Different Forms of Inheritance – Single, Multiple, Multilevel, Hierarchical and Multipath Inheritance, Roles of Constructors and Destructors in Inheritance

Unit 4:

Polymorphism-Function Overloading, Operator Overloading, Function Overriding, Virtual Function and its Need, Pure Virtual Function, Abstract Class, Virtual Derivation, Virtual Destructor. Type Conversion: Basic Type Conversion, Conversion between Objects and Basic Types, Conversion between Objects of Different Classes.

Unit 5:

Files I/O in C++: Class Hierarchy for Files I/O, Text versus Binary Files, Opening and Closing Files, File Pointers, Manipulators and Error Handling.

List of practicals:

1. Write a C++ program to find the largest of three numbers using inline function.
2. Write a C++ program to sort an array of integer in ascending order using a function called exchange() which accepts two integer arguments by reference.
3. Write a C++ program to implement function overloading in order to compute power(m,n)
4. Create a 'DISTANCE' class with:
    a. Feet and inches as data members
    b. Member function to input distance
    c. Member function to output distance
    d. Member function to add two distance objects

    Write a main function to create objects of DISTANCE class. Input two distances and output the sum.
5. Create a class called 'TIME' that has

a. Three integer data members for hours, minutes and seconds
b. construct or to initialize the object to zero
c. construct or to initialize the object to some constant value
d. member function to add two TIME objects
e. member function to display time in HH:MM:SS format

Write a main function to create two TIME objects, add them and display the result in HH:MM:SS format.

6. Create a class 'COMPLEX' to hold a complex number. Write a friend function to add two complex numbers. Write a main function to add two COMPLEX objects.
7. Create a 'MATRIX' class of size m X n. Overload the '+' operator to add two MATRIX objects. Write a main function to implement it.
8. Derive a class 'MAT' from MATRIX class created in program No.7. Add a member function to overload '*' operator to multiply two objects.(Single Inheritance)
9. Write a c++ program:
    a. to illustrate Multilevel inheritance
    b. to illustrate multiple inheritance
10. Create a 'STRING' class which overloads '==' operators to compare two STRING objects.
11. Write a C++ program that uses a single file for both reading and writing the data
12. Define a function template for finding the minimum value contained in an array. Write main() function to find the minimum value of integer array and minimum value of floating point numbers in an array.

Learning Outcomes: After the completion of this course, a successful student will be able to do the following:

- Use the characteristics of an object-oriented programming language in a program.
- Use the basic object-oriented design principles in computer problem solving.
- Use the basic principles of software engineering in managing complex software project.
- Program with advanced features of the C++ programming language.

Text Books:

1.**Object Oriented Programming with C++,**Balaguruswami, E, Tata McGraw-Hill, 6Edition 2017.
2**. C++,The Complete Reference,**HerbertSchildt, Tata McGraw-Hill Education Pvt. Ltd., 4e, 2003.

Reference Books:

1..**Object Oriented Programming using C++ ,** Robert Lafore, BPB Publication , 2004
2. **Object Oriented Programming using C++,** YashwantKaneth, BPB, 2004

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA204	Subject Title	Web Technologies						
LTP	3 0 2	Credit	4	Subject Category	Deptt Core	Year	2	Semester	3

Course Objective: This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web.

Detailed Syllabus

UNIT 1:

Internet Basic - Introduction to HTML - List - Creating Table - Linking document Frames - Graphics to HTML Doc - Style sheet - Style sheet basic - Add style to document - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties.

Unit 2

Introduction to Javascript - Advantage of Javascript ,Javascript Syntax - Datatype - Variable - Array - Operator and Expression - Looping Constructor - Function - Dialog box.

Unit 3

Javascript document object model - Introduction - Object in HTML - Event Handling - Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Build in Object - User defined object - Cookies.

Unit 4

XML: Introduction, The Need for XML, Structured Data and Formatting, Advantages of XML, SGML, XML, and HTML, World Wide Web Consortium (W3C) Specifications and Grammars,

Unit 5

XML Applications and Tools: Creating and Viewing XML Documents, Transforming XML Documents, XML Document Syntax, Validating XML Documents with DTDs, XML Namespaces

List of practicals:

1. Write a program to create student registration form in html.
2. Write a program to create menu using HTML and CSS.
3. Write a program to print date using JavaScript.
4. Write a JavaScript program to print the contents of the current window.
5. Write a JavaScript program to find the area of a triangle.
6. Write a program to Sum and Multiply two numbers using JavaScript.
7. Write a program to Show use of alert, confirm and prompt box.
8. Create validation Form in JavaScript.
9. Write a program to change content of web page.
10. Write a program to view XML coursesMenu.
11. Write a program to create XMLHttpRequest .
12. Wite a XML documents form a tree structure that starts at "the root" as book store and branches to "the leaves".

Learning Outcomes: The student will be able to:

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Style Sheets.
- Build dynamic web pages using JavaScript (Client side programming).
- Create XML documents and Schemas.

Text Books:

1. **Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI,** I. Bayross, BPB Publications, 2000
2. **Mastering Javascript,**J. Jaworski, BPB Publications, 1999

Reference Books:

1. **Complete Reference HTML**T. A. Powell, Third Edition, TMH, 2002
2. **ASP.NET Developers Guide,**G.Buczek, TMH, 2002

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA205	Subject Title	Computer Networks						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	2	Semester	3

Course Objective: objective of this course is to build an understanding of the fundamental concepts of computer networking and to familiarize the student with the basic taxonomy and terminology of the computer networking area.

Detailed Syllabus

UNIT 1:

Introduction: Motivation, OSI model, Signals and media, Bits over signals, Synchronous communication, Modulation and modems, Bandwidth, Throughput, and noise, Time division and Frequency division multiplexing, Standards, Switching methods, ISDN.

Unit 2

Packet Transmission: Multiplexing, Frames, Error correction techniques, LAN/WAN/MAN, Topology, CSMA/CD,LAN protocol, Elementary Data link protocol- Sliding window protocols, Token passing rings, FDDI, IEEE 802.3, 802.5.

Unit 3

Routing Algorithms: Distance-Vector, Link-State, Shortest path computation, Dijkstra's algorithm, Congestion control, WAN technologies including frame relay, X.25, ATM.

Unit 4

Internetworking: Motivation, Concept, Goals, TCP/IP model, IP addressing with sub netting, Address binding with ARP, IP Datagram, Encapsulation IP fragmentation and reassembly, ICMP,IGMP,TCP.

Unit 5

Network Services: Electronic mail, File transfer, Access and management, Virtual terminals, Remote procedure call.

Learning Outcomes: After completing this course the student must demonstrate the knowledge and ability to:

- Independently understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer

Text Books:

1. **Data communication and Networking,**Forouzan, B.A, McGraw Hill, 4th Edition, 2006

2. **Computer Networks,**Tanenbaum, A.S., Prentice Hall,4th Edition, 2003

Reference Books:

1. **Internetworking with TCP/IP Vol. 1 Principles,**Comer, D.E., Prentice Hall of India,5th Edition, 2005

2. **Computer Networking with Internet Protocols and Tech,**Stallings, W.,Prentice Hall of India, 2007.

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA206	Subject Title	Organization Behavior						
LTP	3 0 0	Credit	3	Subject Category	Deptt Core	Year	2	Semester	3

Course Objective: The objectives of this course are two-fold. First, the course is intended to provide a Comprehensive background in the strategic, economic, financial and organizational aspects of Industry. Secondly, the course will seek to provide a practical framework for managerial decision-making in the context of IT sector.

Detailed Syllabus

UNIT 1:

Fundamentals of Organizational Behaviour-Nature, Scope, Definition and Goals of Organizational Behaviour; Fundamental Concepts of Organizational Behaviour; Models of Organizational Behaviour; Emerging aspects of Organizational Behaviour: Meaning Cultural Diversity

Unit 2

Managing the Perception Process-Attitude, Values and Motivation Concept, Nature, Process, Importance, Management Behavioural aspect of Perception. 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 McGregcrs's Theory 'X' and Theory 'Y'.

Unit 3

Personality-Definition of Personality, Determinants of Personality; Theories of Personality- Traitand Type Theories, The Big Five Traites, Mytes-Briggs Indicator; Locus of Control,S Type A and Type B Assessment of Personality.

Unit 4

Work Stress Meaning and definition of Stress-Symptoms of Stress; Sources of Stress: Individual Level, Group Level, Organizational Level; Stressors, Extra Organizational Stressors; Effect of Stress – Burnouts; Stress Management – Individual Strategies, Organizational Strategies; Employee Counselling.

Unit 5

Group Behaviour and Leadership-Nature of Group, Types of Groups; Nature and Characteristics of team; Team Building, Effective Teamwork; Nature of Leadership, Leadership Styles; Traits of Effective Leaders.

Learning Outcomes: At the completion of this paper students should be able to:

- Analyze the behavior of individuals and groups in organizations in terms of the key factors that influence organizational behavior.
- Assess the potential effects of organizational level factors (such as structure, culture and change) on organizational behavior.
- Analyze organizational behavioral issues in the context of organizational behavior theories, models and concepts.

Text Books

1. **Organizational Behavior Text, Cases and Games,**K.Aswathappa, Himalaya Publishing House, Mumbai, Sixth Edition ,2005
2. **Organizational Behavior**,Stephen P. Robbins, Timothy A. Judge,Prentice Hall,15th Edition,2012

Reference Books

1. **Organizational Behavior Human Behavior at Work,**J.W. Newstrom, Tata McGraw Hill Publishing Company Limited, New Delhi, 12th Edition, 2007

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	HS202	Subject Title	APTITUDE & PERSONALITY DEVELOPMENT I					
LTP	3 0 0	Credit	0	Subject Category	AC	Year	II	Semester	III

Course Outline: The first step of an intensive two step placement training module equips the students to successfully handle the placement program of any on-campus/off-campus company. It not only provides career guidance about the selection process but also helps students in profile building; self-introduction and proactive internship search techniques.

Course Objective:

1. Interpret the questions of aptitude building objectively and prepare for various competitive examinations
2. Understand the optimized approach of dealing with placement questions
3. Learn ways of representing themselves effectively in formal settings

Course Pre / Co- requisite (if any): Understanding of writing concepts, general intelligence of LR, algebra concepts and equation formation, time management and presentation skills.

Detailed Syllabus

UNIT 1 - QUANTITATIVE APTITUDE 11 hours

Number System 03 hours

Types of numbers; Factors; Divisibility test; Place and face Value; Base system ; Remainder theorem; digits at the unit places and finding last two digits in a given expression; Calculating number of zeroes, Finding maximum power of any prime number or any composite number in any factorial, HCF and LCM; Fractions.

Percentage 02 hours

Basic concepts; Conversion from fraction to percentage; Application of percentage in – Expenditure, Cost, Consumption problems, Population increase or decrease problems, Production, Manpower and Working hour problems; Successive increment & decrement; Comparison of salary or numbers; Percentage change in area or volume, etc.

Ages and Averages 01 hour

Problems based on ages solving with algebraic equations; Concept of hence time and past time; Averages**:** Basic Concepts; Weighted Average; Basic understanding of mean, median and mode.

Ratio and Proportion 01 hour

Introduction & types; Comparison of Ratios; Concept of duplicate, triplicate, sub-duplicate and sub-triplicate ratiosProportion and variation–Concept of direct, inverse, continuous and mean proportions.

Profit and Loss 02 hours

Introduction; Concept of single, double and triple discount and marked price.

Simple / Compound Interest 02 hours

Basic concept of Principal, Time, Amount and Rate of Interest; Concept of Lent money.

UNIT 2- VERBAL APTITUDE 09 hours

Tenses 02 hours

Understanding and aligning them with the various question types.

Subject – Verb Agreement **02 hours**

Subject-Verb Agreement: Rules and Applications; commonly confused words-II; Gerunds, Active and Passive voice.

Question Types **03 hours** Introduction to Question types-I: Fill in the blanks, One word Substitutes, Spellings, understanding the right word choice, concept of para jumbles and para completion, reading comprehension, verbal analogies, odd man out, phrases and idioms.
Introduction to Question types-II: Error identification, Homophones, Usage of the various figures of speech, commonly confused words and phrases, techniques for tackling synonyms and antonyms.

Reading Comprehensions **02 hour s** Reading Comprehension: Basics of Comprehensions, different tones of comprehensions, cracking question types like contextual vocabulary, fill in the blanks, true/false questions, reference to context, summary and title of the passage, paraphrasing the text.

UNIT 3- LOGICAL REASONING **10 hours**

Coding Decoding and Sequences **02 hours**

Coding Decoding, Cryptarithmetic, Sequence and Series-Finding the missing term/wrong term in the logical sequence of letter/number/word/alphanumeric, Continuous pattern series.

Verbal Analogies and Odd man out **02 hours**

Verbal Analogy based on various parameters-Antonym / synonym relationship, Quantity and unit, Individual and Group, Product and Raw material, cause and Effect etc.
Odd man out based on several kind of relationship–Relationship based on meaning, functional relationship, even-odd or prime-composite, divisibility rule, etc.

Blood Relation and Direction Sense **02 hours** Blood Relation-Indicating form / puzzle form / coding form, Direction Sense, Direction puzzles.

Seating Arrangements **02 hours** Seating Arrangements – Linear / Circular / Distribution / comparison/ Floor and box arrangement /Quant based arrangements, etc.

Critical Reasoning–I **02 hours**

Statement and assumptions, course of action, statement and conclusion, probably true/false.

UNIT 4- SOFT SKILLS **09 hours**

Non Verbal Communication **04 hours**

Types, Practical Application Body Language in day to day life, Body Language Exercises and Activities, Error Analysis & Feedback Sharing.
Suggested Activities & Exercises: (i) Communication Origami, (ii) Power of body language, (iii) Draw it.

Online Profiling & Social Media Ethics **05 hours**

Social Media Ethics, Why Social Media Etiquette? Social Media Do's & Don'ts, How to Avoid Social Media Mistakes, Best LinkedIn Profile Tips for Job Seekers, How To Create A LinkedIn Profile & Example Sharing, Feedback Sharing & Error Analysis.
Suggested Activities & Exercises: (i) Online Portfolio Creation, (ii) Fun Social Media Projects,(iii) LinkedIn profile development project with feedback sharing and error analysis.

LEARNING OUTCOME:

By the end of this semester, students will be able to perceive and analyse the requirements of placement trends as detailed information about the selection process would be provided by career guidance. They will be more confident and will be able to develop a professional profile, both online and offline.

Text book [TB]:

1. Quantitative Ability :How to prepare for Quantitative Aptitude, Arun Sharma, McGraw Hill, 8 th edition, 2018.
2. Logical Reasoning **:** A Modern Approach to Logical Reasoning-R.S. Aggarwal, S Chand Publishing,2 Colour edition -2018.
3. Verbal Aptitude : English is Easy- Chetanand Singh (BSC Publication)-2018 edition.
4. Soft Skills: The Definitive Book of Body Language by Barbara and Allan Pease,RHUS, 1 edition- 2006.

Reference books [RB]:

1. QA :Quantitative Aptitude for Competitive Examinations- R.S. Agarwal S. Chand Publications-2017.
   QA: Quantitative Aptitude- Saurabh Rawat and Anushree Sah Rawat, Savera Publishing House, 1st Edition-2016.
2. LR: Logical Reasoning and Data Interpretation for the CAT - Nishit K Sinha, Pearson India; 5th edition-2016.
   LR: Wiley's Verbal Ability and Reasoning - P A ANAND,Wiley-2016.
3. VA : Oxford Guide to English Grammar- John Eastwood, Oxford University Press-2003.
   VA: Fun with grammar- Suzanne W. Woodward Pearson Education ESL-1996
4. Soft Skills :How to Talk to Anyone by Leil Lowndes Harper Element; New edition-2015.
   Soft Skills: Crucial Conversations: Tools for Talking When Stakes Are High by Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler; Brilliance Audio; Abridged, Updated edition-2013.

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA211	Subject Title	Management Information Systems						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	2	Semester	4

Course Objective:

- Explain to students why information systems are so important today for business and management;
- Evaluate the role of the major types of information systems in a business environment and their relationship to each other;

Detailed Syllabus

UNIT 1:

Introduction to MIS: The Technical and Business Perspective, Organization Structure, Evaluation of MIS through Information System, Levels of MIS (Top, Middle, Lower), MIS Organization within the Company, Methodology and Tools/Techniques for Systematic Identification,Evaluation and Modification of MIS.

Unit 2

Information Systems for Decision Making: An introduction to information systems, Information systems in organizations,Information Technology Concepts, The IS Revolution; Information requirement for the different levels of management, transaction processing system, Decision support system. Strategic Role of Information Systems. Business Processes, Information management, and Decision Making. Computers and Information Processing.

Unit 3

Transaction Processing System: hardware and software requirements, tools used,case studies, merits and demerits of transaction processing system, Managerial control, Information and tools required, difference between transactional system and managerial system. Frequency of taking outputs, Need for interconnected system, common database, Redundancy control, case studies.

Decision Support System: Introduction, concept and tools, case studies, virtual organizations,strategic decisions-unstructured approach, cost and values of unstructured information.

Unit 4

Optimization:Optimization techniques, difference between optimization tools and DSS toolsexpert system, difference between expert system and management information system. Role of chief information officer.

Unit 5

Advanced MIS: Concepts, Needs and Problems in Achieving Advanced MIS, DSS.

Pitfalls in MIS Development: Fundamental Weakness, Soft Spots in Planning and DesignProblems.

Functional MIS: A Study of Marketing, Personnel, Financial and Production MIS.

Learning Outcomes: Upon completion of this course, students will be able to:

- Understand the basic concepts and technologies used in the field of management information systems;
- Have the knowledge of the different types of management information systems;
- Understand the processes of developing and implementing information systems.

Text Books:

1. **Analysis and Design of Information Systems**, V. Rajaraman,3 Edition,PHI,2011
2. **Management Information Systems**, S. Sadagopan, Prentice-Hall of India

Reference Books:

1. **Management Information Systems,** Jawadekarw. S, Tata McGraw-Hill
2. **Management Information Systems**, Kanter, J., PHI, 3rdEdition,

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA212	Subject Title	Visual Programming with VB .Net						
LTP	3 0 2	Credit	4	Subject Category	Deptt Core	Year	2	Semester	4

Course Objective: This course provides an exhaustive coverage of C# programming language features like Object-oriented Programming, Inheritance, Interfaces, Exception Handling, Reflection, Standard I/O programming, File Handling, Generics, Windows Application using Windows form, File I/O, ADO.NET

Detailed Syllabus

UNIT 1:

The .Net framework: Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In –Time Compilation, Framework Base Classes.

Unit 2

C -Sharp Language (C#): Introduction, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading, Interfaces, Delegates and Events. Type conversion

Unit 3

C# Using Libraries: Namespace- System, Input-Output, Multi-Threading, Networking and sockets, Managing Console I/O Operations, Windows Forms, Error Handling.

Unit 4

Advanced Features Using C#:ADO.Net: Connection(OleDBConnection and SqlConnection),Command, Data Readers,DataAdapters and DataSet , Unsafe Mode

Unit 5

.**Net Assemblies and Attribute:** .Net Assemblies features and structure, private and share assemblies, Built-In attribute and custom attribute. Introduction about generic

List of practicals:

1. First Console Application (Hello World) in C#
2. Program to demonstrate Boolean Operators
3. Draw Mandelbrot sets using for loop and switch case
4. Write a program using enum
5. Write a program using struts
6. Write a program using string arrays
7. Write a program for single level inheritance
8. Write a program for polymorphism
9. Write a program for method overriding
10. Write a program of Arraylist Collection
11. Write a program of HashTable collection
12. Write a program of reading and writing to a data file

Learning Outcome : After completion of this course student will be able to:

- Apply OOAD concepts to build C# applications
- Develop console based applications using C#
- Develop windows applications using C#
- Create database applications using C#

Text Books:

1. **"AGuidetothe Project ManagementBodyof Knowledge (PMBOK)",** Project Management Institute, USA,5th edition, 2013.
2. **"Project Management Workbook and PMP/CAPM Exam Study Guide"** Harold Kerzner,Frank P.Saladis, John-Wiley &Sons,USA,,11 Edition, 2013

Reference Books:

1. **"Professional C#"**, Simon Robinson, Christian Nagel, Karli Watson, Jay Glynn, Morgan Skinner, Bill Evjen,Wrox p2p series,USA,3 Edition, 2004
2. **"Professional C# and .Net 4",** Christian Nagel et al, ,Wrox,USA,1 Edition, 2010.

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA213	Subject Title	Microprocessor						
LTP	3 0 2	Credit	4	Subject Category	Deptt Core	Year	2	Semester	4

Course Objective: The objective of this course is to provide the students with fundamentals of analog and digital communication design with their practical considerations. Develop a fundamental understanding of communication systems with emphasis on signal modulation techniques.

Detailed Syllabus

UNIT 1:

Introduction of Microcomputer System: CPU, I/O devices, clock, memory, bussed architecture, tristate logic, address bus, data bus and control bus.Semiconductor Memories: Development of semiconductor memory, internal structure and decoding, memory read and write timing diagrams, MROM, ROM,EPROM,EEPROM, DRAM,

Unit 2

Architecture of 8-bit Microprocessor: Intel 8085A microprocessor,Pin description and internal architecture.Operation and Control of Microprocessor: Timing and control Unit, op-code fetch machine cycle, memory read/write machine cycles, I/O read/write machine cycles, interrupt acknowledge machine cycle..

Unit 3

Instruction Set: Addressing modes; Data transfer, arithmetic, logical, branch, stack and machine control groups of instruction set, macro RTLand micro RTL flow chart of few typical instructions; Unspecified flags and instructions.Assembly Language Programming: Assembler directives, simple examples; Subroutines, parameter passing to subroutines.

Unit 4

Interfacing: Interfacing of memory chips, address allocation technique and decoding; Interfacing of I/O devices, LEDs and toggle-switches as examples, memory mapped and isolated I/O structure; Input/Output techniques: CPU initiated unconditional and conditional I/O transfer, device initiated interrupt I/O transfer.
Interrupts: Interrupt structure of 8085A microprocessor, processing of vectored and non-vectored interrupts, latency time and response time; Handling multiple interrupts

Unit 5

Programmable Peripheral Interface: Intel 8255, pin configuration, internal structure of a port bit, modes of operation, bit SET/RESET feature, programming, Intel 8253, pin configuration, internal block diagram of counter and modes of operation, counter read methods, programming.

List of practicals:

1. Addition of two 8 bit numbers
2. Addition of two 16 bit numbers
3. Subtraction of two 16 bit numbers
4. Addition of two BCD numbers
5. Sum of squares of first ‘n’ numbers
6. The length of the given string
7. Factorial of a given number
8. Fibonacci series
9. Storing successive numbers
10. Arithmetic mean of ‘n’ numbers
11. Elevator interface
12. Traffic light interface

Learning Outcomes :

- The student will be able to analyze, specify, design, write and test assembly language programs of moderate complexity.
- The student will be able to select an appropriate 'architecture' or program design to apply to a particular situation; e.g. an interrupt-driven I/O handler for a responsive real-time machine. Following on from this, the student will be able to design and build the necessary programs.

Text Books:

1. **Microprocessor and Interfacing-Programming and Hardware**, Hall D.V.,2nd Ed., Tata McGraw-Hill Publishing Company Limited, 2008.
2. **Microprocessor Architecture,Programming and Applications,**Gaonkar R.S., 5th Ed., Penram International, 2007.

Reference Books:

1. **Microprocessor Systems- Hardware,Software and Programming**, Stewart J, Prentice Hall International Edition,1990
2. **Microprocessors and Programmed Logic,**Short K. L, 2nd Ed.,Pearson Education, 2008.

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA214	Subject Title	Advanced Web Technologies						
LTP	3 0 2	Credit	4	Subject Category	Deptt Core	Year	2	Semester	4

Course Objective: This course introduces World Wide Web Consortium (W3C) standard markup language and services of the Internet. Topics include creating web pages, search engines, FTP, and other related topics. Upon completion, students should be able to deploy a hand-coded web site created with mark-up language, and effectively use and understand the function of search engines.

Detailed Syllabus

UNIT 1:

PHP: Introduction to PHP Evaluation of Php Basic Syntax Defining variable and constant PhP Data type Operator and Expression, GET & POST method PHP,Conditional Structure & Looping Structure, Array,StringCreating and accessing, String Searching & Replacing, String Formatting String, String Related Library function.

Unit 2:

Function: Call by value and Call by reference, Recursive function. Handling Html Form With PhP: Capturing Form, Data Dealing with Multi-value filed, Generating File uploaded form, Redirecting a form after submission.

Unit 3

PHP Components: PHP GD Library, PHP Regular expression function, Cookies, Session, Server variable, Database Connectivity with MySQL (Using PhpMyAdmin)

Unit 4

Working with file and Directories: Understanding file& directory, Opening and closing a file Coping ,renaming and deleting a file, Working with directories, Building a text editor, File Uploading & Downloading

Unit 5

PHP with OOPS: Class, constructor, inheritance, serialize objects PHP with XML

List of practicals:

1. Program to print each element of an array using foreach().
2. Program to find number of elements in an array.
3. Program to sort elements in an array in ascending order.
4. Program to Program to create a Simple Calculator.
5. Programs to create simple Login and Logout using sessions.
6. Program to Upload a file to the Server.
7. Program to create a New Database.
8. Program to connect to the server and selecting database.
9. Program to Insert and Fetch records to the table in Database.
10. Program to Store and Read an image in Database.
11. Program to create a simple Registration form.
12. Contact form using PHP.

Learning Outcomes : Upon successful completion of the course, the student

- is able to understand and use the basics of the XML based technologies
- is able to understand and define and utilize the Web Services / Windows Communication Foundations concept
- is able to describe how Web Services can be used to implement Service Oriented Architecture (SOA)
- is able to design and implement user interfaces based on the AJAX technology

Text Book:

1. **XML How to Program**, Deitel, Nieto, Pearson, 1st edition, 2001
2. **PHP Bible**, Joyce Park and Tim Converse, Wiley, 2nd edition, 2002

Reference Book:

1. **Beginning XML**, Joe Fawcett, Danny Ayers, Liam R. E. Quin, Wrox, 5th Edition, 2012
2. **Professional PHP5**, Stephen Nowicki, Wiley, 2nd edition, 2007

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA215	Subject Title	Computer Graphics						
LTP	3 0 2	Credit	4	Subject Category	Deptt Core	Year	2	Semester	4

Course Objective: This subject helps students develop problem-solving, communication and research skills in the context of computer graphics, including computer representation, and manipulation and display of pictorial information. It also helps students enhance their skills to design and implement three-dimensional (3D) computer images, such as those used in animated films, virtual reality (VR), data visualisation and computer games.

Detailed Syllabus

UNIT 1:

Introduction to Active and Passive Graphics, Applications of Computer Graphics, concept of pixels, resolution, aspect ratio, frame buffer.Positioningtechniques,Rubber-Band techniques, Dragging Dimensioning techniques and Graphical Potentiometers, Pointing and Selection: the use of selection points defining a boundary rectangle, multiple selections, Menu selection,Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet, Scanner and Digitizing Cameraetc

Refresh Cathode Ray Tube, Raster Scan displays, Random Scan displays, Architecture of Raster and Random Scan Monitors, Color CRT-monitors and Color generating techniques (Shadow Mask, Beam Penetration) , Direct View Storage Tube, Flat-Panel Displays; 3-D Viewing Devices, Raster Scan Systems, Random Scan Systems, Graphics monitors and workstations, Color Models (RGB and CMY), Lookup Table.

Unit 2

Process and need of Scan Conversion, effect of scan conversion,imagerepresentation.Line- Straight Line, DDA algorithm, Bresenham's Line Algorithm. Circle- Mid Point Circle Algorithm, Bresenham's Algorithm, Ellipse-Mid Point Algorithm.polygon filling algorithms- boundary fill, scan-line algorithm, Aliasing and Anti-aliasing, flood fill techniques, character generation.

Unit 3

Translation, scaling, fixed point scaling,rotation, reflection, transformation with respect to arbitrary points. Application of homogeneous coordinates for uniform matrix operations, composite transformations.Window to viewport transformation, Clipping- Point clipping, Line Clipping, Cohen-Sutherland Line Clipping algorithms, Polygon Clipping-Sutherland-hodgeman algorithm.

Unit 4

3D Graphics: 3DDisplay Methods, 3D transformations (Translation, Scaling, Rotation, Reflection, Shearing), Projection-parallel projections, perspective projection, Hidden Surface removal Algorithms-scan line method, Z-buffer method.

Unit 5

Illumination and shading: illumination models, Ambient light, Diffuse reflection, Specular reflection, Gouraud and Phong shading models, parametric cubic curves, Hermite, Bezier and Bspline curves.

List of practicals:

1. Write a program to implement DDA line drawing algorithm
2. Write a program to implement the Bresenham line drawing algorithm
3. Write a program to implement Bresenham circle drawing algorithm
4. Write a program to implement Midpoint circle drawing algorithm
5. Write a program to rotate a triangle (continuous rotation)
6. Write a program to depict movement of a man walking
7. Write a program to depict a rotating cylinder.
8. Write a program to implement Cohen Sutherland line clipping algorithm
9. Write a program to implement Liang Barsky line clipping algorithm

10 Write a program to implement 2D transformation
11 Write a program to implement 3D transformation
12 Write a program to implement Bezier curve.

Learning Outcomes : Upon successful completion of this subject students should be able to:

- Describe the major computer graphics applications.
- Explain the operations of graphics hardware systems
- Explain the viewing pipeline of generating a raster-scan image.
- Explain some classic 2D and 3D graphics algorithms.

Text Books:

1. **Computer Graphics C Version**, Donald Hearn and M Pauline Baker, Pearson Education, 2nd edition, 2006
2. **Introduction to Computer Graphics,** J.D. Foley, A.V. Dam, Addison-Wesley Publishing Company, 2nd edition, 1994.

Reference Books:

1. **Computer Graphics(Schaums Outline Series)**, R.A. Plastock et.al., TMH, 2nd edition, 2006
2. **Computer Graphics,** J.D.Foley, Pearson Education, 2nd edition, 2004

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	OR216	Subject Title	Administration Workshop-I						
LTP	2 0 2	Credit	3	Subject Category	Deptt Core	Year	2	Semester	4

Course Objective: The objective of the course is to understand the fundamentals of basic Database Administration. The students will learn to Install Oracle Grid Infrastructure, Create and manage users., Install and configure an Oracle Database, Create and manage storage structures, Administer the Oracle Database, Understand the Oracle database architecture and how its components work and interact with one another, Perform backup and recovery.

Detailed Syllabus

UNIT 1:

Oracle Database Architecture Overview, Oracle ASM Architecture Overview, Process Architecture, Memory structures, Logical and physical storage structures, ASM storage components, Tasks of an Oracle Database Administrator, Tools Used to Administer an Oracle Database, Installation: System Requirements, Oracle Universal Installer (OUI), Installing Oracle Grid Infrastructure, Installing Oracle Database Software, Silent Install, Planning the Database, Using the DBCA to Create a Database Password Management, Creating a Database Design Template, Using the DBCA to Delete a Database

Unit 2

Start and stop the Oracle database and components, Use Oracle Enterprise Manager, Access a database with SQLPlus, Modify database installation parameters, Describe the stages of database startup, Describe database shutdown options, View the alert log, Access dynamic performance views, Set up initialization parameter files for ASM instance, Start up and shut down ASM instances, Administer ASM disk groups, Use Enterprise Manager to create and configure the Listener, Enable Oracle Restart to monitor the listener, Use tnspingto test Oracle Net connectivity, Identify when to use shared servers and when to use dedicated servers

Unit 3

Storage Structures, How Table Data Is Stored, Anatomy of a Database Block, Space Management in Tablespaces, Tablespaces in the Preconfigured Database, Actions with Tablespaces, Oracle Managed Files (OMF), Database User Accounts, Predefined Administrative Accounts, Benefits of Roles, Predefined Roles, Implementing Profiles, Data Concurrency, Enqueue Mechanism, Resolving Lock Conflicts, Deadlocks, Data Manipulation, Transactions and Undo Data, Undo Data Versus Redo Data, Configuring Undo Retention.

Unit 4

Describe DBA responsibilities for security, Enable standard database auditing, Specify audit options, Review audit information, Maintain the audit trail, Manage optimizer statistics, Manage the Automatic, Workload Repository (AWR), Use the Automatic Database Diagnostic Monitor (ADDM), Describe and use the advisory framework, Set alert thresholds, Use server-generated alerts, Use automated tasks, Performance Monitoring, Managing Memory Components, Enabling Automatic Memory Management (AMM), Automatic Shared Memory Advisor, Using Memory Advisors, Dynamic Performance Statistics, Troubleshooting and Tuning Views, Invalid and Unusable Objects, Part of Your Job, Statement Failure, User Error, Understanding Instance Recovery, Phases of Instance Recovery, Using the MTTR Advisor, Media Failure, Archive Log Files

Unit 5

Backup Solutions: Overview, Oracle Secure Backup, User-Managed Backup, Terminology, Recovery Manager (RMAN), Configuring Backup Settings, Backing Up the Control File to a Trace File, Monitoring the Flash Recovery Area, Opening a Database, Data Recovery Advisor, Loss of a Control File, Loss of a Redo Log File, Data Recovery Advisor, Data Failures, Listing Data Failures, Data Recovery Advisor Views, Describe ways to move data, Create and use directory objects, Use SQL*Loader to move data, Use external tables to move data, General architecture of Oracle Data Pump, Use Data Pump export and import to move data, Use the Enterprise Manager Support Workbench, Work with Oracle Support, Log service requests (SR), Manage patches

Learning Outcomes: After studying this course, you should be able to:

1. Create an operational database
2. Manage the various structures in an effective and efficient manner.
3. Perform Performance monitoring, database security, user management and
4. Backup/recovery Techniques.

Text Books

1. Oracle Digital Student Books

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	HS205	Subject Title	APTITUDE & PERSONALITY DEVELOPMENT II					
LTP	3 0 0	Credit	0	Subject Category	AC	Year	II	Semester	IV

Course Outline: Aptitude and Soft Skills IV is the final step of programme and the module is designed to enhance the analytical and interpersonal skills of students to make them ready to face various placements, interviews. It will also help them learn various personality development techniques by enhancing their GD and PI skills. Mock Placement Drive will test and improve students by Feedback Sharing & Error Correction.

Course Objective:

1. Align themselves with the placement requirements and their needs
2. Learn analytical and employability skills
3. Prepare students for job placements so that they could clear the selection process successfully and give them strategies and skills to crack GD as well as PI to get selected with decent job offers

Course Pre/Co- requisite (if any):

1. Understanding grammar, number system and basic arithmetic, analytical reasoning concepts, covered in Aptitude and Soft Skills III
2. Professional profile building and Self introduction

Detailed Syllabus

UNIT 1: QUANTITATIVE APTITUDE **12 hours**

Partnership **02 hours**

Partnership: Introduction & types; Speed, Distance and Time: Average Velocity; Race tracks - Straight and Circular; Trains; Boats and Streams

Time and Work **02 hours**

Time, Work and Wages: Basic concepts(relationship between men, days and work); Understanding group efficiency; Alternate work; Negative work; Wages; Pipes and Cisterns;

Permutation and Combination **02 hours** Permutations and Combinations: Basic Principles of Counting (Addition and Multiplication); Arrangements around- Circular, Square and Rectangular tables and in straight lines;

Probability **02 hours**

Probability –Introduction, various types of events; Classical definition of probability; Random and Discrete variables; Bayes' Theorem and question types;

Data Interpretation **02 hours**

Introduction; Different ways of representing data- Narration based, pictorial, pie chart, Bar graph, line charts; various questions based upon them

Miscellaneous **02 hours**

Basic algebraic equations; Quadratic Equations; Geometry and Mensuration

UNIT 2: VERBAL APTITUDE **08 hours**

Approaches **02 hours**

Understanding the basic approaches of all the various question types, intricacies of cloze test, correct use of specific adjectives, concept of sentence improvement, writing concept, auxiliaries and modals

Words **02 hours**

Concept of consistency, precision, concision in terms of reading and writing, advance word choice with respect to placement papers, SAP (Subject-Audience-Purpose) approach

Clauses **01 hours**

Subordinate Clauses- The noun clause, the adjective clause, the adverb clause, Analysis of simple and complex sentences, prepositional phrases, transformation of sentences

Vocabulary **01 hours**

Revisiting vocabulary- high, medium and low frequency words, organization of ideas an thoughts in order to understand the text- The Pyramid Principle

Questions **02 hours**

Various test taking skills in accordance with the placement papers

UNIT 3: LOGICAL REASONING **11 HOURS**

Deductive Logic **03 hours**

Premises and conclusion structure, Quality of deductive argument, Categorical arguments, Syllogism, Conditional Arguments- If..then, only if..then, If and only if , Either or.

Puzzles **02 hours**

Grouping and selection, Double line up, Binary logic- truth teller-lie teller, Team formation and miscellaneous puzzles.

Set Theory and Critical Reasoning -II **03hours** Set theory and Venn diagram: Union of sets, Intersection of sets, Use of venn diagrams in problem solving with two, three, four set, concept of maxima-minima through Venn diagram.

Critical reasoning II: Statement and Inference, cause and Effects, Statement and Arguments- Strengthen or Weaken the argument, Statement Assertion and Reason

Non-verbal Reasoning **01 hours**

Non-Verbal reasoning: Mirror-image, Water-image, Spotting out the embedded figures, Completion of incomplete pattern, Figure matrix, Paper folding, Paper cutting, Grouping of identical figures, Counting figures, Non verbal series / analogies / odd man out

Data Sufficiency & Clock/Calendar **02 hours**

Data Sufficiency based on logical reasoning field like Coding-Decoding / Puzzle Test / Blood Relations / clock / calendar / etc

UNIT 4: SOFT SKILLS **08 hours**

Group Discussion **04 hours**

Importance, Do's & Don'ts, Personality Traits, Tips and Strategies, Types of Group Discussions.
Suggested Exercises, Games & Activities: Mock Group Discussions (on basic topics), with feedback sharing and error analysis.

Personal Interview **04 hours** Importance, Do's & Don'ts, Personality Interview, Tips and Strategies, Etiquette Rules.
Suggested Exercises, Games & Activities: Mock Personal Interviews (contd.) with feedback sharing and error analysis.

Learning Outcomes:

1. Be prepared for the upcoming placements and they will also be ready for other competitive exams.
2. Improve their GD and PI Skills and be able to have firsthand experience of a Placement drive and gain sufficient confidence to perform well.

Text book [TB]:

1. Quantitative Aptitude **:** How to prepare for Quantitative Aptitude, Arun Sharma, McGraw Hill, 8th edition- 2018.
2. Logical Reasoning**:** A Modern Approach to Logical Reasoning-R.S. Aggarwal, S Chand Publishing, 2 Colour edition -2018.
3. Verbal Aptitude : English is Easy- Chetanand Singh, BSC Publication.
4. Soft Skills : Group Discussion on Current Topics by P. N. Joshi; Upkar Prakashan- 2010.

Reference books [RB]:

1. Quantitative Aptitude:Quantitative Aptitude for Competitive Examinations- R.S. Agarwal, S. Chand Publications-2017.

Quantitative Aptitude:Quantitative Aptitude-Saurabh Rawat & Anushree Sah Rawat Savera Publishing House, 1st edition-2016.

2. Logical Reasoning: Logical Reasoning and Data Interpretation for the CAT - Nishit K Sinha, Pearson India; 5th edition-2016.
   Logical Reasoning: Wiley's Verbal Ability and Reasoning - P A ANAND, Wiley-2016.
3. Verbal Aptitude: Oxford Guide to English Grammar- John Eastwood, Oxford University Press-2003.
   Verbal Aptitude: Fun with grammar- Suzanne W. Woodward Pearson Education ESL-1996.
4. Soft Skills: AComplete Kit for Group Discussion by S. Hundiwala; Arihant publications; edition-2018.
   Soft Skills: Basic Interviewing Skills by Raymond L. Gorden, Waveland Press, Inc.; 1 edition-1998.

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA301	Subject Title	Multimedia & Animation						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	3	Semester	5

Course Objective: Aware the student with the basics of Multimedia and Graphics. Students need to be familiar with various types and formats of animations, video and audio formats and learn Multimedia and animation Tools.

Detailed Syllabus

UNIT 1:

Introduction to Multimedia and animation, Multimedia Systems, Design Fundamentals, Elements of multimedia and animation and their use, Back ground of Art, Color theory overview, Sketching & illustration, Storyboarding, different tools for animation

Unit 2

Multimedia Skills, Hardware, Use of Graphics in Multimedia, Overview of Vector and Raster Graphics, Basic software tools, Multimedia Authoring Tools, Planning and Costing, Designing and Producing, Contents and talent, Delivering, Enhancing and Testing Multimedia Projects.

Unit 3

Paint and Draw Applications, Graphic effects and techniques, Image File Format, Anti-aliasing, Morphing,Multimedia Authoring tools, professional development tools.

Unit 4

Introduction and Principles of Animations, Power of Motion, Animation Techniques, Animation File Format,Making animation for Rolling Ball, making animation for a Bouncing Ball, Animation for the web, GIF, Plug-ins and Players, Animation tools for World Wide Web.

Unit 5

Multiple monitors, bitmaps, Vector drawing, lossy graphic compression, image file formatic animations Images standards, JPEG Compression, Zig Zag Coding, Multimedia Database.Content based retrieval for text and images,Video: Video representation, Colors, Video Compression, MPEG standards, MHEG Standard Video Streaming on net, Video Conferencing, Multimedia Broadcast Services, Indexing and retrieval of Video Database, recent development in multimedia

Learning Outcome: After studying this course, you should be able to:

- Understand the fundamental principles of Multimedia and Animations.
- Understand the hardware requirement for graphics and animation.
- Understand various audio and video compression techniques and video streaming

Text Books

1. **Multimedia, Making IT Work,** Tay Vaughan, Tata McGraw Hill,9th edition,2014
2. **Fundamentals of Multimedia,** Ze-Nian Li and Mark S.Drew, Pearson Education,1st edition,2003

Reference Books

1. **Multimedia systems design,**Prabhat K Andleigh, Kiran Thakrar, PHI Learning Private Limited, Delhi India.,1st Edition,1995

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA302	Subject Title	Probability and Statistics						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	3	Semester	5

Course Objective: To get the knowledge about probability, random variables, distributions and basics of statistics.

Detailed Syllabus

UNIT 1:

Classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Bayes' Theorem and independence, problems Random Variables: Discrete, continuous and mixed random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, probability and moment generating function, median and quintiles, Markov inequality, Chebyshev's inequality, problems.

Unit 2

Special Distributions: Discrete uniform, binomial, geometric, negative binomial, hyper geometric, Poisson, continuous uniform, exponential, gamma, Weibull, Pareto, beta, normal, lognormal, inverse Gaussian, Cauchy, d o u b l e exponential distributions, reliability and hazard rate, reliability of series and parallel systems, problems.

Unit 3

Joint Distributions: Joint, marginal and conditional distributions, product moments, correlation and regression, independence of random variables, bivariate normal distribution, problems, The CentralLimit Theorem, distributions of the sample mean and the sample variance for a normal population, Chi-Square, t and F distributions, problems.

Unit 4

Unbiasedness, consistency, the method of moments and the method of maximum likelihood estimation, confidence intervals for parameters in one sample and two sample problems of normal populations, confidence intervals for proportions, problems.

Unit 5

Testing of Hypotheses: Null and alternative hypotheses, the critical and acceptance regions, two types of error, power of the test, the most powerful test and Neyman-Pearson Fundamental Lemma, tests for one sample and two sample problems for normal populations, tests for proportions, Chisquaregoodness of fit test and its applications, problems.

Learning Outcomes: After studying this course, you should be able to:

- Understand the meaning of probability and randomness
- Ability to use probability and other concepts in problem solving
- Ability to deal with different types of data and apply various statistical concepts on it

Text Books:

1. **An Introduction to Probability and Statistics**, V.K. Rohatgi& A.K. Md. E. Saleh, Wiley-Interscience, 2nd edition, 2000
2. **Introduction to Probability and Statistics: Principles and Applications for Engineering and the Computing Sciences**, J.S. Milton & J.C. Arnold,4th Edition, McGraw-Hill Education, 2002

Reference Books:

1. **Probability and Statistics in Engineering**,W.W. Hines et al, Wiley, 4th edition,2003

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA303	Subject Title	: Data Warehouse and Data Mining						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	3	Semester	5

Course Objective: Understand data mining principles and techniques: Introduce DM as a cutting edge business intelligence method and acquaint the students with the DM techniques for building competitive advantage through proactive analysis, predictive modeling, and identifying new trends and behaviors

Detailed Syllabus

UNIT 1:

Dss Uses, definition, Operational Database. Introduction to DATA Warehousing. Data-Mart, Conceptof Data-Warehousing, Multi-Dimensional DatabaseStructures. Client/Server Computing Model &Data Warehousing. Parallel Processors &Cluster Systems.Distributed DBMS implementations.

Unit 2

DATA Warehousing. Data Warehousing Components. Building a Data Warehouse. Warehouse Database. Mapping the Data Warehouse to a Multiprocessor Architecture. DBMS Schemas for Decision Support. Data Extraction, Cleanup &Transformation Tools, Metadata.

Unit 3

Business Analysis. Reporting &Query Tools & Applications. On line Analytical Processing (OLAP).Patterns &Models. Statistics. Artificial Intelligence.

Unit 4

Knowledge Discovery, Data Mining. Introduction to Data-Mining. Techniques of Data-Mining. DecisionTrees. Neural Networks. Nearest Neighbor &Clustering. Genetic Algorithms. Rule Introduction. Selecting &Using the Right Technique.

Unit 5

Multimedia Data-Mining, Multimedia-Databases, Mining Multimedia Data, Data-Mining and the World Wide Web, Web Data-Mining, Mining and Meta-Data. Data Visualization &Overal lP erspective. Data Visualization. Applications of Data-Mining.

Learning Outcomes: After studying this course, you should be able to:

- Learning how to gather and analyze large sets of data to gain useful business understanding.
- Learning how to produce a quantitative analysis report/memo with the necessary information to make decisions.
- Describing and demonstrating basic data mining algorithms, methods, and tools
- Identifying business applications of data mining

Text Books:

1 **Data Warehousing, Data Mining and OLAP,**AlexBerson and Stephen J.Smith, Tata McGraw – Hill Edition, Thirteenth Reprint, 2008.

2 **Data Mining Concepts and Techniques,**Jiawei Han and Micheline Kamber, Third Edition, Elsevier, 2012.

Reference Books:

1. **Insight into Data Mining Theory and Practice,** K.P. Soman, ShyamDiwakar and V. Aja, Eastern Economy Edition, Prentice Hall of India, 2006.
2. **Introduction to Data Mining with Case Studies,** G. K. Gupta, Eastern Economy Edition, Prentice Hall of India, 2006.

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA351	Subject Title	Cryptography & Network Security						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Elective	Year	3	Semester	5

Course Objective: : This course provides students with concepts of computer security, cryptography, digital money, secure protocols, detection and other security techniques.

Detailed Syllabus

UNIT 1:
Introduction to security attacks, services and mechanism, Classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers, Modern Block Ciphers: Block ciphers principles,

Unit 2
Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard(DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

Unit 3
Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA

Unit 4
Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA) Digital Signatures: Digital Signatures, Digital signature standards (DSS)

Unit 5
Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications

Learning Outcomes: After studying this course, you should be able to:

- Understand, appreciate, employ, design and implement appropriate security technologies
- Apply policies to protect computers and digital information.

Text Books

1. **Cryptography and Network Security: Principals and Practice,** William Stallings, Pearson Education,6th Edition,2013
2. **Cryptography and Network Security,**Behrouz A. Frouzan, TMH,2nd Edition,2010

Reference Books

1. **Network Security and Cryptography**, Bernard Menezes, Cengage Learning,1st edition,2010

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA352	Subject Title	Mobile Computing						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Elective	Year	3	Semester	5

Course Objective: To provide basic knowledge on Wireless Communications, Mobile Internet and Mobile Content Services.

Detailed Syllabus

UNIT 1:

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Unit 2

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

Unit 3

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

Unit 4

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Unit 5

Adhoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Learning Outcomes: After studying this course, you should be able to:

- To learn the basics of Wireless voice and data communications technologies.
- To build working knowledge on various telephone and satellite networks.
- To build skills in working with Wireless application Protocols to develop mobile content applications

Text Books

1. **Mobile Communications,** J. Schiller, PHI,2nd Edition,2003
2. **Mobile Computing,** Raj kamal, Oxford university Press,2nd Edition,2011

Reference Books

1. **Mobile Computing,Applications and services**, Griss, Martin, Yang, Guang, Springer,1st Edition,2011

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA353	Subject Title	Software Testing						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Elective	Year	3	Semester	5

Course Objective: To understand the basics of software testing, its need and implications on software development and its overall effect on software quality.

Detailed Syllabus

UNIT 1:
Fundamentals of testing: Necessity of testing, what is it, Testing principles, Fundamental test Process, The psychology of testing

Unit 2

Testing throughout the software life cycle: Software development models, Test levels, Test types: the targets of testing, Maintenance testing

Unit 3

Static techniques: Reviews and the test process, Review process, Static analysis by tools

Unit 4

Test design techniques: Identifying test conditions and designing test cases, Categories of test design techniques, Specification-based or black-box techniques, Structure-based or white-box techniques, Experience-based techniques

Unit 5

Test management: Test organization, Test plans, estimates, and strategies, Test progress monitoring and control, Configuration management, Risk and testing, Incident management
Tool support for testing: Types of test tool, Effective use of tools: Potential benefits and risks, Introducing a tool in to an organization

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Learning Outcomes: After studying this course, you should be able to:

- To gain knowledge of various functional and structural testing techniques
- To gain knowledge of various activities and levels of testing
- To learn the issues in testing of object oriented and internet based applications

Text Books:

1. **Software Testing Foundations**, Hans Schaefer, Andreas Spillner, Tilo Linz, Rocky Nook, 3rd Edition,2011
2. **Foundations of Software Testing**, Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black, Cengage Learning,1st Edition,2008

Reference Books:

1. **Software Testing**, Louise Tamres, Pearson Education,1st Edition,2002

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA304	Subject Title	Linux and System Administration						
LTP	3 0 2	Credit	4	Subject Category	Deptt Core	Year	3	Semester	5

Course Objective: : This course provides an intensely practical introduction to Unix System Administration using Linux. In addition to System Administration, TCP/IP network service administration and the use of scripting languages will be introduced.

Detailed Syllabus

UNIT 1:

Fundamentals of UNIX & Linux Systems: Covers the history of UNIX &Linux,installation, navigation of the file system, the command line interface, piping, standard input/output redirection, basic text editors and common tools, shell scripting, process management, and booting

Unit 2

User account management: Instructs how to add/modify/remove users & groups, modify UNIX permissions, set password & account policies, create access controls, monitor account activity, and set resource limits.

Unit 3

Networking: Reviews the fundamentals of networking and the TCP/IP model, teaches how to remotely administer a large amount of UNIX machines, configure, maintain and troubleshoot essential network services, set up routing, VPN tunnels, and networked file systems.

Unit 4

Software & Configuration Management: Teaches various practices to manage software packages, application updates, to track modifications to system configuration over time, and automate the systeminstallation process.

Unit 5

Logging, Performance Analysis, and System Monitoring: Provides an overview of metrics related to system performance, teaches how to analyze and store log files, set up tools to routinely monitor for important events, create automated notifications when system or services are unavailable, and Conduct analysis to resolve performance issues.

List of practicals:

1. use of general purpose commands: mkdir, cd, pwd,ls,cat,less,cp, mv,rm,man,input and output redirection(< and >),pipe (|),grep,chmod,passwd,ps,kill,gzip,tar,find.
2. Use Vi editor to create a file which contain some text. Correct typing errors during creation, Save the file & Logout of the file.
3. Open the file created in Exp 1, Add, Change, delete & Save the changes.
4. Use the cat command to create a file containing the following data. Call it mutable use tabs to separate the fields 1425 ravi 15.65, 4320 ramu 26.27, 6830 sita 36.15, 1450 raju 21.86.
5. Use the cat command to display the content of file, use vi command to correct any errors in the file, use the sort command to sort the file according to the first field. Call the sorted file & print the file
6. Use the cut & paste commands to swap columns of file.
7. Use the date and who commands in sequence ?(in one line) such that the output of date will display on the screen and the output of who will be redirected to a file .Use the more command to check the contents of file.
8. Develop an interactive grep script that asks for a word and a file name and then tells how many lines contain that word.
9. Create users with add user command and quotas and permissions to users.

10. Write A shell script that takes a command –line argument and reports on whether it is directory,afile,or something else.
11. Write a shell script that accepts one or more file name as a arguments and converts all of them to uppercase,provided they exits in the current directory.
12. Write a shell script that determines the period for which a specified user is working on the system

Learning Outcomes: After studying this course, you should be able to:

- Demonstrate knowledge of the role and responsibilities of a Unix system administrator
- Install and configure the Linux operating system
- Manage the resources and security of a computer running Linux at a basic level

Text Books:

1. **UNIX and Linux System Administration Handbook,**Evi Nemeth, Garth Snyder, Trent R. Hein, and Ben Whaley, Prentice Hall, 4th Edition, 2010
2. **The Linux Command Line: A Complete Introduction**, William E. Shotts Jr, No Starch Press, January 2012

Reference Books:

1. **Running Linux**, Matthias Dalheimer, and Matt Welsh, O'Reilly Media, 5th Edition, December 2005

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	OR305	Subject Title	Java SE 8 Programming						
LTP	2 0 2	Credit	3	Subject Category	Deptt Core	Year	3	Semester	5

Course Objective: The objective of the course is to cover the core language features and Application Programming Interfaces (API) you will use to design object-oriented applications with Java Standard Edition 8 (Java SE 8) Platform.

Detailed Syllabus

UNIT 1:

Defining how the Java language achieves platform independence, Differentiating between the Java ME, Java SE, and Java EE Platforms, Evaluating Java libraries, middle-ware, and database options, Defining how the Java language continues to evolve, Creating simple Java classes, Creating primitive variables, Using operators, Creating and manipulate strings, Using if-else and switch statements, Iterating with loops: while,do-while,for,enhanced for Creating arrays, Using Java fields, constructors, and methods, Using encapsulation in Java class design, Modeling business problems using Java classes, Making classes immutable, Creating and use Java subclasses, Overloading methods

Unit 2

Using access levels: private, protected, default, and public, Overriding methods, Using virtual method invocation, Using varargs to specify variable arguments, Using the instanceof operator to compare object types, Using upward and downward casts, Modeling business problems by using the static keyword, Implementing the singleton design pattern, Designing general-purpose base classes by using abstract classes, Constructing abstract Java classes and subclasses, Applying final keyword in Java, Distinguish between top-level and nested classes, Defining a Java interface, Choosing between interface inheritance and class inheritance, Extending an interface, Defaulting methods, Anonymous inner classes, Defining a Lambda Expression, Creating a custom generic class, Using the type inference diamond to create an object, Creating a collection by using generics, Implementing an ArrayList, Implementing a TreeSet, Implementing a HashMap, Implementing a Deque, Ordering collections

Unit 3

Describing the Builder pattern, Iterating through a collection using lambda syntax
Describing the Stream interface, Filtering a collection using lambda expressions, Calling an existing method using a method reference, Chaining multiple methods together, Defining pipelines in terms of lambdas and collections, Listing the built-in interfaces included in java.util.function, Core interfaces, Predicate, Consumer, Function, Supplier, Using primitive versions of base interfaces, Using binary versions of base interfaces, Extracting data from an object using map, Describing the types of stream operations, Describing the Optional class, Describing lazy processing, Sorting a stream, Saving results to a collection using the collect method, Grouping and partition data using the Collectors class, Defining the purpose of Java exceptions, Using the try and throw statements, Using the catch, multi-catch, and finally clauses, Autoclose resources with a try-with-resources statement, Recognizing common exception classes and categories, Creating custom exceptions, Testing invariants by using assertions

Unit 4

Creating and manage date-based events, Creating and manage time-based events, Combining date and time into a single object, Working with dates and times across time zones, Managing changes resulting from daylight savings, Defining and create timestamps, periods and durations, Applying formatting to local and zoned dates and times, Describing the basics of input and output in Java, Read and write data from the console, Using streams to read and write files, Writing and read objects using serialization, Using the Path interface to operate on file and directory paths, Using the Files class to check, delete, copy, or move a file or directory, Using Stream API with NIO2, Describing operating system task scheduling, Creating worker threads using Runnable and Callable, Using an ExecutorService to concurrently execute tasks, Identifying potential threading problems, Using synchronized and concurrent atomic to manage atomicity, Using monitor locks to control the order of thread execution, Using the java.util.concurrent collections

Unit 5

Parallelism, The need for Fork-Join, Work stealing, RecursiveTask, RecursiveTask, Reviewing the key characteristics of streams, Describing how to make a stream pipeline execute in parallel, List the key assumptions needed to use a parallel pipeline, Defining reduction, Describing why reduction requires an associative function, Calculating a value using reduce, Describing the process for decomposing and then merging work, Listing the key performance considerations for parallel streams, Defining the layout of the JDBC API, Connecting to a database by using a JDBC driver, Submitting queries and get results from the database, Specifying JDBC driver information externally, Performing CRUD operations using the JDBC API, Describing the advantages of localizing an application, Defining what a locale represents, Read and set the locale by using the Locale object, Building a resource bundle for each locale, Calling a resource bundle from an application, Changing the locale for a resource bundle

List of Practical's:

1. Java Santax and Class Review
2. Encapsulation and Subclassing
3. Overriding methods and applying Polymorphism
4. Abstract & Nested Classes
5. Interfaces and Lambda Expressions
6. Generics and Collections
7. Collections Streams and Filters
8. Lambda Built-in Functional Interface
9. Lambda Operations
10. Exceptions and Assertions
11. Using the Date/Time API
12. Java I/O Fundamentals
13. Java File NIO2
14. Concurrency
15. The Fork Join Framework
16. Parallel Streams
17. Building Database Applications with JDBC
18. Localization

Learning Outcomes: After studying this course, you should be able to:

1. Create Java technology applications with the latest JDK Technology
2. Develop your object-oriented skills
3. Identify good practices in the use of the language to create robust Java application
4. Use Lambda expressions in Java applications
5. Store and manipulate data using collections
6. Manipulate files, directories and file systems
7. Connect to databases using standard SQL queries through JDBC
8. Create high-performance multi-threaded applications

Text Books

1. Oracle Digital Student Books&
2. Oracle Digital Student Activity Guide

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA311	Subject Title	Software Project Management						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	3	Semester	6

Course Objective: Upon completion of this course in Project Management, student will be able to demonstrate professional level competencies in the key areas of project management and project management leadership.

Detailed Syllabus

UNIT 1:
Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

Unit 2
Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

Unit 3
Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance(CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews and Types of Review.

Unit 4
Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process.

Unit 5
Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

Learning Outcomes: After studying this course, you should be able to:

- Manage the selection and initiation of individual projects and of portfolios of projects in the enterprise.
- Conduct project planning activities that accurately forecast project costs, timelines, and quality. Implement processes for successful resource, communication, and risk and change management

Text Books:

1. **Software Project Management,** Hughes,5th Edition, McGraw Hill Education,2011
2. **Applied Software Project Management** , Andrew Stellman, Jennifer Greene O'Reilly Media,1st Edition,2005

Reference Books:

1. **Introduction to Software Project Management**, Adolfo Villafiorita,Auerbach Publications,1st Edition,2014

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA312	Subject Title	Artificial Intelligence						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	3	Semester	6

Course Objective: Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms)

Detailed Syllabus

Unit 1

Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence,

UNIT 2

Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

Unit 3

Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory,

Unit 4

Supervised and unsupervised learning, Decision trees,Bayesian Networks

Unit 5

Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Artificial neural Networks, Reinforcement learning

Learning Outcomes: After studying this course, you should be able to:

- Understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving
- Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information

Text Books:

1. **Artificial Intelligence,** Elaine Rich and Kevin Knight, McGraw-Hill,2nd Edition,1991
2. **Artificial Intelligence – A Modern Approach,** Stuart Russell, Peter Norvig, Pearson Education,3rd Edition,2009

Reference Books:

1. **Artificial Intelligence: The Basics**, Kevin Warwick, Routledge,1st Edition,2006

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA313	Subject Title	Python Programming						
LTP	3 0 2	Credit	4	Subject Category	Deptt Core	Year	3	Semester	6

Course Objective: : To understand why Python is a useful scripting language for developers.

Detailed Syllabus

UNIT 1:

Introduction to python, Installation and versions of python, variables, expression and data types, conditional statements, Loops and iterations, functions, strings ,strings functions, Sequences: List, tuples, Sets and Dictionaries, indexing and slicing lists, Functions, Functions parameters, closures, decorators, lambda functions, map, reduce and filters.

Unit 2

list comprehensions, dictionary comprehensions, set comprehensions , Numpy basics: ndarrays, data types for ndarrays, operations between array and scalar, indexing, slicing ,transposing, swapping axes, conditional logics, mathematical and statistical methods, linear algebra, random number generation

Unit 3

Classes and objects: string representation of instances, making objects, encapsulating name in a class, managed attributes, inheritance, constructors, modules and packages: import everything, import submodule, splitting a module into multiple files, reloading modules.

Unit 4

Pandas: series, data frame, index object, indexing ,dropping, selection, filtering, reindexing, data alignment, function application and mapping, sorting ,ranking, summarizing, missing data, hierarchical indexing, data loading, file formats, combining, merging, reshaping, pivoting

Unit 5

Plotting and visualization: figures ,subplot, colors markers, line style, tick, label, legends, annotation, drawing, line plots, bar plots, histogram and density plots, scatter plots, chaco, mayavi and other packages

List of practicals:

1. Programs demonstrating data types, variable and expression
2. Programs demonstrating the use of conditional statements,loops and arrays.
3. WAP to demonstrate list, tuples and dictionary(indexing and iloc function)
4. Create functions that perform arithmetic operation .Also create lambda function for the same
5. WAP of list comprehensions, dictionary comprehensions, set comprehensions
6. WAP of n x darrays and perform slicing and other operations
7. WAP of various mathematical and statistical functions
8. WAP to demonstrate classes and object,inheritance,constructor,managed attributes
9. WAP to import data using pandas read methods like read(),read_csv() etc
10. WAP using pandas to reset index of data frame and use methods like idxmax(),idxmin() etc.
11. WAP in pandas to import various file formats(csv,excel,txt etc.) and perform various operation on data frame and Series
12. WAP using matplotlib to create histograms,densityplots,scatter plots etc..

Learning Outcomes: After studying this course, you should be able to:

- To learn how to use lists, tuples, and dictionaries in Python programs
- To define the structure and components of a Python program
- To learn how to read and write files in Python.
- To learn how to use exception handling in Python applications for error handling

Text Books:

1. **Python Cook Book**,david Beazley et al, 3rd edition, O'reilly media, 2013,
2. **Python for Data Analysis**, Wes Mckinney,1stedition,O'reilly media,2012

Reference Books:

1. **Trending on Python Vol I**,Matt Harrison, 1st edition, 2013
2. **Trending on Python Vol II**,Matt Harrison, 1st edition, 2013

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA361	Subject Title	Ethical hacking & Cyber law						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Elective	Year	3	Semester	6

Course Objective: Students identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.

Detailed Syllabus

UNIT 1:

Introduction to Ethical Hacking, Ethics, and Legality: Ethical Hacking Terminology, Different Types of Hacking Technologies, Different Phases Involved in Ethical Hacking and Stages of Ethical Hacking: Passive and Active Reconnaissance, Scanning, Gaining Access, Maintaining Access, Covering Tracks, Types of Hacker Classes, Ways to Conduct Ethical Hacking, Creating a Security Evaluation Plan, Types of Ethical Hacks, Testing Types, Ethical Hacking Report.

Unit 2

Foot printing and Social Engineering: Foot printing, Information Gathering Methodology, Competitive Intelligence, DNS Enumeration Who is and ARIN Lookups, Types of DNS Records, Trace route, E- Mail Tracking, Web Spiders, Social Engineering, Common Types Of Attacks, Insider Attacks, Identity Theft, Phishing Attacks, Online Scams, URL Obfuscation, Social-Engineering Countermeasures.

Unit 3

Scanning, types of Scanning , CEH Scanning Methodology ,Ping Sweep Techniques, N map Command Switches, SYN, Stealth, XMAS, NULL, IDLE, and FIN Scans, TCP Communication Flag Types, War-Dialing Techniques, Banner Grabbing and OS Fingerprinting Techniques, Proxy Servers.

Unit 4

Understanding Password - Cracking Techniques, Understanding the LAN Manager Hash Cracking Windows 2000 Passwords, Password - Cracking Countermeasures, Understanding Different Types of Passwords Passive Online Attacks, Active Online Attacks, Offline Attacks Non electronic Attacks.

Unit 5

Electronic Banking: Banking and Bookkeeping, Legal recognition of digital signature, The Cyber Crime: Tampering with computer source document, Hacking with computer system, At least two case studies on each topic, IT Act 2000, IT Amendment Act 2006 & 2008.

Learning Outcomes: After studying this course, you should be able to:

- Students locate and apply case law and common law to current legal dilemmas in the technology
  field.
- Students apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
- Students distinguish enforceable contracts from non-enforceable contracts

Text Books

1. **CEH official Certfied Ethical Hacking Review Guide**, Kimberly Graves, Wiley India, 1st Edition 2007.
2. **Handbook of Cyber and E-commerce Laws**, Bakshi P.M and Suri R.K., Bharat Publishing House, 2nd Edition, 2002.

Reference Books:

1. **Insider Computer Fraud**, Kenneth C. Brancik, Auerbach Publications Taylor & Francis Group, 2ndEdition , 2008.
2. **Ethical Hacking**, Ankit Fadia, Macmillan India Ltd, 2nd Edition, 2006

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA362	Subject Title	Cloud Computing						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Elective	Year	3	Semester	6

Course Objective: Design and develop highly scalable cloud-based applications by creating and configuring virtual machines on the cloud and building private cloud

Detailed Syllabus

UNIT 1:

Understanding Cloud Computing: Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage –Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services

Unit 2

Developing Cloud Services: Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service –Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds

Unit 3

Cloud Computing For Everyone: Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists –Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation

Unit 4

Using Cloud Services 10: Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files

Unit 5

Other Ways to Collaborate: Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis

Learning Outcomes: After studying this course, you should be able to:

- Develop and deploy cloud application using popular cloud platforms.
- Compare, contrast, and evaluate the key trade-offs between multiple approaches to cloud system design, and Identify appropriate design choices when solving real-world cloud computing problems.
- Write comprehensive case studies analysing and contrasting different cloud computing solutions.

Text Books:

1. **"Handbook of Cloud Computing"**,Furht, Borko, Escalante, Armando,Springer,USA, 1/e,2010
2. **"Cloud Computing: Concepts, Technology &Architecture",**ThomasErl et al,Prentice Hall,USA,1/e 2013

Reference Books:

1. **"A Road to Cloud Computing:A Beginner's Perspective"**HarjotDhawan,LAP Lambert Academic Publishing,USA,2012
2. **"Cloud Computing for Dummies",** Judith Hurwitz,, ,John Wiley &Sons,USA,1/e 2010
3. **"Cloud Computing: Principles and Paradigms"**,RajkumarBuyya,,John Wiley &Sons,USA,1/e 2011

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA363	Subject Title	ENTERPRISE RESOURCE PLANNING						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Elective	Year	3	Semester	6

Course Objective: In-depth knowledge of major ERP components, including material requirements planning, master production scheduling, and capacity requirements planning; knowledge of typical ERP systems, and the advantages and limitations of implementing such systems.

Detailed Syllabus

UNIT 1:

ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, The Evolution of ERP, The Structure of ERP.

Unit 2

Business Process Reengineering, Data ware Housing, Data Mining, Online Analytic Processing(OLAP), Product Life Cycle Management(PLM),LAP, Supply chain Management.

Unit 3

ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, The Changing ERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration ofERP, Supply chain and Customer Relationship Applications.

Unit 4

ERP Implementation Basics, ERP Implementation Life Cycle, Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees,

Unit 5

ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into organizational culture. Using ERP tool: either SAP or ORACLE format to case study

Learning Outcomes: After studying this course, you should be able to:

- examine systematically the planning mechanisms in an enterprise, and identify all components in an ERP system and the relationships among the components
- understand production planning in an ERP system, and systematicallydevelop plans for an enterprise

Text Books:

1. **Concepts in Enterprise Resource Planning,**Ellen Monk, Bret Wagner ,4th Edition,2012
2. **ERP: Making It Happen: The Implementers' Guide to Success with Enterprise Resource Planning,**Thomas F. Wallace, Michael H. Kremzar,Wiley,1st Edition,2001

Reference Books:

1. **Enterprise Resource Planning: Fundamentals of Design and Implementation,**K., Mohapatra, S., Anbuudayasankar, S.P., Sivakumar,springer,1st Edition,2014

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA314	Subject Title	E-commerce						
LTP	3 1 0	Credit	3.5	Subject Category	Deptt Core	Year	3	Semester	6

Course Objective: Understand the basic concepts of e-commerce, security and other issues and their solutions. Design the framework to implement an e-commerce application . Analyze real business cases regarding their e-business strategies and transformation processes and choices.

Detailed Syllabus

UNIT 1:

Introduction: Definition of Electronic Commerce, E-Commerce: technology and prospects, incentives for engaging in electronic commerce, needs of E-Commerce, advantages and disadvantages, framework, Impact of E-commerce on business, E-Commerce Models.

Unit 2

Network Infrastructure for E- Commerce: Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY). Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device.

Unit 3

Web Security: Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.

Unit 4

Encryption: Encryption techniques, Symmetric Encryption: Keys and data encryption standard, Triple encryption, Secret key encryption; Asymmetric encryption: public and private pair key encryption, Digital Signatures, Virtual Private Network.

Unit 5

Electronic Payments: Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking. EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda.

Learning Outcomes:

- Integrate user-centered design guidelines in developing user-friendly websites
- Evaluate the bullwhip effect in a supply chain, analyze the causes, and recommend possible solutions.
- Analyze different types of portal technologies and deployment methodologies commonly used in the industry.

Text Books:

1. **Electronic Commerce: A Managerial and Social Networks Perspective,**Turban, E., King, D., Lee, J.K., Liang, T.-P., Turban,Springer,1st Edition,2015
2. **E-Business and E-Commerce Management ,** Dave Chaffey,5th Edition,2011

Reference Books:

1. **E-Commerce,** Kenneth C Loudon,Pearson 13th edition,2017

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	OR315	Subject Title	Java EE 7: Front End Web Application Development						
LTP	2 0 2	Credit	3	Subject Category	Deptt Core	Year	3	Semester	6

Course Objective: The objective of the course is to helps you explore building and deploying enterprise applications that comply with the Java Platform, Enterprise Edition 7 Web Profile. This course will help you explore annotations, Session Enterprise JavaBeans (EJB-Lite), Java Persistence API (JPA), servlets, JavaServer Pages(JSPs), Contexts and Dependency Injection (CDI), JAX-RS RESTful web services, the Java API for WebSocket and the Java API for JSON processing.

Detailed Syllabus

UNIT 1:

The Java EE Platform, The needs of enterprise application developers, Java EE specifications, A comparison of services and libraries, The Java EE Web Profile, Java EE application tiers and layers, The purpose of an application server, Starting and stopping WebLogic Server, Properties of Java EE components, The development process of a Java EE application, Configuring and packaging Java EE applications

Unit 2

Java SE features used in Java EE applications, Creating POJO JavaBeans components, Using Logging, Using Common Java Annotations, Develop custom annotations, The role of annotations in Java EE applications, The HTTP request-response model, Differences between Java Servlets, JSP, and JSF components, Application layering and the MVC pattern, Avoiding thread safety issues in web components, Use the Expression Language, The Servlet API, Request and response APIs, Set response headers, Two approaches to creating a response body, Uploading files using a servlet, Forwarding control and passing data, Using the session management API

Unit 3

The role of JSP as a presentation mechanism, Authoring JSP view pages, Processing data from servlets in a JSP page, Using tag libraries, The need for web services, Designing a RESTful web service, Create methods that follow the prescribed rules of HTTP method behavior, Create JAX-RS resource and application classes, Consume query and other parameter types, Produce and consume complex data in the form of XML, HTTP status codes, Pre-JAX-RS 2 Clients: HttpUrlConnection and the Jersey Client API, The JAX-RS 2 Client API

Unit 4

HTML DOM manipulation with JavaScript, RESTful clients with JavaScript (AJAX), Limitations of JavaScript clients, The Same-Origin policy and CORS, Web Service Limitations, WebSocket Explained, Creating WebSockets with Java, Client-side WebSokect with JavaScript, Client-side WebSocket with Java, Consuming JSON with Java, Producing JSON with Java, Container-managed security, User roles and responsibilities, Create a role-based security policy, The security API

Unit 5

The role of EJB components in Java EE applications, The benefits of EJB components, Operational characteristics of stateless and stateful session beans, Creating session beans, Creating session bean clients, The role of the Java Persistence API in Java EE applications, Basics of Object-relational mapping The elements and environment of an entity component, The life cycle and operational characteristics of entity components, Transaction semantics, Programmatic vs. declarative transaction scoping, Using JTA to scope transactions programmatically, Implementing a container-managed transaction policy, Optimistic locking with the versioning of entity components, Pessimistic locking using EntityManager APIs, The effect of exceptions on transaction state

List of Practical's:

1. Configuring the Enterprise Development Tools and Applications Servers
2. JavaBeans, Logging and Annotations

3. Comparing Java EE Web Components
4. Developing Servlets
5. Developing with JavaServer Pages Technology
6. JAX-RX Web Services
7. Java RESTful Clients
8. HTML5 Applications with Java Script and AJAX
9. Web Socket and the Java API for JSON
10. Web Application Security
11. POJO and EJB Lite Component Models
12. Applying Java Persistence API
13. Implementing a Transaction Policy

Learning Outcomes:

After studying this course, you should be able to:

1. Develop web-based interfaces for both desktop and mobile devices.
2. Assemble an application.
3. Build Java applications.
4. Deploy an application into an application server (Java EE platform runtime environment).

Text Books:

1. Oracle Digital Student Books&
2. Oracle Digital Student Activity Guide.

Course Structure& Syllabus of BCA (ADC)
Applicable for Batch: 2018-2021

Subject Code	CA317	Subject Title	Industrial Project						
LTP	0 0 32	Credit	16	Subject Category	PRJT	Year	3	Semester	6

Student of BCA Final Semester can opt the four/six month Internship in an Industry in lieu of regular final semester.

During the Internship the evaluation process shall be as:

i. Student will work on one industrial project on one industrial project in consultation with mentor at Industry and one guide from University.
ii. University Guide shall be responsible for continuous monitoring of student during the entire duration of Internship.
iii. Student shall send the progress report, duly signed by the mentor at Industry, to the Guide at University.
iv. The last date of obtaining NOC for the Industrial Internship shall be two weeks from the commencement of final semester. After that no NOC shall be issued to the student.
v. The final presentation/final assessment will take place during the End Term Examination.
vi. The result will be declared with regular result declaration.
vii. Students who will get placement without support of the placement procedure followed by the University, the Career Service Department will check the company background.
viii. Student should not have any backlog.
ix. Continuous monitoring of the training progress and project assigned to the student during the Industrial Internship should be undertaken.

Sr. No.	Evaluation	Marks
1	Supervisor	20
2	Industry Feedback	40
3	Presentation	20
4	Project Report	20