Hirachand Nemchand College of Commerce, Solapur (Autonomous College)

Syllabus for

BACHELOR OF COMPUTER APPLICATION

(B. C. A.)

SECOND YEAR

SEMESTER - III & IV

with

Choice Based Credit System (CBCS)

(w. e. from June 2022-2023)

Preamble :
Bachelor of Computer Applications (BCA) is a three Year under Graduate Programme Spread over six semesters. The Course is designed to bridge the gap between IT industries and Academic institutes by incorporating the latest development, into the Curriculum and to give students a complete understanding within a structured framework. The Course helps the students to build-up a successful Career in Computer Science and for pursuing higher studies in Computer Science.

Objective of the Program :
At the end of the three year BCA programme the students will be able to:
• Understand, analyze and develop computer programs in the areas related to algorithm, web design and networking for efficient design of computer based system.
• Work in the IT sector as system engineer, software tester, junior programmer, web developer, system administrator, software developer etc.

Internal Assessment:-
The medium of instruction and examination will be only in English.
a) Details of Internal examination:

Particulars	Marks (2 Credit Paper)	Marks (4 Credit Paper)
Attendance	05 Marks	05 Marks
Mid Test	05 Marks	10 Marks
Home Assignment/ MCQ	--	05 Marks
Group Exercise / Seminar / Projects	--	--
Total	**10**	**20**

B. C. A. - II SYLLABUS
SEMESTER III & IV
CBCS PATTERN: w. e. from June 2022-2023

		B. C. A. Semester-III		
	Subject Code	**Subject**	**Credit**	**Marks (ESE+ISE)**
1	21UCACS301	OOPS with C++-I	2.0	50 (40+10)
2	21UCACS302	Data structures using 'C' -I	2.0	50 (40+10)
3	21UCACS303	Database Management System	2.0	50 (40+10)
4	21UCACS304	Software Testing & Quality Assurance	2.0	50 (40+10)
5	21UCACS305	Web Development using PHP	2.0	50 (40+10)
6	21UCACS306	Computer Networks-I	2.0	50 (40+10)
7	21UCACS307	Financial Accounting with Tally	4.0	100 (80+20)
8	21UCACC301	Certificate Course in Bootstrap	0.0	--
9	21UCAPS301	Practical I [301 & 302]	2.0	50 (40+10)
10	21UCAPS302	Practical II [305]	2.0	50 (40+10)
11	21UCAPS303	Practical III [307]	2.0	50 (40+10)
		TOTAL	**22.00**	**550**
		B. C. A. Semester-IV		
	Subject Code	**Subject**	**Credit**	**Marks (ESE+ISE)**
1	21UCACS401	OOPS with C++-II	2.0	50 (40+10)
2	21UCACS402	Data structures using 'C' -II	2.0	50 (40+10)
3	21UCACS403	MySQL	2.0	50 (40+10)
4	21UCACS404	Ethics and Cyber law	2.0	50 (40+10)
5	21UCACS405	Angular JS	2.0	50 (40+10)
6	21UCACS406	Advanced Computer Network	2.0	50 (40+10)
7	21UCACS407	Python Programming	4.0	100 (80+20)
8	21UCAMS401	Environmental Studies	0.0	--
9	21UCAPS401	Practical I [401 & 402]	2.0	50 (40+10)
10	21UCAPS402	Practical II [403 & 405]	2.0	50 (40+10)
11	21UCAPS403	Practical III [407]	2.0	50 (40+10)
		TOTAL	**22.00**	**550**

ESE= End Semester Evaluation, ISE= In-Semester Evaluation,
21UCA: Hard Core Course- All courses (subjects) are compulsory. Non-credit course: for Semester III: Certificate Course in Bootstrap and Semester IV: Environmental Studies

Semester : III	Hard Core	Semester Exam			L/W*	Credits
Code: 21UCACS301	OOPS with C++ - I	ESE*	ISE*	Total	3	2.0
Subject Title		40	10	50		

Course Objectives	• To learn OOP concepts and implementation within OOP environment • To practice the fundamental programming methodologies in the C/C++ programming language via laboratory experiences. • To write reusable modules (collections of functions).
Course Outcomes	• To demonstrate an understanding of primitive data types, values, operators and expressions in C/C++ • Select appropriate primitive data types for solving a variety ofproblems (e.g.,, integer, real, character and string data) • To apply good programming principles to the design and implementation of C/C++ programs
Module 1	Introduction to (Object Oriented Programming) OOP

- Introduction to OOP, Features of OOP's- Class, Object, Data Abstraction and encapsulation, Data hiding, Message passing, polymorphism, inheritance, persistency, delegation, extensibility
- Comparison between POP(Procedural Oriented Programming) andOOP, Advantages of OOP's, Application of OOP

Module 2	Introduction to C++

- History of C++, C++ basics(C++ tokens)- Keywords, identifiers, data types,constants, operators, special symbols, control flow statements
- Types of Variables- Value, pointer and reference.
- Structure of C++ program, Introduction to cin and cout objects
- Function and its types, template, Default argument, Parameter passingmethods, inline function
- Static polymorphism(Function overloading)

Module 3	Classes and Objects

- Introduction to class and object.
- Defining class (class specification), Creating object
- Access specifier(Visibility modes)-public, protected, private
- Class members- data members, member & Non-member function,Defining member function inside and outside the class, Static data members and static member functions
- Pointer to object, Array of object, Returning objects from functions
- Passing object as parameter by value, by pointer, by reference
- Dynamic memory allocation (new, delete)
- Friend function and friend class, nesting of classes.
- Constructors Concept, characteristics of constructor, Types of constructor- default, parameterized and copy, Constructor overloading, Constructor with default argument
- Destructor Concept, characteristics of destructor.
- Static polymorphism (Operator overloading) Concept- rules to overload operator, unary and binary operator overloading, overloading operator usingmember function and friend function.
- Type conversion (type casting)- implicit and explicit.

Books Recommended	1) OOP in C++ – E-balagurusamy 2) Mastering C++-K. R. Venugopal 3) The Complete Reference C++-Herbert Schildt

Semester : III	Hard Core		Semester Exam			L/W*	Credits
Code: 21UCACS302	Data Structures using 'C' - I		ESE*	ISE*	Total		
Subject Title			40	10	50	3	2.0
Course Objectives	- To provide the knowledge of basic data structures and their implementations. - To understand importance of data structures in context of writing efficient programs. - To develop skills to apply appropriate data structures in problem solving.						
Course Outcomes	- Learn the basic types for data structure, implementation and application. - Know the strength and weakness of different data structures. - Develop programming skills which require to solve given problem.						
Module 1	**An Introduction to Data Structures:**						
Introduction, Definition and types of Data structure. Abstract Data Type (ADT)-ADT for array, ADT for stack, ADT for queue. Algorithm: Definition, characteristics of algorithm, Complexity of algorithm-Space complexity, time complexity, Big-O Notation. Design strategies of Algorithm- Divide and Conquer, Greedy Algorithm, branch & bound, backtracking and dynamic programming.							
Module 2	**Array:**						
Introduction to Array, types of array- one dimensional, two dimensional, multidimensional, Operations of array- insert, delete, traverse, count, display, reverse							
Module 3	**Stack:**						
Introduction to Stack, Operations of stack- Create, isempty, isfull, push, pop, display, Implementation of stack using array(Static Implementation), Applications of Stack-Conversion of infix expression to postfix expression, Conversion of infix expression to prefix expression, Matching parenthesis in an expression (Checking expression is valid or invalid), Evaluation of postfix expression, Stack in recursion, Implementation of applications of stack.							
Module 4	**Queue**						
Introduction to Queue, Operations of queue- Create, isempty, isfull,insert, remove, display, Types of Queue- Linear Queue, Circular Queue, Deque (Double Ended Queue), Priority queue. Implementation of all types of queue using array(Static Implementation), Difference between stack and queue, Applications of Queue							
Module 5	**Linked List**						
Introduction to Linked Lists, Difference between Array andlinked list. Types of linked list- 1) Linear linked list- Singly (Single) and Doubly (Double) 2) Circular linked list- Singly (Single) and Doubly (Double) Operations of linked list- Creation, Insertion, Deletion, Traversing, Searching, Display, count, reverse, Implementation of all types of linked list,Implementation of stack using linked list (Dynamic stack),Implementation of queue using linked list (Dynamic queue)							
Recommended Books	1. Tanenbaum: Data structures using C and C++ 2. Data Structures Through C in Depth- S.K.Srivastava, D.Srivastava 3. Fundamentals of Data Structures in C by Sahni						

Semester : III		Hard Core	Semester Exam			L/W*	Credits
Code: 21UCACS303		**Database Management System**	ESE*	ISE*	Total	3	2.0
Subject Title			40	10	50		
Course Objectives		• The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.					
Course Outcomes		• Describe the fundamental elements of relational database management systems. • Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL • Design ER-models to represent simple database application scenarios					

Module 1   **Introduction to Database Management System**

- Definition, Limitations of traditional file system
- Advantages of DBMS, Components of DBMS, Database Users
- Database Structure
- Database Architecture- 2-tier and 3 level tier architecture
- Instances and Schemas-3 Schema architecture
- Database languages, Data Independence, Data Abstraction

Module 2   **Database Design**

- Types of data models- Relational, Network, Hierarchical
- E-R model: entities, attributes and its types, Relationship, Relationship sets, Generalization, Specialization, Aggregation, ER-to-Relational Mapping
- Relational Model: Relation, Domain, Tuples, Degree, cardinality
- Relational Algebra operations: Select, Project, Cartesian Product, Union, Set difference, join

Module 3   **Transaction Management & Concurrency Control**

- Introduction of Transaction, ACID properties, transaction states, scheduling and types, conflict and view serializability.
- Introduction of Concurrency Control, problems of concurrency control, lock based protocols, timestamp based protocol, deadlock, deadlock handling methods.

Module 4   **Database recovery and Atomicity**

- Introduction, Failure Classification, recovery algorithms, Undo/Redo operations, Log file,log base recovery, shadow paging, recovery with concurrent transaction, checkpoints/syncpoints/ savepoints.
- Distributed Databases: Structure of Distributed Database, Advantages and Disadvantages of Data Distribution, Data Replication, Data Fragmentation

Books Recommended	1) Database System Concepts by Korth Silberschetz 2) Fundamentals of Database Systems by Elmsari, Navathe 3) SQL, PL/SQL The programming language of Oracle by Ivan Bayross 4) "Introduction to Database Systems", C.J.Date, Pearson Education.

Semester : III	Hard Core	Semester Exam			L/W*	Credits
Code: 21UCACS304	Software Testing & Quality Assurance	ESE*	ISE*	Total	3	2.0
Subject Title		40	10	50		
Course Objectives	• Introduce basic concepts of software testing • Understand white box, block box, object oriented, web based and cloud testing • Understand the importance of software quality and assurance software systems development.					
Course Outcomes	• Describe fundamental concepts of software quality assurance. • Understand fundamental concepts of software automation. • Demonstrate the quality management, assurance, and quality standard to software system. • Demonstrate Software Quality Tools and analyze their effectiveness.					
Module 1	**Introduction To Software Testing**					

Introduction To Software Testing:
- What is Software Testing, Importance or need of software testing
- Differences between Manual and Automation Testing

White Box Testing (WBT):
- Introduction to WBT, Advantages & Disadvantages of WBT.
- Static Techniques: Informal Reviews, Walkthroughs, Technical Reviews, Inspection
- Dynamic Techniques or Structural Techniques: Statement Coverage Testing, Branch Coverage Testing, Path Coverage Testing, Conditional Coverage Testing, Loop Coverage Testing

Module 2	**Black Box Testing(BBT)**

- Introduction to BBT, Advantages and Disadvantages of BBT
- Black Box Techniques: Boundary Value Analysis, Equivalence Class Partition, State Transition, Cause Effective Graph, Decision Table, Use Case Testing
- Experienced Based Techniques: Error guessing, Exploratory testing

Levels of Testing
- Functional Testing: System Testing, Smoke Testing,
- Integration Testing & types-Top-Down, Bottom-Up, Non-Incremental
- Acceptance Testing-Alpha and Beta
- Regression Testing and types- Unit/Retest, Regional, Full
- Non Functional Testing: Adhoc Testing, Recovery Testing
- Performance Testing and types: Load Testing, Stress Testing, Volume Testing, Soak Testing

Module 3	**Test cases design Techniques**

- Introduction Test Case, Types of Test Cases, Test Case Template
- How to write a test case with examples, Preparing Review Report

Software Test Life cycle
- Writing Test Plan, Preparing Traceability Matrix
- Writing Test Execution Report and Summary Report

Module 4	**Bug/Defect Life Cycle**

- Difference between Bug, Defect, Failure, Error Defect Tracking and Reporting
- Types of Bugs, Identifying the Bugs, Reporting the Bugs

Case study: Design test case for login page, Online Purchase Order

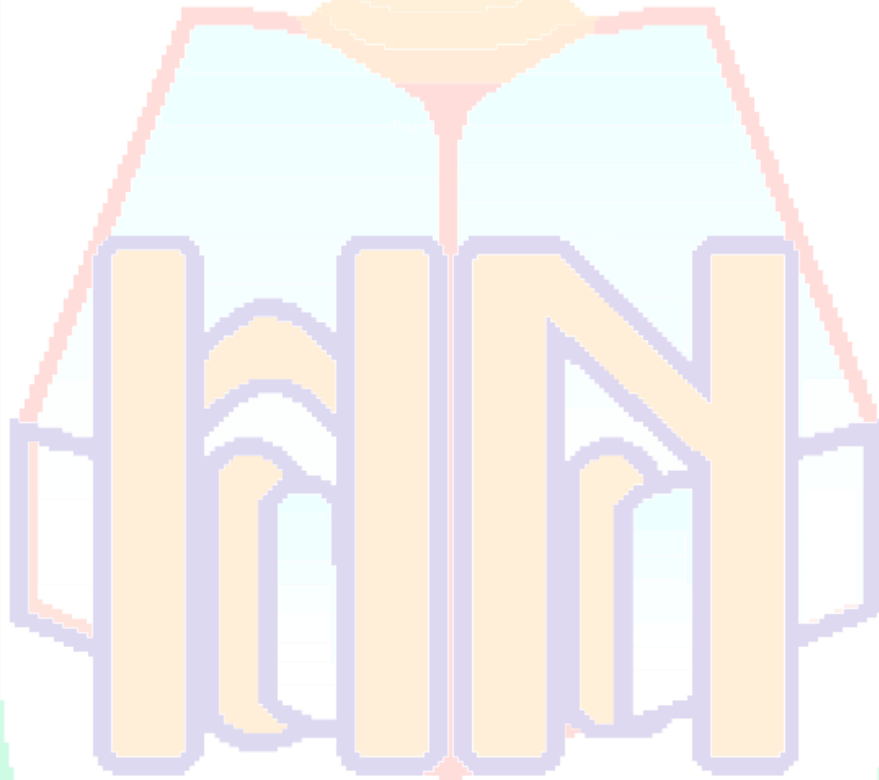| **Recommended Books**	1) The art of Software Testing– Glenford J. Myers 2) Lessons learned in Software Testing – CemKaner, James Bach, Bret Pettichord 3) A Practitioner's Guide to Software Test Design- Lee Copeland 4) Software Testing Techniques, 2nd edition- Boris Beizer 5) How to Break Software: A Practical Guide to Testing- James Whittaker

Semester : III	Hard Core	Semester Exam			L/W*	Credits
Code: 21UCACS305	Web Development using PHP	ESE*	ISE*	Total	3	2.0
Subject Title		40	10	50		

Course Objectives	• To understand functionality of each component of PHP and MySql framework • To learn and create dynamic website • To understand web server installation process and its importance in dynamic website development
Course Outcomes	• After the completion of course, students will get hands on experience on various techniques of web development and will be able to design and develop a complete dynamic website.
Module 1	**Introduction to Web Development**

- Introduction to web applications, Client Side Vs Server Side Scripting
- WebServers: Local Servers and Remote Servers, Installing Web servers,Internet Information Server(IIS),Personal Web Server(PWS)
- Introduction to PHP Framework, Basic PHP syntax,
- Data types in PHP, Variables, Constants, operators and Expressions
- Control statements–if, switch case, for, while
- Arrays: Initialization of an array, Iterating through an array, ,Array Functions,
Functions: Defining and Calling Functions, Passing by Value and passing by references, Inbuilt Functions.

Module 2	**String and Working with Forms**

- String: String functios, patterns, basic regular expressions.
- Working With Forms: Forms controls properties, methods and events, Retrieving form data with $_POST, $_GET and $_REQUEST arrays, Validating retrieved data, Super globalvariables, Super global array, Combine HTML and PHP code, Using hidden fields, Redirecting the user, File upload and scripts, Validation-Server side validation

Module 3	**Working with Database MySQL**

MySQL Architecture, MySQL Server Start and Stop, Data Types in MySQL, Working with PHP-MySQL Environment, Connecting to the MYSQL, Defining a Database, Creating Tables, Selecting a database, Adding data to a table, Displaying returned data on Web pages, Finding the number of rows, Inserting, deleting and updating Data, Executing multiple queries, Checking data errors

Module 4	**State Management**

- Cookies: Setting time in a cookie with PHP, Deleting a cookie, Creatingsession cookie, Working with the query string
- Session: Starting a session, Registering Session variables, working with session variables, destroying session, passing session Ids, encoding and decoding session variables

Books Recommended	1)	PHP: The Complete Reference-Steven Holzner.
	2)	Professional PHP 5-Ed Lecky-Thompson,HeowEide-Goodman, Steven D. Nowicki
	3)	Programming PHP- Rasmuslerdorf, Kevin Tatroe.
	4)	Learning php, mysql, javascript and css –Oreilly- Robin Nixon

Semester : III	Hard Core	Semester Exam			L/W*	Credits
Code:21UCACS306	Computer Networks - I	ESE*	ISE*	Total	3	2.0
Subject Title		40	10	50		
Course Objectives	• To develop an understanding of computer networking basics. • To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.					
Course Outcomes	• Recognize the technological trends of Computer Networking. • Describe, analyse and evaluate a number of datalink, network, and transport layer protocols. • Evaluate the challenges in building networks and solutions to those.					
Module 1	Introduction to Data Communication & Networking					
Data Communication: Components, Data Representation, Data Flow, Communication Model **Computer N/W:** Introduction of Network, Uses of computer network N/W Components: Hubs, Switches, Repeaters, Bridges, Routers, Gateways**.** N/W Topologies, Types of Networks, Inter-networking, Applications of Internet						
Module 2	Network Models					
Protocols & Standards, Protocol Hierarchies, Design Issuesof Layers, Services Primitives, Connection oriented and connection less services Reference Model: ISO-OSI reference model, TCP/IP reference model						
Module 3	Physical layer					
Signals-Analog & Digital Signals, Period, Frequency, Phase, Amplitude, Bandwidth, Bit Rate, Bit Length, Fourier analysis. Transmission Impairment-Attenuation, Distortion, Noise, Transmission Media-Guided Media-Magnetic Media, Twisted Pair, Coaxial Cable, Fiber Optic Cable, Unguided Media- Wireless Radio Waves, Microwaves, Infrared, Satellite Communication Analog Transmission-Modem, Digital Transmission-Pulse Code Modulation, Manchester & Differential Manchester Coding. Modulation and types- Amplitude, Frequency, Phase Transmission Mode-Parallel, Serial, Synchronous Transmission, Asynchronous Transmission. Multiplexing and types- Frequency, Time, Wavelength, Switching and types- Circuit, Message, Packet						
Module 4	Data link layer					
Data link layer Design issues, Error Detection & Correction-Types of Errors, Hamming Distance, Error Detection-Parity Check, Cyclic Redundancy Check, Checksum Check Error correction, Data Link Control-Framing, Flow & Error Control, Protocols-Simplex, Stop and Wait, Stop and Wait ARQ, Go Back N ARQ, Selective repeat ARQ. Multiple Access Protocol-ALOHA, CSMA, CSMA/CD, CSMA/CA Channelization, FDMA, TDMA, CDMA						
Recommended Books	1. Computer Networking by Tannenbaum. 2. Data communication and networking by B A Forouzan					

Semester : III	Hard Core	Semester Exam			L/W*	Credits
Subject Title:	**Financial Accounting withTally**	ESE*	ISE*	Total	4	4.0
Code: 21UCACS307		80	20	100		

Course Objectives	- To describe knowledge regarding concepts of Financial Accounting. - To apply accounting concepts. - To develop students to work with well-known accounting software i.e.Tally ERP.9
Course Outcomes	Students will possess required skill and can also be employed as Tallydata entry operator.
Module 1	**Introduction to Book-keeping and Accountancy-**

Definition and Objectives,Importance of Book-keeping, Difference between Book-keeping and Accountancy, Definition of Accountancy, Basis of Accounting System, characteristics of accounting information, Basic Accounting Terminologies, Accounting Concepts, Conventions and Principles, Accounting Standards (AS) and IFRS

Fundamentals of Double Entry Book-keeping- Introduction of Double entry Book-keeping System, Methods of Recording Accounting Information(Indian, Single, Double), Advantages of Double entry Book-keeping system,Classification of Accounts, Golden Rules of Debit and Credit (Traditional Approach), Modern Approach of Rules of Accounts, Accounting Equations

Module 2	**Journal , Ledger , Subsidiary-Books**

Importance and Utility of Accounting Documents, Definition, Importance and Utility of Journal, Specimen of Journal, Recording of Journalentries with GST.

Ledger- Definition and Importance of Ledger, Specimen of Ledger, Posting ofentries from Journal/Subsidiary Books to Ledger, Balancing of Ledger Accounts, Preparation of Trial Balance

Subsidiary-Books-Introduction and need for maintaining Subsidiary Books,Cash Book with Cash Column, Cash Book with Cash and Bank Columns, Simple and Analytical Petty Cash Book under Imprest System, Purchase Book, Purchase Return Book, Sales Book, Sales Return Book, Journal Proper

Module 3	**Bank Reconciliation Statement**

Introduction and Utilities of Accounting Documents, Need and Importance, Introduction of Bank Reconciliation Statement, Reasons for difference between Cash Book balance and Pass Bookbalance, Specimen of Bank Reconciliation Statement.

Depreciation- Introduction and Importance of Depreciation, Factors ofDepreciation, Methods of Depreciation, Accounting Treatment for Depreciation.

Rectification of Errors-Introduction and Effects of errors, Types of Errors,Detection & Rectification of errors, Preparation of Suspense Accounts

Module 4	**Final Accounts of a Proprietary concern**

Introduction, Objectives andImportance of Final Accounts, Preparation of Trading Account. Preparation of Profit and Loss Account, Preparation of Balance Sheet.Effects of following adjustments.

- Closing stock, Outstanding Expenses, Prepaid Expenses, Depreciationon assets, Bad debts and R.D.D., Discount on Debtors and Creditors, Income received in advance , Accrued Income, Goods distributed as free sample, Goods withdrawn by proprietor for Personal use, Intereston capital, Interest on Drawings

Introduction to Tax Deducted at Source (TDS)-TDS in Tally, TDS Masters, Vouchers / Transactions, Advance to a Party, TDS Reports, TDS Return, TDSE-Return, TDS Outstanding, GST Basics

Module 5	Implementation through Tally

1. Create, Alter & Display Stock Groups and Stock Items,

2. All inventory voucher types and transactions Inventory details in accountingvouchers. Reports like Stock summary, Inventory books like Stock item, Group summary, Stock transfers, Physical stock register, Movement analysis, Stock group & item analysis, stock category analysis Ageing analysis, Salesorder & Purchase order book, Statement of inventory related to Godowns, categories, stock query, Reorder status, Purchase & Sales order summary, Purchase & Sales bill pending, Exception reports like negative stock& ledger, overdue receivables & payables, memorandum vouchers, optional vouchers, post-datedvouchers, reversing journal

Recommended Books	1) Elements of double entry book keeping – Batliboi 2) Advanced Accounts – M.C.Shukla, T.S.Grewal and S.C.Gupta3)An Introduction to Accountancy – S.N.Maheshwari. 4) Accounting for Management – S.K.Bhattacharyya& John Dea

Semester : IV	Hard Core	Semester Exam			L/W*	Credits
Code: 21UCACS401		ESE*	ISE*	Total		
Subject Title	OOPS with C++ - II	40	10	50	3	2.0

Course Objectives	• The objectives of the course are to have students identify and practice the object-oriented programming concepts and techniques, practice the use of C++ classes and class libraries, arrays, inheritance and file I/O stream concepts.
Course Outcomes	• Student will be able to identify importance of object oriented programming and difference between structured oriented and object oriented programming features. • Able to make use of objects and classes for developing programs. Able to use various object oriented concepts to solve different problems.
Module 1	**Inheritance and Runtime Polymorphism**

- Introduction of inheritance, benefits,use
- Defining derived class
- Types of derivations
- Types(Forms) of Inheritance- Single, Multi-level, Multiple, Hierarchical,Hybrid, Multi-path (Virtual base class)
- Behavior of constructors and destructor in inheritance
- Overloaded member functions
- Pointer to base class, Pointer to derived class
- Object composition-delegation

Runtime polymorphism-
- Introduction of runtime polymorphism
- Virtual functions- Concept, characteristics and use of virtual function.
- Pure virtual function-Concept, characteristics and Use.
  Abstract class, virtual destructors

Module 2	**Stream and Files**

- Introduction to streams in C++
- Stream classes and File stream classes
- Formatted and unformatted I/O functions and Manipulators.
- File Manipulations- Opening, closing, reading, writing, Appending
- File opening modes-Opening files, using open() and constructor
- Error handling during file manipulations
  Command line arguments.

Module 3	**Exception Handling and Template**

- Introduction to Exception handling
- Exception handling mechanism-try, catch, throw keywords.
- Custom exception.
- Introduction to function template- overloaded function and user defined template
  class template- inheritance of class template, overloaded operators and class template containership

Recommended Books	1) OOP in C++ – E-balagurusamy 2) Mastering C++ - K.R. Venugopal 3) Structured approach using C++ – Behrouz A. Forouzan 4) The Complete ReferenceC++- Fourth Edition. Herbert Schildt

Semester : IV	Hard Core	Semester Exam			L/W*	Credits
Code: 21UCACS402	Data Structures using 'C' - II	ESE*	ISE*	Total		
Subject Title		40	10	50	3	2.0
Course Objectives	- To defines basic static and dynamic data structures and relevant standard algorithms for them: stack, queue, dynamically linked lists, trees, graphs, heap, priority queue, hash tables, sorting algorithms, min-max algorithm. - To demonstrate advantages and disadvantages of specific algorithms and data structures,					
Course Outcomes	- Student will be able to design and analyze the time and space efficiency of the data structure. - Understanding of fundamental Data Structures including linked-lists, trees, binary search trees, AVL trees, stacks, queues, priority queues, and hash-tables.					

Module 1	**Trees**

Introduction to Tree, Introduction to Binary Trees, Types of Binary tree- Strictly Binary tree, Complete Binary tree, Extended (2-Tree) Binary tree, Binary expression tree, Binary Search tree, Heap Tree- Min heap tree, Max heap tree, Representation of Binary tree using- Array, Linked list

Operations of Binary search tree-Creating and inserting node, Searching node, Counting total nodes, Counting and displaying leaf nodes, Tree Traversal methods- Preorder, Inorder, Postorder, Deletion of Nodes, Implementation of binary search tree, Height balanced tree/Balanced Binary Tree/AVL tree,Application of tree

Module 2	**Graph**

Concept & terminologies used in graph, Graph Representation using- Array
and linked list, Graph traversals – BFS & DFS, Dijakstra's shortest pathalgorithm, andapplication of graph.

Module 3	**Sorting**

Introduction and definition of Sorting, Types of Sorting-Bubble sort, Quicksort, Shell sort, Selection sort, Insertion sort, Heap Sort, Merge sort, Radix
Sort, Tree Sort techniques

Module 4	**Searching**

Introduction and definition of Searching, Types of searching-Linear (Sequential) Search, Binary Search, Indexed sequential search, Hashing anddifferent Hash functions.

Recommended Books	1. Aho, Hopcroft, Ulman: Data structures and Algorithms. 2. Nikaulus Wirth: Algorithms, data structures, Programs. 3. ThomsHorbron: File Systems, Structures and Algorithms (PHI). 4. D. E. Kunth: Art of computer Programming Vol – I. 5. Tanenbaum: Data structures using C and C++ (PHI). 6. fundamentals of computer algorithms by ellis horowitz sartaj sahni 2nd edition galgotiapublication

Semester : IV	Hard Core	Semester Exam			L/W*	Credits
Code: 21UCACS403	MySQL	ESE*	ISE*	Total	3	2.0
Subject Title		40	10	50		

Course Objectives	• To learn structured query language (SQL) to an intermediate/advanced level. • To write data retrieval queries and evaluate the result set. • To write SQL statements that edit existing data, create database objects. • Understand the structure and design of relational databases. • Understand the importance and major issues of database security and the maintenance of data integrity.
Course Outcomes	• Student will understand basic concepts of how a database stores information via tables • Understanding of SQL syntax used with MySQL • Learn how to retrieve and manipulate data from one or more tables • To know how to filter data based upon multiple conditions
Module 1	Introduction to MySQL

- Installing and starting MySQL instance, History and Architecture of MySQL
- Components of MySQL -DML,DDL,DCL,DQL
- Data types in MySQL-Numeric, String, Complex, Date and Time,
Creating databases and show databases

Module 2	MySQL Operators, Function and clauses

- MySQL operators- Arithmetic, Comparison, Logical, Bit, like
- MySQL Functions- Aggregate, Math, String, Date and Time, control flowfunctions and expressions, Type conversion, Formatting, Encryption
MySQL clause-where, distinct, order by, group by, having, rollup.

Module 3	Performing Operation on Table Data

- Populating tables with data, Retrieving data from tables, Sorting data in atable, Deleting data from table, Updating data in tables, searching data
- Adding and Dropping columns, Modifying and Rename existing columns
- Renaming table using alter table, Changing a table type
- Finding out the tables created by user, Displaying a table structure
Creating a table from a table, Inserting data into a table from another table

Module 4	MySQL constraints, Join and View

- Applying data constraints- column level and table level
- Types of Data constraints-
  - I/O constraints- Not null, Unique, Primary key, Foreign key,composite
  - Business rule constraints- Check,
- Adding, Modify and drop constraints using alter table command
- MySQL join:- Advantages & disadvantages of Join, Types of Joins
MySQL View:- why view, Create, Update, Alter and Drop view

Module 5	SubQueries, Union and Indexing

- sub queries-use, example
- Set Operations- Union, Union all, Minus and Intersect
Indexing:- Advantages and disadvantages of Indexing, creating index(simple, composite, unique),multiple indexing, drop index

Module 6	Stored Procedures, Transaction and cursor

- Stored Procedure:- Structure, use of stored procedure, Supported SQL statements in Procedures, creating dynamic procedure, Adding record tothe table using procedure, procedure with IN,OUT,INOUT parameter, dropping procedure.
- Transaction :MySQL transactions, open and closing transaction, commit,rollback, savepoint in transaction, table lock
- Trigger: Introduction, types of trigger – before, after, insert, update & delete, advantages
- Cursor:-use of cursor, types of cursor ,opening a cursor, fetching a recordfrom the cursor, cursor fetch statement, closing cursor, MySQL import & export- Import CSV File into MySQL Table, Export MySQL Table to CSV

Recommended Books	1. MySQL(TM): The Complete Reference-Vikram Vaswani 2. Learning MySQL, by Seyed Tahaghoghi, Hugh Williams. 3. MYSQL 5 for professional, Ivan Bayross and Sharanam Shah

Semester : IV	Hard Core	Semester Exam			L/W*	Credits
Code: 21UCACS404	Ethics and Cyber Law	ESE*	ISE*	Total	3	2.0
Subject Title		40	10	50		

Course Objectives	• To understand principles of web security and to guarantee a secure network by monitoring and analyzing the nature of attacks through cyber/computer forensics software/tools.
Course Outcomes	• Analyze and evaluate the cyber security needs of an organization. • Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.
Module 1	**Introduction to Cybercrime**

what is Cybercrime, Categories of Cybercrime Classifications of Security attacks (Passive Attacks and Active Attacks), Essential Terminology (Threat, Vulnerability, Target of Evaluation, Attack, Exploit). Classifications of Cybercrimes: E-Mail Spoofing, Spamming, Cyberdefamation, Internet Time Theft, Newsgroup Spam/Crimes from Usenet Newsgroup, Industrial Spying/Industrial Espionage, Hacking, Online Frauds, Pornographic Offenses, Software Piracy, Password Sniffing, Credit Card Frauds and Identity Theft. Cyber offenses: How Criminals Plan that attacks, Scanning/Scrutinizing gathered Information, Attack (Gaining and Maintainingthe System Access), Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector and CloudComputing.

Module 2	**Cyber Law**

Introduction, Information Technology Act-2000, Weakness in Information Technology Act, Amendments to the Indian IT Act, Cybercrimeand Punishment, key elements certification and monitoring prevention of crimes, contract aspect, security aspects, intellectual property aspects, Intellectual Property aspect, criminal aspect.

Module 3	**Introduction to Ethical Hacking**

What is Hacking, Types of Hackers, Reasons for Hacking, Effects of Computer Hacking on an organization, Network Security Challenges ,Elements of Information Security, The Security,Functionality & Usability Triangle, What is Ethical Hacking, Scope & Limitations of Ethical Hacking, skills required, phases of ethical hacking, toolsand techniques, Black Box, Gray Box and White Box techniques, What is Penetration Testing, What is Vulnerability Auditing, differences betweenvulnerability assessment, Reverse engineering

Module 4	**Foot Printing**

What is Foot Printing, Objectives of Foot Printing, Finding acompany's details, Finding a company's domain name, Finding a company'sInternal URLs, Finding a company's Public and Restricted URLs, Finding a company's Server details, Finding the details of domain registration, Findingthe range of IP Address, Finding the DNS information, Finding the services running on the server, Finding the location of servers, Trace-route analysis, Tracking e-mail communications. **Types of Attacks-** phishing, key loggers, backdoor access, password cracking, data stolen, data deleted virus attack.

Recommended Books	1. Cyber Security: Understanding Cyber Crimes, Computer Forensics & Legal Perspectives by NinaGodbole And Sunit Belapure 2. Ethical Hacking and Countermeasures: Attack Phases By EC-Council 3. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws Paperback –Wiley, 2ndEdition, Dafydd Stuttard, 4. Gray Hat Hacking The Ethical Hackers Handbook, 3rd Edition Paperback – 1 Jul 2017 by AllenHarper, Shon Harris, Jonathan Ness, Chris Eagle, McGraw Hill Education 5. CEH Certified Ethical Hacker Study Guide By Kimberly Graves

Semester: IV	Hard Core	Semester Exam			L/W*	Credits
Code: 21UCACS405	AngularJS	ESE*	ISE*	Total	3	2.0
Subject Title		40	10	50		

Course Objectives	• To provide exposure to problem-solving through programming. • To train the student to the basic concepts of the Angular JS programming language. • To increase the reliability and maintainability of UI by using data binding. • To create Single Page Applications (SPA).
Course Outcomes	• Student will familiar with client-side Javascript frameworks and the Angular framework. • Student will implement a functional front-end web application using AngularJS • Understand in Building different AngularJS orders.
Module 1	**Overview of AngularJS**

Overview of AngularJS: What is AngularJS?, Why AngularJS?,
Features of AngularJS, AngularJS architecture, Setting up the Environment,Model-View-Controller
explained, My first AngularJS app
Directives: Introduction to Directives, Directive lifecycle, Using AngularJS built-in directives, Core
Directives, Conditional Directives, Style Directives,Mouse and Keyboard Events Directives, Matching
directives, Creating a custom directive
Angular Expressions: All about Angular expressions, How to use expressions,Number and String
Expressions, Object Binding and Expressions, Working with Arrays, Forgiving Behavior, Angular
expressions v/s Javascript
expressions

Module 2	**Controller, Filters, AngularJS Modules**

Controller: Role of a Controller, Attaching properties and functions to scope,Nested Controllers, Using
filters in Controllers, Controllers in External Files,Controllers & Modules, Controllers
Filters: Built-in filters, Uppercase and Lowercase Filters, Currency and Number Formatting
Filters,OrederBy Filter, Filter Filter, Using AngularJSfilters, Creating custom filters
AngularJS Modules: Introduction to AngularJS Modules, Module Loading andDependencies, Creation vs
Retrieval, Bootstrapping AngularJS

Module 3	**AngularJS Forms**

AngularJS Forms: Working with Angular Forms, Model binding, Understanding Data Binding, Binding
controls to data, Form controller, Validating Angular Forms, Form events, Updating models with a twist,
$errorobject, Scope-What is scope, Scope lifecycle, Two way data binding, Scope inheritance, Scope &
controllers, Scope & directives, $apply and $watch,Rootscope, Scopebroadcasting, Scope events

Module 4	**Single Page Application and AngularJS Services**

Single Page Application(SPA): What is SPA, Pros & Cons of SPA, Installingthe ngRoute module,
Configure routes, Passing parameters, Changing location, Resolving promises, Create a Single Page
Application, AngularJS
AngularJS Services: What is a Service? Why use Services? Types of Services, Custom Services,
$httpService, $qService, AjaxImplementationusing $httpand $qService

Recommended Books	1. Professional AngularJS by Diego Netto and Valeri Karpov-Wrox press 2.Learning AngularJS by Brad Dayley- Addison-Wesley Professional 3.AngularJS by Brad Green and Shyam Seshadri- O'Reilly

Semester : IV	Hard Core	Semester Exam			L/W*	Credits
Code: 21UCACS406	Advanced Computer Networks	ESE*	ISE*	Total	3	2.0
Subject Title		40	10	50		

Course Objectives	• To understand basic computer network technology. • To 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. • To understand advanced computer network technology. • To identify the different types of layers, protocols and topologies. • To enumerate the security models and network services.
Course Outcomes	• Student will understand principles of cryptography, securing e-mail, securing TCP and network-layer • Will understand concept and programming of DNS and Web server. • Student will familiar with The Internet standard management framework.
Module 1	**Network layer**
Network layer Design issues, Routing Algorithm: Optimality Principle, Shortest Path Routing, Distance Vector Routing, Link State Routing, Broadcast Routing, Multicast Routing CongestionControl Algorithm: General principle of congestion control, Congestion prevention policies, CongestionControl in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets	
Module 2	**Transport, Session, Presentation & Application layers**
Elements of Transport Protocols-Addressing,Connection establishment, Connection Release, Flow Control & Buffering, TCP/IP protocol suite- Transmission Control Protocol, User Datagram Protocol, IP, Real Time Transport Protocol,FTP, DNS, TelNet, SMTP, POP, HTTP, WWW, SNMP, ARP, RARP etc., Data Compression-Audio Compression, Video Compression.	
Module 3	**Network and Web Security**
Introduction Network security, Security Techniques- Encryption &decryption, Digital Signatures, Cryptography, Firewall Security Services, Authentication Mechanisms- Passwords, SmartCard, Biometrics. Web Security: SSL Encryption, TLS, SET, E-mail Security, PGPs / MIME, IPSecurity.	
Module 4	**Network Services**
VPN, Virtual LAN, Wi-Fi Network, Remote Sensing, GPS GPRS, GSM, Bluetooth,Video Conferencing. CASE study-Linux: Installing client & server, Roles & responsibility of Network Administrator Server Management Login Script, Ftp Server, News &search server, Web Server, Samba Server, Mail Server, Proxy Server, Print Server, User & group management	
Recommended Books	1. Computer Networking by Tannenbaum. 1. Network Security Essentials by William Stallings 2. Dorothy E. Denning, "Cryptography and Data Security", Addison-Wesley 3. Data communication and networking by William Stallings 4. Complete Reference Red Hat Enterprise Linux & Fedora Edition by Petersen Haddan

Semester : IV	Hard Core	Semester Exam			L/W*	Credits
Code: 21UCACS407	Python Programming	ESE*	ISE*	Total	4	4.0
Subject Title		80	20	100		
Course Objectives	- To acquire programming skills in core Python. - To acquire Object Oriented Skills in Python - To develop the skill of designing Graphical user Interfaces in Python - To develop the ability to write database applications in Python					
Course Outcomes	- Student will able decompose a Python program into functions, lists etc. - Read and write data from/to files in Python Programs - Underline the use of package					
Module 1	Introduction to Python					

Introduction to Python: Features/Characteristics of Python, Installation and Working with Python, Structure of a Python Program, Writing simplepython program, Executing python program using command line windowand IDLE graphics window, Python Virtual Machine, Identifiers and Keywords,
Python Data Types: Python Variables, Data types, Sequences, Sets, Literals, Constants, Type conversion, I/O Statements, Command linearguments.
Operators-Arithmetic, Relational, Logical, Boolean, Assignment, Bit wise,Membership, Identity, Operator Precedence and Associativity
Conditional Statements- if, if-else, nested if –else,**Looping-**for, while, nested loops, Loop manipulation using pass, continue, break, assert and elsesuite

Module 2	Array,Strings,Collection List,Tuples, Dictionaries

Array: introduction, importing and slicing on array, types of array, compareand aliasing. **Strings:** Introduction to String, String Manipulation.
Collection List: Introduction to List, Manipulating list. **Tuples:** Introduction to Tuples, Manipulating Tuples.
Dictionaries: Concept ofDictionary, Techniques to create, update & delete dictionary items.

Module 3	Functions , Object Oriented Programming

Functions: Difference between a Function and a Method, Defining a function, Calling a function, Advantages of functions, Types of functions,Function parameters:-Formal parameters, Actual parameters, Anonymousfunctions, Global and Local variables, **Modules:** Importing module, Creating & exploring modules, Math module, Random module, Time module
Object Oriented Programming: Features, Concept of Class & Objects, Constructor, Types of Variables, Namespaces, Types of Methods, Inner Classes, Constructors in Inheritance, Overriding Super Class Constructorsand Methods, Types of Inheritance, Abstract Classes and Interfaces, The Super() Method, Operator Overloading, Method Overloading, Method Overriding.
Threads: Introduction, uses, types, creating threads, thread class methodsand synchronization

Module 4	Regular Expressions, Exception Handling and Python File Operation

Regular Expressions: Introduction to Regular Expression, Advantages &Operations, Sequence characters in Regular Expression, Powerful pattern matching and searching, Password, email, url validation using regular expression, Pattern finding programs using regular expression
Exception Handling: Errors in a Program, Exceptions, Exception handling,Types of Exceptions, User-defined Exceptions
Python File Operation: Types of File, Opening and Closing a File,Reading and writing to files, Manipulating directories

Module 5	Graphical user interface

Graphical user interface- root window, fonts and colors, working with containers, canvas, frame, widgets and its types. **Database connectivity-** Installing MySQLdb module, working with MySQL, Retrieving, inserting, Deleting and Updating rows into table, creating database tables

Recommended Books	1) HTML5 Black Book- Kogent Learning Solutions IncDreamtech. 2) Beginning JavaScript and CSS Development with jQuery- Richard York. 3) Beginning HTML and CSS-Rob Larsen. 4) HTML_&_CSS_The_Complete_Reference-Thomas A. Powell. (Fifth Edition). 5) W3schools.com

Lab course based on 21UCAPS301 & 21UCAPS401
Sample Programs on OOP's with C++-I and II

1) Write different programs in 'C++' language that shows use of array, pointers variable, reference variable, cin and cout objects, scope resolution operators, basic operators
2) Write a program that shows use of class and object.
3) Write a program that shows parameter passing techniques in C++
4) Write a program that shows defining member function inside and outside of class body
5) Write a program that demonstrate use of inline function
6) Write a program to implement function overloading concept
7) Write a program to implement parameterized and copy constructor
8) Write a program that shows use of static data member and static member function.
9) Write a program that shows use of nesting classes.
10) Write a program that shows passing and returning object from function.
11) Write a program that shows use of new and delete operator.
12) Write a program that shows explicit type conversion
13) Write a program to overload different unary and binary operators by using friend and member function.
14) Write a program to calculate factorial of given number by using recursion.
15) Write a program for addition, subtraction, multiplication and division of two complex numbers by using return by object method.
16) Create 2 distance classes "class A" stores distance in meter and cm and "Class B" stores distance in feet and inches and add two distances by friend function and display the result.
17) Generate the result for 5 students with following data - Name, exam no, Theory marks in 5 subjects, grade. Use array of object concept.
18) Write a program for constructor overloading.
19) Write a program to calculate root of quadratic equation by using default argument constructor.
20) Write a program to demonstrate friend function, friend class, member function of a class is friend to another class.
21) Write a program to count no. of objects created by using static data member & member function.
22) Write a program to overload unary operators (++, - -, -).
23) Write a program to overload binary operator.(+, -, *, /, %) by using member function and friend function.
Inheritance & Runtime polymorphism
24) Write a program to implement single inheritance.
25) Write a program to implement multi-level inheritance
26) Write a program to implement multiple inheritance
27) Write a program to implement hierarchical inheritance
28) Write a program to implement hybrid inheritance
29) Write a program to implement multi-path inheritance
30) Write a program that shows use of pointer to base class
31) Write a program that shows use of pointer to derived class
32) Write a program that shows use of virtual function.
33) Write a program that shows use of pure virtual function.
34) Write a program that shows use of abstract class
35) Write a program that shows use of virtual destructor
36) Write a program that shows behavior of constructor and destructor in inheritance. Syllabus & Structure of
37) Write a program that shows use of istream class.
38) Write a program that shows use of ostream class.
39) Write a program that shows use of different manipulators.
40) Write a program to read, write and append data into file.
41) Write a program that checks two files are identical or not.
42) Write a program that shows use of random access of file.
43) Write a program that shows use of command line argument. Exception Handling and template
44) Write a program that shows use try, catch and throw
45) Write a program that shows use multiple catch blocks.
46) Write a program that shows use of custom exception.
47) Write a program that shows use of function template
48) Write a program that shows use of class template

Lab course based on 21UCAPS301 & 21UCAPS401

Sample Programs on Data Structure using 'C'- I and II Array

1) Write a program to implement array with following operations:
a) Insert Element
b) Delete element from entered position
c) Traverse array element ,Count
e) Search element
2) Write a programs that prints array elements in reverse order.
3) Write a program that finds only even elements in an array.
4) Write a program that finds only odd elements in an array.
5) Write a program that finds addition of matrices.
6) Write a program that finds multiplication of matrices.

Stack

1) Write a program to implement stack by using array. (Static Implementation of stack)
2) Write a program, which reverses the string by using stack.
3) Write a program to check entered string is palindrome or not by using stack.
4) Write a program to convert decimal number into binary number by using stack.
5) Write a program to count total number of vowels present in string by using stack.
6) Write a program which convert infix expression into prefix expression.
7) Write a program which convert infix expression into Postfix expression.
8) Write a program which check entered expression is valid or not.
9) Write a program for evaluation of postfix expression.
10) Write a program to calculate factorial of entered number by using recursion.
11) Write a program to calculate digit sum of entered number by using recursion.
12) Write a program to find face value of entered number by using recursion.

Queue

1) Write a program to implement linear queue by using array. (Static Implementation of queue)
2) Write a program to implement Circular queue.
3) Write a program to implement Priority queue.
4) Write a program to implement IRD (Input Restricted Deque)
 5) Write a program to implement ORD (Output Restricted Deque)

Linked List

1) Write a program to implement singly linear linked list with its basic operations.
2) Write a program to implement stack by using linked list. (Dynamic implementation)
3) Write a program to implement queue by using linked list. (Dynamic implementation)
4) Write a program to implement doubly linear linked list with its basic operations.
5) Write a program to implement singly circular linked list with its basic operations.
 6) Write a program to implement doubly circular linked list with its basic operations.

Tree

1) Write a program to implement binary search tree with tree traversal methods.
2) Write a program to implement BST with following operations:
   I) Insert Node II) Count Leaf nodes III) Count Non-Leaf nodes IV) Count Total nodes
3) Write a program to implement BST with following operations:
   I) Insert Node
  II) Find Maximum node
 III) Find Minimum Node
  IV) Search node
   V) Display only odd nodes
  VI) Display only even nodes
 VII) Display leaf nodes
VIII) Find level of node
  IX) Find degree of node
   X) Delete Node

Graph
1) Write a program to represent undirected and directed graph by using Adjacency matrix.
2) Write a program to represent weighted graph by using Adjacency matrix.
3) Write a program to implement graph by using linked list and perform following operations:

1) Insert Vertex (Node)	2) Display Vertices	3) Search Vertex
4) Insert Edge	5) Find adjacent Vertices	6) Display Graph

4) Write a program to implement breadth first search (BFS) traversal of graph.
5) Write a program to implement depth first search (DFS) traversal of graph.

Sorting and Searching
1) Write a program to implement simple exchange sort method.
2) Write a program to implement bubble sort method.
3) Write a program to implement insertion sort method.
4) Write a program to implement selection sort method.
5) Write a program to implement Shell sort method.
6) Write a program to implement linear searching technique for unsorted data.
7) Write a program to implement linear searching technique for sorted data.
8) Write a program to implement Binary search technique.
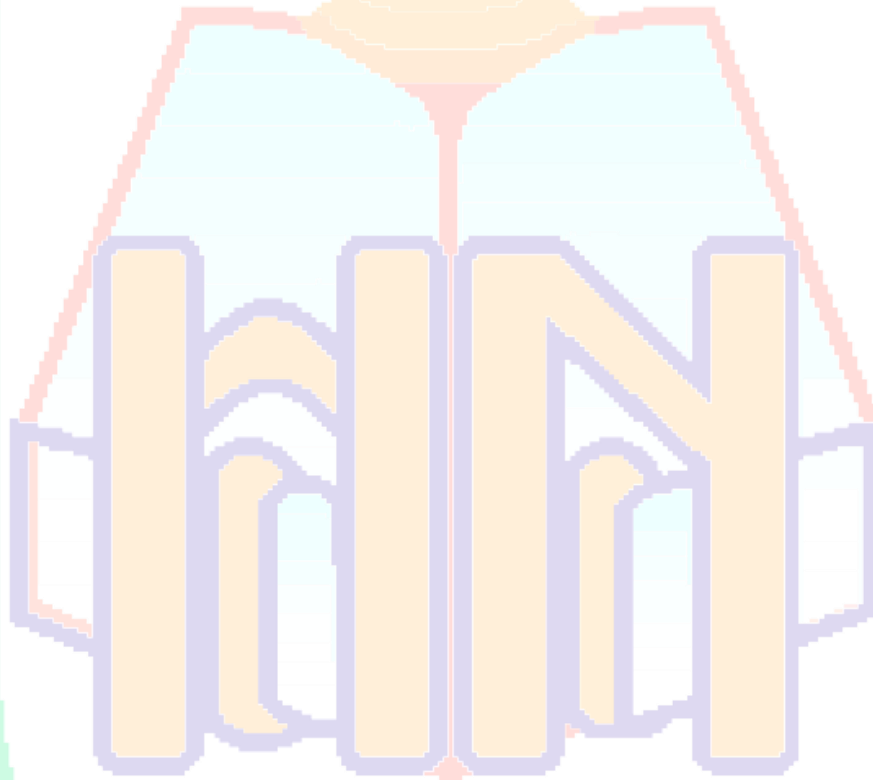
Lab course based on 21UCAPS302

Sample Programs on Web Technology using PHP

1) Write PHP code to check entered number is Armstrong or Not.
2) Write a menu driven program to perform following operations:
a) Check Number is Palindrome or not.
b) Check Number is Perfect or not.
c) Find face value of Entered number.
d) Check Number is Prime or not.
e) Check Number is Strong or not.
3) Write a PHP code to perform following operations:
 a) Sort array element b) Find Maximum and Minimum number in array
c) Merge two arrays in third array. d) Swap two array elements
4) Write a program to overload the constructor.
5) Write a program which uses the static methods and static variables.
6) Write a program to implement different types of inheritance.
7) Write a program to implement interface.
8) Write a program to handle different types of exceptions.
9) Write a program which shows the use of 'final' keyword.
10) Write a program to copy the content of one file into another.
11) Write a program to merge two files into third file.
12) Design a web application to perform following task on employee table.
I) Add New II) Save III) Delete IV) Update V) Move First VI) Move Last
13) Design a web application that uses cookies and session object

Lab course based on 21UCAPS402

Sample Programs on angular js

1. Write an angular js app which display your name, college name and class.
2. Write an angular js app which demonstrate that one way data binding and two way data binding.
3. Write an angular js app which demonstrate ng-cut, ng-copy, ng-paste directive.
4. Write an angular js app which demonstrate different directive realeted to keyboard.
5. Write an angular js app which demonstrate conditional directive.
6. Write an angular js app for creating custom directive which display employee id and name.
7. Write an angular js app which demonstrate all types of expressions
 1) Number expression
 2) String expression
 3) Object expression
 4) Array expression
8. Demonstrate nested controller
9. Demonstrate multiple controller
10. Demonstrate json filter
11. Demonstrate custom filter
12. Design simple single page application.
13. Custom validation in angular js.

Lab course based on 21UCAPS303

Sample Programs on Python

1) Installing Python and setting up Python environment.

2) Write a program to print strings, numbers and perform simple mathematical calculations.

3) Write a program to implement command line arguments.

4) Write a program to implements conditional statements -if, if-else, nested if.

5) Write a program to implement loops.

6) Write a program to manipulate strings like string copy, string concatenation, string comparison, string length, string reverse etc.

7) Write program to show use of Lists and Tuples.

8) Write program which uses dictionaries 9) Write program to implement functions & Modules

10) Write program to implement Package.

11) Write a program to implement Constructors.

12) Write a program to implement types of Inheritance and Interfaces. 13) Write a program to implement Method Overloading and Method Overriding.

14) Write a program to implement Operator Overloading.

15) Write a program in to read and write contents in a file.

16) Write a program to demonstrate Exception handling

17) Write a program to demonstrate user defined exception.

18) Write a program to demonstrate the use of regular expressions

19) Write a program to draw different shape.
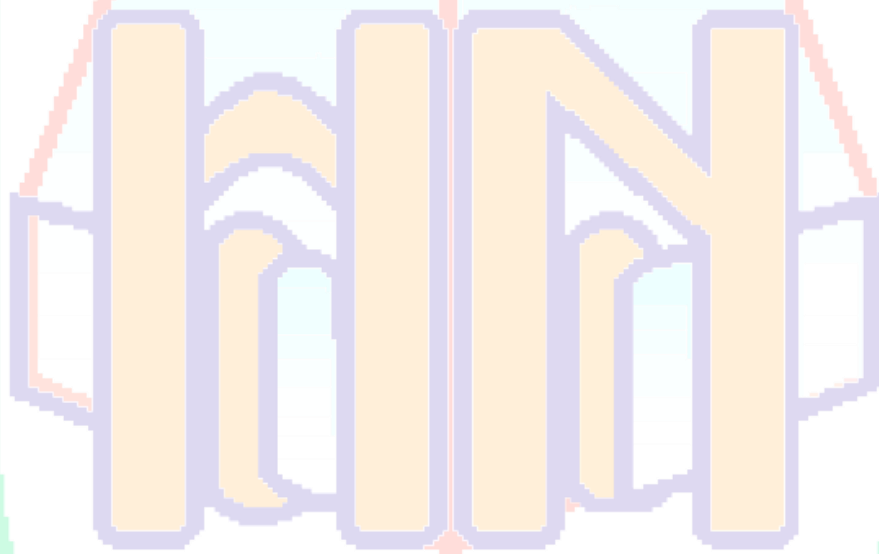
Date:

Time: -2hrs.   Total Marks-40

Instructions:

1. All questions are compulsory.
2. Draw neat diagrams and give equations wherever necessary.
3. Figures to the right indicate full marks.

Q. No.1) Multiple Choice Question.   **(08)**

    1) --

           a)   b)   c)   d)

    2)

    3)

    4)

    5)

    6)

    7)

    8)

Q. 2 Explain the following concepts (Any 4)   **(08)**

    A

    B

    C

    D

    E

Q. 3 Write short note/Short answer/Short problem   **(08)**

    A   (03)

    B   (03)

    C   (02)

Q. 4 Solve the following (Long answer/Problem)   **(08)**

    A

    B

Q. 5 Answer the following (Any two)   **(08)**

    A

    B

    C

Date:

Time: -3hrs.   TotalMarks-80

Instructions: *1. All Questions are Compulsory*
2. Marks are indicated to the right of each question.
3. Use of Calculators is allowed

Q.1: A) Select the most appropriate alternative and rewrite the following sentences: (10)

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

B) Fill in the Blanks /True or False: (06)

1.
2.
3.
4.
5.
6.

Q.2: Answer *Any Eight* of the Following in brief: (16)

a)

b)

c)

d)

e)

f)

g)

h)

i)

j)

Q.3: A) Write short notes on _Any Two_ of the following: (10)

    a)

    b)

    c)

    B) (06)

Q.4: A) Answer _Any Two_ of the following: (08)

    a)

    b)

    c)

    B) (08)

Q.5: Attempt _Any Two_ of the following: (16)

    1.

    2.

    3.