



Hirachand Nemchand College of Commerce, Solapur

(Autonomous College)



(Affiliated to P.A.H Solapur University, Solapur)

Name of Faculty: Computer Science & Information technology

Choice Based Credit System

Syllabus for Bachelor of Computer Application B.C.A Second Year Semester III & IV

With
(NEP 2023)

(w.e.from June 2024-25)

Internal Assessment:

The medium of instruction & examination will be only in English.

Details of Internal examination:

Particulars	Marks (2creditpaper)	Marks (4creditPaper)
Attendance	05 Marks	05 Marks
Mid Test	05 Marks	10 Marks
Home Assignments	--	05 Marks
Group Exercise / Seminars/Projects	--	--
Total	10	20

HIRACHAND NEMCHAND COLLEGE OF COMMERCE, SOLAPUR

(Autonomous College)

BCA–Computer Science & Information Technology

BCA PART-II SEMESTER–III & IV

BCA PART-II,SEMESER–III					
Level	Category	Subject Code	Subject Name	Credit	Marks (ESE+ISE)
5.0	Major-Mandatory-7	23BCAMM231	Data Structure Using C	4	100=(60+40)
	Major-Mandatory-8	23BCAMM232	OOP with C++	2	50=(30+20)
	Major-Mandatory-9	23BCAMM233	RDBMS Using MySQL	2	50=(30+20)
	Minor-2	23BCAMN231	Laboratory Course on Major Mandatory	4	100=(60+40)
	GE-3	23BCAGE231 23BCAGE232	Bootstrap/ Advanced Excel	2	50=(30+20)
	VSC-3	23BCAVS231	IT Act2000	2	50=(30+20)
	AEC-3	23BCAAE231	UML	2	50=(30+20)
	FP-1	23BCAFP231	Mini Project	2	50=(30+20)
	CC-3	23BCACC231	Indian Constitution	2	50=(30+20)
Total Credits				22	Total=550
BCA PART-II, SEMESER–IV					
Level	Category	Subject Code	Subject Name	Credit	Marks (ESE+ISE)
5.0	Major-Mandatory-10	23BCAMM241	PHP	4	100=(60+40)
	Major-Mandatory-11	23BCAMM242	Core Java	2	50=(30+20)
	Major-Mandatory-12	23BCAMM243	Computer Network & Communication	2	50=(30+20)
	Minor–3	23BCAMN241	Laboratory Course on Major Mandatory 10 & 11	4	100=(60+40)
	GE-4	23BCAGE241/ 23BCAGE242	AWS/ SAP	2	50=(30+20)
	SEC-3	23BCASE241	Software Testing	2	50=(30+20)
	AEC-4	23BCAAE241	Business Analytics	2	50=(30+20)
	CEP-1	23BCACE241	Digital Marketing	2	50=(30+20)
	CC-4	23BCACC241	Environmental Studies	2	50=(30+20)
Total Credits				22	Total=550
OE- Open Electives, VSC-Vocational Skill Courses, SEC- Skill Enhancement Courses, AEC-Ability Enhancement Courses, VEC-Value Education Courses, IKS-Indian Knowledge System, OJT-On Job Training, FP- Field Projects, CEP- Community Engagement Projects, CC- Co curricular Courses, RM- Research Methodology, RP-Research Project					

Semester:	III	Assessment & Evaluation			L/W*	Credits
Paper Category:	Major Mandatory 7	Pattern				
Paper Name:	Data Structure Using C	ESE*	ISE*	Total	4	4
Paper Code:	23BCAMM231	60	40	100		

Course Objectives:

- To decide the choice of data structures and algorithm design methods impacts the performance of solution.
- To choose the appropriate data structure and algorithm design method for a specified application.
- To solve the real world problems by implementing suitable data structures such as linear lists, stacks, queues, binary trees, binary search trees, and graphs and writing programs for these solutions.

Learning Outcomes: After the completion of this course, the students could be able to:

- **CO1 Remember (Knowledge):** Define key terms related to data structure, algorithms, implementation and application.
- **CO2 Understand (Comprehension):** Explain the strength and weakness of different data structures.
- **CO3 Apply (Application):** Identifying real world problems & implementation of related data structures.
- **CO4 Analyze (Analysis):** Analyze implementations strategies of different types of algorithms related to solution.
- **CO5 Evaluate (Evaluation):** Assess the solutions, benefits and limitations of different algorithms.

Module1:

- **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.
- **Array:** Types of array- one D, two D, multidimensional, Operations of array- insert, delete, traverse, count, display, reverse
- **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, Stackin recursion, applications of stack.

Module2:

- **Queue:** Operations of queue- Create, isEmpty, isFull, insert, remove, display, Types of Queue-Linear, Circular, Deque (Double Ended Queue) & Priority queue. Implementation of all types of queue using array (Static Implementation), Difference between stack and queue, Applications of Queue
- **Linked List:** Difference between Array and Linked list. Types of linked list:- Linear linked list- Singly (Single) and Doubly (Double)
Circular linked list- Singly (Single) and Doubly (Double) Operations of linked List Creation, Insertion,Deletion,Traversing,Searching,Display,count,reverse,Implementationofalltypesof linked list, Implementation of stack using linked list (Dynamic stack), Implementation of queue using linked list (Dynamic queue)

Module 3:

- **Tree:** Introduction, 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 linked list, 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 4:

- **Graph:** Concept & terminologies used in graph, Graph Representation using- Array and linked list, implementation of graph traversals – BFS & DFS, Dijkstra's shortest path algorithm, and application of graph.
- **Sorting:** Introduction and definition of Sorting, Types of Sorting-Bubble sort, Quick sort, Shell sort, Selection sort, Insertion sort, Merge sort, Radix Sort techniques
- **Searching:** Introduction and definition of Searching, Types of searching-Linear (Sequential) Search, Binary Search, Indexed sequential search.

Recommended Books:

- Tanenbaum: Data structures using C and C++
- Data Structures Through C in Depth-S.K. Srivastava

Semester:	III	Assessment & Evaluation Pattern			L/W*	Credits
Paper Category:	Major Mandatory8	Assessment & Evaluation Pattern			L/W*	Credits
Paper Name:	OOP With C++	ESE*	ISE*	Total	3	2
Paper Code:	23BCAMM232	30	20	50		

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, vectors, inheritance and file I/O stream concepts.

Learning Outcomes: After the completion of this course, the student should be able to:

- **CO1 Remember (Knowledge):** Introduces Object Oriented Programming concepts using the C++ language.
- **CO2 Understand (Comprehension):** Understanding the principles of data abstraction, inheritance and polymorphism.
- **CO3 Apply (Application):** Apply the principles of virtual functions and polymorphism.
- **CO4 Analyze (Analysis):** Analyzing the handling formatted I/O and unformatted.
- **CO5 Evaluate (Evaluation):** Evaluate the I/O Introduces file & stream handling.

Module 1:

- **Introduction to OOP, Features of OOP's**
 - Comparison between POP and OOP, Advantages of OOP's, Application of OOP
 - data types, constants, operators, special symbols, control flow statements, Pointer and reference variable
 - Structure of C++ program, Introduction to cin and cout objects
 - Function and its types, Default argument, Parameter passing methods, inline function
 - Static polymorphism (Function overloading)
- **Classes & Objects**
 - Access Specifier (Visibility modes)-public, protected, private
 - Static data members and static member functions
 - Array of object, Pointer to object, Returning objects from functions
 - Passing object as parameter by value, by pointer, by reference
 - Dynamic memory allocation(new, delete)
 - Constructors Concept, characteristics of constructor, Types of constructor
 - Constructor overloading, Constructor with default argument
 - Destructor, characteristics of destructor

Module 2:

- **Inheritance**
 - Defining derived class, Types of Inheritance
 - Virtual base class
 - Behavior of constructors and destructor in inheritance
 - Pointer to base class, Pointer to derived class
 - Introduction of run time polymorphism
 - Virtual functions & Pure virtual function
 - Abstract class, virtual destructors
- **Streams & Classes**
 - Stream classes and File stream classes
 - Formatted and unformatted I/O functions
 - File Manipulations-Opening, closing, reading, writing, Appending
 - File opening modes-Opening files, using open() and constructor
 - Error handling during file manipulations
 - Command line arguments

- **Template**

- Introduction to function template- overloaded function and user defined template class template
- Inheritance of class template, overloaded operators and class template containership

Recommended Books:

- OOP in C++—E-balagurusamy
- Mastering C++- K.R. Venugopal
- Structured approach using C++—Behrouz A. Forouzan
- The Complete Reference C++- Fourth Edition. Herbert Schildt

Semester:	III	Assessment & Evaluation Pattern			L/W*	Credits
Paper Category:	Major Mandatory 9					
Paper Name:	RDBMS using MySQL	ESE*	ISE*	Total	3	2
Paper Code:	23BCAMM233	30	20	50		

Course Objective:

- 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 data base objects.
- Understand the structure and design of relational databases.
- Understand the importance and major issues of database security and the maintenance of data integrity.

Learning Outcomes : After the completion of this course, the student should be able to:

- **CO1 Remember (Knowledge):** Understand relational database management systems and query languages.
- **CO2 Understand (Comprehension):** Understand principles of database transaction management, database recovery, and security.
- **CO3 Apply (Application):** Apply to manage the processing of queries and it's optimization.
- **CO4 Analyze (Analysis):** Analyze the concepts of file structure and it's storage.
- **CO5 Evaluate (Evaluation):** Develop, install and configure a data base management system for business application and formulate queries to access the database.

Module1:

- Definition DBMS, limitation of traditional file system, Advantages of DBMS, Components of DBMS, Database users, Database Structure, Two & Three Level Tier Architecture, RDBMS architecture, Data independence, Data abstraction, Types of Data mode- Relational, Network, Hierarchical, ER Model: entities, attributes & types, Relationships, sets, generalization, specialization, aggregation, ER to Relational mapping, Relational Model: Relation, domain, tupels, degree, cardinality, Relational Algebra Operations: select, project, cartation product, union, set difference, join
- 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 database
- MySQL operators-Arithmetic,Comparison,Logical,like
- MySQL Functions- Aggregate, Math, String, Date and Time, control flow functions and expressions, Type conversion, Formatting, MySQL clause-where, distinct, orderby, groupby, having, rollup.
- Populating tables with data,Retrieving data from tables,Sorting data in a table,Deleting data from table, Updating data in tables, searching data
- Add in gandDroppingcolumns,ModifyingandRenameexistingcolumns
- Renamingtableusingaltertable,Changingatabletype
- Findingoutthetablescreatedbyuser, Displaying atablestructureCreatingatable froma table, Inserting data into a table from another table

Module2:

- 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
- MySQLjoin:-Advantages&disadvantagesofJoin,TypesofJoins
- MySQLView:-whyview, Create,Update,Alter andDropview
- Subqueries-use&example
- Stored Procedure:- Structure, use of stored procedure, Supported SQL statements in Procedures,creatingdynamicprocedure,Addingrecordtothetableusingprocedure, procedure with IN, OUT, INOUT parameter, dropping procedure.
- Transaction: MySQL transactions, open and closing transaction, commit, rollback, save point in transaction, table lock
- Trigger:Introduction,typesoftrigger–before,after,insert,update&delete,advantages
- Cursor:-use ofcursor,types ofcursor, opening a cursor, fetching a record fromthe cursor, cursor fetch statement, closing cursor, MySQL import & export- Import CSV File intoMySQL Table,ExportMySQL Table to CSV

RecommendedBooks:

- ComputerNetworking byTannenbaum.
- NetworkSecurityEssentialsbyWilliamStallings
- DorothyE.Denning,"CryptographyandDataSecurity",Addison-Wesley
- DatacommunicationandnetworkingbyWilliamStallings

Semester:	III	Assessment&Evaluation Pattern			L/W*	Credits
PaperCategory:	MinorMandatory2					
PaperName:	LaboratoryCourseon MajorMandatory (7,8 & 9)	ESE*	ISE*	Total	4	4
PaperCode:	23BCAMN231	60	40	100		

DataStructureusing‘C’Array

- 1) Write a program to implement array with following operations: a) Insert Element b)Delete element fromentered position c) Traverse arrayelement ,Count e) Search element
- 2) Writeaprogramthatprintsarrayelements inreverse order.
- 3) Writeaprogramthatfindsonlyevenelementsinanarray.
- 4) Writeaprogramthatfindsonlyodd elementsin anarray.
- 5) Writeaprogramthatfindsadditionofmatrices.
- 6) Writeaprogramthatfindsmultiplicationofmatrices.

Stack

- 1) Writeaprogramto implementstack byusing array.(StaticImplementationofstack)
- 2) Writeaprogram,whichreversesthestring byusing stack.
- 3) Writeaprogramto checkentered stringispalindromeornotbyusing stack.
- 4) Writeaprogramto convertdecimalnumberintobinarynumberbyusing stack.
- 5) Writeaprogramto count totalnumberofvowelspresentinstringbyusing stack.
- 6) Writeaprogramwhichconvertinfixexpressionintoprefix expression.
- 7) WriteaprogramwhichconvertinfixexpressionintoPostfixexpression.
- 8) Writeaprogramwhichcheckenteredexpressionisvalidornot.
- 9) Writeaprogramfor evaluationofpostfixexpression.
- 10) Writea programtocalculatefactorialofenterednumberbyusingrecursion.
- 11) Writea programtocalculate digitsumofenterednumberbyusingrecursion.
- 12) Writeaprogramto findfacevalueofenterednumber byusing recursion.

Queue

- 1) Write a program to implement linear queue by using array. (Static Implementation ofqueue)
- 2) WriteaprogramtoimplementCircular queue.
- 3) WriteaprogramtoimplementPriorityqueue.
- 4) WriteaprogramtoimplementIRD(InputRestrictedDeque)
- 5) WriteaprogramtoimplementORD(OutputRestrictedDeque)

LinkedList

- 1) Writeaprogramtoimplementsinglylinearlinkedlistwithitsbasicoperations.
- 2) Writeaprogramtoimplementstackbyusinglinkedlist.(Dynamicimplementation)
- 3) Writeaprogramtoimplementqueuebyusinglinkedlist. (Dynamicimplementation)
- 4) Writeaprogramto implementdoublylinearlinkedlistwithitsbasicoperations.
- 5) Writeaprogramtoimplementsinglycircularlinked listwithitsbasicoperations.
- 6) Writeaprogramtoimplementdoublycircularlinked listwithitsbasicoperations.

Tree

- 1) Writea programtoimplementbinarysearchtree withtreetraversalmethods.
- 2) Write a programto implement BSTwith following operations: I)Insert NodeII)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 MaximumnodeIII) Find MinimumNodeIV) SearchnodeV) DisplayonlyoddnodesVI) Displayonlyeven nodes VII) Display leaf nodes VIII) Find levelofnode 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.

OOP With C++

- 1) Write different programs in 'C++' language that show use of array, pointer 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 demonstrates 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 ostream 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 of try, catch and throw
- 45) Write a program that shows use of 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

RDBMS using MySQL

1. Create the following Databases. Salesmen

Customers

CNUM	CNAME	CITY	RATING	SNUM
2001	Harsh	Baroda	100	1001
2002	Gita	Pune	200	1003
2003	Lalit	Mumbai	200	1002
2004	Govind	Delhi	300	1002
2006	Chirag	Surat	100	1001
2008	Prajakta	Delhi	300	1007
2007	Sushma	Mumbai	100	1004

SNUM	SNAME	CITY	COMMISSION
1001	Prashnat	Mumbai	12
1002	Rajesh	Surat	13
1004	Anandi	Mumbai	11
1007	Priya	Delhi	15
1003	Suchita	Pune	10
1005	Nayan	Baroda	14

Orders

ONUM	AMOUNT	ODATE	CNUM	SNUM
3001	18	10/3/2019	2008	1007
3003	767	15/3/2019	2001	1001
3002	1900	10/3/2019	2007	1004
3005	5160	20/4/2019	2003	1002
3006	1098	20/4/2019	2008	1007
3007	1713	10/5/2019	2002	1003
3008	75	10/5/2019	2004	1002
3010	4723	15/6/2019	2006	1001
3011	1309	18/3/2019	2004	1002

- **Solve the following queries using above databases and where clause range searching and pattern matching.**

1. Produce the order no, amount and date of all orders.
2. Give all the information about all the customers with salesman number 1001.
3. Display the following information in the order of city, sname, snum and commission.
4. List of rating followed by the name of each customer in Surat.
5. List of snum of all salesmen with orders in order table without any duplicates.

- **Solve the following queries using above databases and group by clause.**

1. Find out the largest orders of salesman 1002 and 1007.
2. Count all orders of October 3, 1997.
3. Calculate the total amount ordered.
4. Calculate the average amount ordered.

5. Count the no. of salesmen currently having orders.

- **Solve the following queries using above databases and formatted output and order by clause.**

1. List all salesmen with their % of commission.
2. Display the no. of orders for each day in the descending order of the no. of.
3. Display order number, salesman no and the amount of commission for that order.
4. Find the highest rating in each city in the form: For the city(city), the highest rating is (rating)
5. List all in descending order of rating.
6. Calculate the total of orders for each day and place the result in descending order.

- **Solve the following queries using above databases and join.**

1. Show the name of all customers with their salesman's name.
2. List all customers and salesmen who shared a same city.
3. List all orders with the names of their customer and salesman.
4. List all orders by the customers not located in the same city as their salesman.
5. List all customers serviced by salespeople with commission above 12%.

- **Solve the following queries using above databases and join and subquery.**

1. Find all orders attributed to salesmen in 'London'.
2. List the commission of all salesmen serving customers in 'London'.
3. Find all customers whose cnum is 1000 above than the snum of 'Sejal'.
4. Count the no. of customers with the rating above than the average of 'Surat'.
5. List all orders of the customer 'Chirag'.

- **Solve the following queries using above databases and delete and update.**

1. Remove all orders from customer Chirag from the orderstable.
2. Set the ratings of all the customers of Piyush to 400.
3. Increase the rating of all customers in Rome by 100.
4. Salesman Sejal has left the company. Assign her customer to Miti.
5. Salesman Miti has resigned. Reassign her number to a new salesman Gopal whose city is Bombay and commission is 10%.

- **Solve the following queries using above databases and alter table and table constraints.**

1. How the onum field is forced to be unique?
2. Create an index to permit each salesman to find out his orders by date quickly.
3. Write a command to enforce that each salesman is to have only one customer of a given rating.
4. Write a command to add the item-name column to the order table.
5. Write a command to create the salesmen table so that the default commission is 10% with no NULLs permitted, snum is the primary key and all names contain alphabetical only.
6. Give the commands to create our sample tables (salesmen, customer, orders) with all the necessary constraints like primary key, not null, unique, foreign key.

- **Solve the following queries using above databases and view.**

1. Create a view called big orders which stores all orders larger than Rs. 4000.
2. Create a view Ratecount that gives the count of no. of customers at each rating.
3. Create a view that shows all the customers who have the highest ratings.
4. Create a view that shows all the number of salesmen in each city.
5. Create a view that shows the average and total orders for each salesman after his name and number.
6. Create a cursor emp_cur, fetch record from emp table and check whether sal > 10000 then update Grade = 'A' else if sal >= 5000 and sal <= 10000 then update Grade = 'B'
7. Write a procedure to find the table structure of a given number 8. Write a procedure on software table to calc

Semester:	III	Assessment&Evaluation Pattern			L/W*	Credits
PaperCategory:	GE3					
PaperName:	Bootstrap	ESE*	ISE*	Total	3	2
PaperCode:	23BCAGE231	30	20	50		

Course Objectives:

- CSS and JavaScript components of Bootstrap, Work & Customize Bootstrap installation.
- Design layouts adhering to a baseline grid and fluid grid.
- Optimize Bootstrap design for target device features
- Create responsive images and graphics

Learning Outcomes: After the completion of this course, the students should be able to:

- **CO1 Remember (Knowledge):** Learn to utilize Bootstrap's file structure for efficient web development workflows.
- **CO2 Understand (Comprehension):** Explore the possibilities of extending Bootstrap with custom plug-in and community-driven components.
- **CO 3 Apply (Application):** Implement Bootstrap's layout components, including dropdown menus, navigation elements, and various UI components like breadcrumbs and pagination.
- **CO4 Analyze (Analysis):** Develop the ability to troubleshoot common issues and optimize Bootstrap-based designs for a professional finish.
- **CO5 Evaluate (Evaluation):** Develop, install and configure a website for business application.

Module1:

- Bootstrap Introduction, What is Bootstrap Framework, Why Bootstrap
- History of Bootstrap
- Advantages of Bootstrap Framework
- What is Responsive webpage
- How to remove Responsiveness
- Major Features of Bootstrap
- Mobile-First Strategy
- Setting up Environment
- Apply Bootstrap to Applications
- Bootstrap Containers, Grid System, Fixed Layout, Fluid Layout
- Responsive Layout, Typography, Tables

Module2:

- Lists, List Groups, Forms, Checks and Radios, Range
- Input Groups, Floating Labels, Form Validation, Custom Forms
- Buttons, Button Groups, Images, Cards, Media Objects
- Icons, Navs, Navbar
- Accordion, Breadcrumbs, Pagination
- Badges, Progress Bars, Spinners
- Jumbotron, Bootstrap Helper Classes
- Modals, Dropdowns, Tabs, Collapse, Tooltips, Popovers, Alerts
- Stateful Buttons, Carousel, Typeahead, ScrollSpy, Toasts

Recommended Books:

- Learn Bootstrap Web Design: From School Level To Everyone [by Aadishree Avinash]
- Bootstrap in 24 Hours, Sams Teach Yourself [by Jennifer Kyrnin]

Semester:	III	Assessment&Evaluation Pattern			L/W*	Credits
PaperCategory:	GE3					
PaperName:	AdvancedExcel	ESE*	ISE*	Total	3	2
PaperCode:	23BCAGE232	30	20	50		

Course Objectives:

- To equip the student to with automation skills on excels.
- To enable the student to use excel for informed decision making.

Learning Outcomes: After the completion of this course, the students should be able to:

- CO1 Remember (Knowledge):** Handle large data generated through business transactions using advanced spreadsheet tools.
- CO2 Understand (Comprehension):** Navigate the Excel interface, enter data and use basic formatting tools..
- CO3 Apply (Application):** Create, edit, and format spreadsheets using various tools, techniques, functions etc.
- CO4 Analyze (Analysis):** Solve complex business problems using various functions.
- CO5 Evaluate (Evaluation):** Create spreadsheets in various real life business problems.

Module1:

- Introduction to Spreadsheets through MS Excel
- Concept of Spreadsheet, Working with spreadsheet using MS Excel
- Formatting Cells, Concept of cell address, Adding rows, columns, sheets, creating well formatted tables, Manipulating in respect of Cells, rows, columns, sheets.
- Auto Fill, Adding Comments, Freeze Panes, using Hyperlinks

Module2:

- Working with Formulas and Functions: Cell referencing – Absolute & relative, Paste Special Function
- Function Library: Math & Trigonometry functions : Abs, Sum, Sumif, Sumifs, int, trunc, ceiling, Round, floor, Rand, Product, Quotient, Mod.
- Statistical, database functions: Average, Averagea, Averageif, Averageifs, count, Counta, Countblank, Countif, Countifs, Max, Min.
- Logical Functions: IF, AND, OR, NOT Functions
- Text Functions: Len, Left, Right, Exact, Replace, Find, Upper, Lower, Proper, Trim, Concatenate & T Functions
- Date & Time Functions: Date, Today, Weekday, Datevalue, Time, Hour, Networkdays
- Financial Functions: Fv, Pmt, Pv, Rate, Nper, Sln, ... etc
- LOOKUP & Reference Function: Vlookup, Hlookup • Database Function: Dget, Dsum, Dmax, Dmin, Dproduct
- Advanced Features:** -Data Validations, Conditional Formatting, Formula Auditing, Sorting & Filtering Data, Advanced Filtering. Text to Columns, Charts & Graphs
- Pivot Tables, Scenario, Goalseek, Solver, Datable, subtotals, Data Consolidation
- Macros in Excel:** - Creating a Macro, Running a Macro, Editing a Macro
- Data Security & Printing in Excel:** - Data Security – Cell Level, Sheet Level, Book Level, Sharing Workbooks • Printing Spreadsheets, using headers and footers, repeating rows above and columns to left, etc.

Recommended Books:

- Microsoft Excel Practical Formulae: From Basic Analysis to advanced Formulae

Programme:BCAII(Level5.0)						
Semester:	III	Assessment&Evaluation Pattern			L/W*	Credits
PaperCategory:	AEC 3					
PaperName:	ITAct2000	ESE*	ISE*	Total	3	2
PaperCode:	23BCAAE231	30	20	50		

Course Objective:

- The Act seeks to protect all transactions done through electronic means.
- E-commerce has reduced paperwork used for communication purposes. It also gives legal protection to communication and the exchange of information through electronic means.
- It protects the digital signatures that are used for any sort of legal authentication.

Learning Outcomes: After the completion of this course, the students should be able to:

- **CO1 Remember (Knowledge):** Get knowledge to know that recognition of electronic records and signatures aims to streamline the electronic delivery of government services and facilitate transactions between businesses and consumers.
- **CO2 Understand (Comprehension):** Understand that the Act protects various cybercrimes such as hacking, data theft, identity theft, and cyber stalking, prescribing penalties for these offenses to ensure a safe and secure cyber environment.
- **CO3 Apply (Application):** Understand application of cyber law with the help of case studies.
- **CO4 Analyze (Analysis):** Intellectual property issues in the cyber space and the growth and development of the law.
- **CO5 Evaluate (Evaluation):** Understanding the evaluation of different sections under IT Act.

Module1:

- Advantages and Disadvantages of Internet Technology
- Information Technology Act 2000
- Need, Aims, Objectives and Applications (Section 1)
- Computer (Section 2(i))
- Computer Resource (Section 2(j))
- Computer System
- E-record (Section 2(v))
- Information (Section 2 (v))
- E- Governance (Sections 4-10A)
- Attribution, Acknowledgement and Dispatch of e-record (Section 11-13)
- Regulations (Section 17-19)

Module2:

- Certifying Authority (Sections 30-34)
- Cyber Contraventions and penalty (Sections 43-45)
- Offences and Extra Territorial Jurisdiction (Sections 65-77)
- Intermediary not liable in certain cases (Sections 2(w), 79)
- Investigation and procedure of search and seizure (Sections 78 & 80)
- Grey Areas of IT Act 2000

Recommended Books:

- Bare Act of Information Technology Act 2000 - Universal Publishing Co. Pvt. Ltd
- Information Technology: Law & Practice - Vakul Sharma
- Law of Information Tech - D.P. Mittal
- A Guide to Cyber Laws and IT Act 2000 with Rules and Notifications - Nandan Kamath

Semester:	III	Assessment&Evaluation Pattern			L/W*	Credits
PaperCategory:	VSC 3					
PaperName:	UML	ESE*	ISE*	Total	3	2
PaperCode:	23BCAVS231	30	20	50		

Course Objective:

- The focus of this course is on design rather than implementation.
- IntroducingtheUnifiedProcessandshowinghow UMLcanbeusedwithintheprocess.
- Presentingacomparisonofthemajor UMLtoolsforindustrial-strengthdevelopment.
- Introductiontodesignpatterns,practicalexperiencewithaselectionofcentralpatterns.

LearningOutcomes: Afterthecompletionofthiscourse,thestudentsshouldbeableto:

- **CO1Remember(Knowledge):**Identifythepurposeandmethodsofuseofcommon object-oriented design patterns.
- **CO2Understand(Comprehension):**Representthedatadependenciesofasimple program using UML.
- **CO3Apply(Application):**Createdesigndocumentationoutliningthetestableand complete design of a simple program.
- **CO4Analyze(Analysis):**Analyzingthedesignfor propersoftware development.
- **CO5Evaluate(Evaluation):**Evaluatingthedesignforrobustsystemapplication.

Module1:

- **Object-Oriented Concepts:** Principles of modeling, abstraction, encapsulation, modularity, hierarchy, typing, concurrency, persistence of objects. Purpose of modeling.
- **OOAnalysisand Design:**
Class Modeling: Object & Class, Links &Associations, Generalization & Inheritance, Association Ends scope, visibility, Multiplicity, Role names, Ordering, bags & sequences, Qualified association, Aggregation, association attributes & association classes, propagation of operations, Abstract class, Metadata, reification, Constraints, derived data, packages, elements of class diagrams, constructing class diagrams.

Module2:

- Principlesofmodeling,UML—Overview
- AConceptualModelofUML
- RoleofUMLinOO Design
- **UML—BuildingBlocks:**Things,Relationships,
- **Use Case modeling:** Actors, Use Cases, relationships - betweenactors,betweenuse cases and between actor and use case, elements of use case diagram, constructing use case diagrams.
- Interaction Modeling: Elements of sequence diagram and communication diagram, constructing sequence diagram and communication diagram
- **ActivityModeling:**Elementsofactivitydiagram,constructingactivitydiagram

RecommendedBooks:

- The Unified Modeling Language Reference Manual(Addison-Wesley Object Technology Series)
- UMLDistilled: ABriefGuidetotheStandard ObjectModeling Language(Paperback)

Semester:	III	Assessment&Evaluation			L/W*	Credits
		Pattern				
PaperCategory:	FP1					
PaperName:	MiniProject	ESE*	ISE*	Total	3	2
PaperCode:	23BCAFP231	30	20	50		

Course Objective:

- The project work facilitates the students to develop and prove Technical, Professional and Ethical skills and knowledge gained during graduation program by applying them from problem identification, analyzing the problem and designing solutions.

Learning Outcomes: After the completion of this course, the students should be able to:

- CO1 Remember (Knowledge):** To know various techniques to be implemented for the selected problem and related technical skills through feasibility analysis.
- CO2 Understand (Comprehension):** To design solutions for real-time problems that will positively impact society and environment.
- CO3 Apply (Application):** Identify and analyze the solution in detail to define its scope with problem specific data.
- CO4 Analyze (Analysis):** Develop & evaluate the system against SRS.
- CO5 Evaluate (Evaluation):** Evaluate the system for actual implementation.

Guidelines:**Module 1: Project Topic Selection and Allocation:**

- Project topic selection process to be defined and followed:
 - Project orientation can be given on start of semester
 - Students can certainly take ideas from anywhere, but be sure that they should evolve them in the unique way to suit their project requirements.
- Topics can be finalized with respect to following criterion:
 - Topic Selection:** The topics selected should be on current requirement of society/industries (Product based, Application based or Research based) or should work towards removing currently existing systems.
 - Technology Used:** Use of latest technology or modern tools can be encouraged.
 - Project work must be carried out by the group of at least 2 students
 - Guide allocations should be done and students have to submit weekly progress report to the internal guide
 - Internal guide has to keep track of the progress of the project and also has to maintain attendance report. This progress report can be used for awarding term work marks.

Module 2: Project Report Format:

A project report should preferably contain at least following details:

- Abstract
- Introduction of Literature Survey/Existing system
- Limitation of Existing system or research gap
- Problem Statement and Objective

- ProposedSystem
 - Analysis/Framework/Algorithm
 - Design details
 - Methodology(your approach to solve the problem)ProposedSystem
- ExperimentalSetup
 - Details of Database or details about input to systems or selected data
 - Performance Evaluation Parameters(for Validation)
 - Software and Hardware Setup

Semester:	III	Assessment&Evaluation Pattern			L/W*	Credits
PaperCategory:	CC3					
PaperName:	IndianConstitution	ESE*	ISE*	Total	3	2
PaperCode:	23BCACC231	30	20	50		

Course Objective:

- To understand the provisions of the constitution of India.
- To make students aware about fundamental rights and duties.
- To learn the structure and functions of the Indian judiciary.
- To understand the constitutional amendment procedure.

Course Learning Outcomes:

- Promotion of active citizenship, legal awareness, and critical thinking about constitutional issues.
- Acquire basic knowledge of the constitution of India.
- Understand the role of parliament in lawmaking and constitutional amendment.
- To create awareness about fundamental rights and fundamental duties.

Unit 1: Introduction to Indian constitution

- **Preamble**-Introduction to Indian constitution (Components),
- **Fundamental Rights** -overview of fundamental rights,
- **Directive Principles**-Introduction to Directive Principles.
- **Union Executive**- Powers and Functions of the President and Prime Minister.

Unit 2: Judiciary & Constitutional Amendments

- **Judiciary Structure** -Supreme Court of India, High Courts and Subordinate Courts.
- **Constitutional Amendments** - Process, significance and impact of important constitutional amendments.
- **Emergency Provisions**- Powers and Implications of emergency provisions.

Recommended Books:

- N.H.Jhabvala -Constitution of India-C.Jamnadas & Co., 2017 Edition
- T.K.Tope :Constitution of India
- G.Austin, History Democratic Constitution: The Indian Experience (2000) Oxford.
- D.D.Basu, Shorter Constitution of India (1996), Prentice Hall of India, Delhi.
- Constituent Assembly Debates Vol. 1 to 12 (1989)
- H.M.Seervai, Constitution of India Vol. 1-3 (1992) Tripathi, Bombay.
- M.P.Singh (ed) V.N.Shukla, Constitutional Law of India (2000) Oxford
- G.Austin, Indian Constitution: Corner Stone of a Nation. (1972)

Semester:	IV	Assessment&Evaluation Pattern			L/W*	Credits
PaperCategory:	MajorMandatory10					
PaperName:	PHP	ESE*	ISE*	Total	4	4
PaperCode:	23BCAMM241	60	40	100		

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

Learning Outcomes: After the completion of this course, the students should be able to:

- **CO1 Remember (Knowledge):** To understand different frameworks and related lexical structure details of PHP.
- **CO2 Understand (Comprehension):** Understand different components in web technology and to know about web servers.
- **CO3 Apply (Application):** Develop an interactive Web page using HTML/XHTML, JavaScript, CSS, PHP.
- **CO4 Analyze (Analysis):** Construct websites for user interactions using JavaScript and JQuery, CSS, PHP, DBMS.
- **CO5 Evaluate (Evaluation):** Evaluate Web applications developed using PHP.

Module1:

- Introduction to web applications, Client Side Vs Server Side Scripting
- Web Servers: Local Servers and Remote Servers, Installing Web servers, Internet Information Server (IIS), Personal Web Server (PWS)
- 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

String & Forms:

- String: String functions, 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 global variables, Super global array, Combine HTML and PHP code, Using hidden fields, Redirecting the user, File upload and scripts, Validation-Server side validation

Module2:**Database Connection:**

- 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

Module3:**State Management:**

- Cookies: Setting time in a cookie with PHP, Deleting a cookie, Creating session 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

Module 4:

ExceptionHandling :

- Meaningofexception,typesofexceptions,system.Exceptionclass,Try,catch,final, Multiple catch classes, catching all exception,
- nestingtryblock,throwingandrethrowingexceptions,commonlyused exceptions

ReferenceBooks:

- PHP:TheCompleteReference-StevenHolzner.
- ProfessionalPHP5-EdLecky-Thompson,HeowEide-Goodman,StevenD. Nowicki
- ProgrammingPHP-Rasmuslerdorf,KevinTatroe.

Semester:	IV	Assessment&Evaluation Pattern			L/W*	Credits
PaperCategory:	MajorMandatory11					
PaperName:	Core Java	ESE*	ISE*	Total	3	2
PaperCode:	23BCAMM242	30	20	50		

Course Objectives:

- To introduce the object-oriented programming concepts
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception handling and multithreading
- To introduce the design of Graphical User Interface using applets and swing controls.

Learning Outcomes: After the completion of this course, the students should be able to:

- **CO1 Remember (Knowledge):** Understand how object-oriented concepts are incorporated into the Java programming language.
- **CO2 Understand (Comprehension):** Understanding the concepts of Multithreading and Exception handling to develop efficient and error free codes.
- **CO3 Apply (Application)** Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
- **CO4 Analyze (Analysis):** Develop the ability to solve real-world problems through multithreaded programming using Java.
- **CO5 Evaluate (Evaluation):** Design event driven GUI and web related applications which mimic the real word scenarios.

Module1:

- **Introduction:** Introduction to java, java buzzword, data types, dynamic initialization, scope and life time, operators, control statements, arrays, type conversion and casting, finals & blank finals. **Classes and Objects:** Concepts, methods, constructors, usage of static, access control, this key word, garbage collection, overloading, parameter passing mechanisms, nested classes and inner classes.
- **Inheritance:** Basic concepts, access specifiers, usage of super key word, method overriding, final methods and classes, abstract classes, dynamic method dispatch.
- **Interfaces:** Differences between classes and interfaces, defining an interface, implementing interface, variables in interface and extending interfaces.
- **Exception Handling:** Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes.

Module2:

- **Multithreading:** Concepts of Multithreading, differences between process and thread, thread life cycle, Thread class, Runnable interface, creating multiple threads, Synchronization, thread priorities, inter thread communication, deadlocks.
- **I/O Streams:** Streams, Byte streams, Character streams, File class, File Streams
- **Event Programming:** AWT Components, windows, canvas, panel, File Dialog boxes, Layout Managers, Layout Manager, Menu, Menu bar, Adapter classes / Listeners
- **Applets:** Concepts of Applets, life cycle of an applet, creating applets, passing parameters to applets, accessing remote applet, Color class and Graphics Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling events.

Reference Books:

- Java2 for professional developers [by Michael Morgen]
- Core Java Vol1 and Vol2 [by Cay.S.Horstmann, Gray Cornell]
- Java The complete Reference [by Herbert Schildt]

Semester:	III	Assessment and Evaluation Pattern			L/W*	Credits
Paper Category:	Major-Mandatory-12					
Paper Name:	Computer Networks & Communication	ESE*	ISE*	Total	3	2
Paper Code:	23BCAMM243	30	20	50		

Course Objective:

- 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.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- To identify the different types of layers and protocols.

Learning Outcomes: After the completion of this course, the students should be able to:

- **CO1 Remember (Knowledge):** Use various routing mechanisms for finding shortest path in the network.
- **CO2 Understand (Comprehension):** Identify the different types of network devices and Multiple Access Protocols.
- **CO3 Apply (Application):** Explain the functions offered by session and presentation layer and their Implementation.
- **CO4 Analyze (Analysis):** Explain & Design the various reference models and networks.
- **CO5 Evaluate (Evaluation):** Evaluate the use of various application layer protocols: HTTP, DNS, and SMTP, FTP etc.

Module 1: Introduction to OSI Layers

- **Physical layer:-** Signals-Analog & Digital Signals, Period, Frequency, Phase, Amplitude, Bandwidth, Bit Rate, Bit Length, Fourier analysis. 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, Modulation and types-Amplitude, Frequency, Phase Transmission Mode-Parallel, Serial, Synchronous Transmission, Asynchronous Transmission. Switching and types- Circuit, Message, Packet
- **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
- **Network layer:-** Network layer Design issues, Routing Algorithm: Optimality Principle, Shortest Path Routing, Distance Vector Routing, Link State Routing, Broadcast Routing, Multicast Routing
- **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, DNS, SMTP, HTTP, WWW, SNMP, ARP, RARP, etc.

Module 2: Network, Web Security and Network Services

- **Network security, Security Techniques-** Encryption & decryption, Digital Signatures, Cryptography, Authentication Mechanisms-Passwords, Smart Card, Biometrics. Web Security: SSL Encryption, TLS, SET, E-mail Security
- **Network Services:-** VPN, Virtual LAN, Wi-Fi Network, Remote Sensing, GPS, GPRS, GSM, Bluetooth, Video Conferencing.

Recommended Books:

- Computer Networking by Tannenbaum.
- Network Security Essentials by William Stallings
- Dorothy E. Denning, "Cryptography and Data Security", Addison-Wesley

Semester:	IV	Assessment&Evaluation Pattern			L/W*	Credits
PaperCategory:	MinorMandatory4					
PaperName:	LaboratoryCourseon Major Mandatory 10&11	ESE*	ISE*	Total	4	4
PaperCode:	23BCAMN241	60	40	100		

PHP

- 1) WritePHPcodetocheckenterednumberisArmstrongor 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 ofEntered number. d)CheckNumberisPrimeor not.e) CheckNumber isStrongornot.
- 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) Writea programtooverloadthe constructor.
- 5) Writeaprogramwhichusesthestaticmethodsand staticvariables.
- 6) Writeaprogramtoimplementdifferenttypesofinheritance.
- 7) Writeaprogramtoimplementinterface.
- 8) Writeaprogramtohandledifferenttypesofexceptions.
- 9) Writeaprogramwhichshowstheuseof'final'keyword.
- 10) Writea programto copythe contentofonefileintoanother.
- 11) Writeaprogramtogettwofilesintothirdfile.
- 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

CoreJava

- 1) WAP todemonstratethe useofvariousdatatypes.
- 2) WAPto printfollowing pattern.a.Ab.ABc.ABCd.ABCD
- 3) WAPwhichwillchecknumberforArmstrong,prime,palindrome&perfectnumber.
- 4) WAPtodemonstratetheuseofAccessControl.(Public,private,protected).
- 5) WAPusingstatic& non-staticdatamembers.
- 6) WAPusingInterface.
- 7) WAPtodemonstrateuseofExceptionHandling.
- 8) WAPwhichwillcreateuserdefinedException.
- 9) WAPwhichwillacceptstringandcalculatehowmanyvowelspresentinit.
- 10) WAPwhichwillacceptrangeofyearsfromusersandprintleapyearsbetweenthem.
- 11) WAPto reverse the number.
- 12) WAPwhichwillaccept numberanddisplays it inwords.a. e.g.- Ifnumber-123asonetwo three.(use switch).
- 13) WAP whichwillcreate following threads. a.Print even &odd numbers. b. Print the prime number.
- 14) WAPwhichwilldemonstrateoverloading&Inheritance.
- 15) WAPto displaytheallpattern.
- 16) WAPto showdemoofparameterized constructor.
- 17) WAPto append thecontentsofonefilewithanotherfile.
- 18) WAPto developacalculatorusing Applet(functionsshowingadd,sub,MultiandDivi)
- 19) WAP whichwill insert student records into database having fieldsroll no, name, marksof five subjects, total marks and percentage and display the same.

Semester:	IV	Assessment&Evaluation Pattern			L/W*	Credits
PaperCategory:	GE4					
PaperName:	AWS(AmazonWeb Services)	ESE*	ISE*	Total	3	2
PaperCode:	23BCAGE241	30	20	50		

Course Objective:

- To learn and understand basics and working definitions of AWS.
- To describe and provide an example of the core AWS services, including compute, network, database, and storage services.
- To understand the AWS Well-Architected Framework.

Learning Outcomes: After the completion of this course, the students should be able to:

- **CO1 Remember (Knowledge):** Understanding different cloud computing model
- **CO2 Understand (Comprehension):** Understanding different imperative of cloud computing. .
- **CO3 Apply (Application):** Applying cloud computing environment as PaaS, IaaS & SaaS..
- **CO4 Analyze (Analysis):** Evaluate and access benefits of cloud computing applications.
- **CO5 Evaluate (Evaluation):** Understanding social impact of cloud computing.

Module1:

AWS Cloud Computing Basics: Overview of AWS cloud, AWS Free tier account creation, AWS Management Console, AWS Region, AWS Availability Zone, AWS Support Plan

Identity & Access Management (IAM): Create IAM Users & Group, Copy Permission from existing users, Applying Policies/Permission to Groups, IAM Users Sign-in link, Set Password Policy for IAM Users, Create Access Key, Activate/Deactivate Keys, Set up rules and policies governing user access and permissions.

Module2:

EC2: Basic of virtualization, What is EC2, EC2 instance Families, Amazon Machine Image, AWS Marketplace, Launching an EC2 instance, Create Public/ Private Key pair, EC2 Instance State, EC2 Shutdown Behavior, EC2 instance state

Create Volume : Generate a storage volume and attach it to the remote Microsoft Windows Server instance.

Elastic Block Storage (EBS): What is EBS, Create EBS, Types of EBS volume, General Purpose & Provisioned IOPS SSD, Throughput Optimized & Cold HDD, Persistent/Non-Persistent Volume, EBS Volume SLA, EBS Backed Instance & Instance Store Backend Instance **Create Buckets:** Establish buckets and upload documents and files to them.

Database Services: Explore and utilize AWS database services.

DevOps Services: Utilize AWS DevOps services for continuous integration and deployment.

Semester:	IV	Assessment&Evaluation			L/W*	Credits
		Pattern				
PaperCategory:	GE4					
PaperName:	SAP	ESE*	ISE*	Total	3	2
PaperCode:	23BCAGE242	30	20	50		

Course Objective:

The course objectives for Enterprise Application Development using SAP ABAP (Advanced Business Application Programming) on typically aim to equip participants with the skills and knowledge necessary to develop and maintain SAP applications using the ABAP programming language.

Learning Outcomes: After the completion of this course, the students should be able to:

- **CO1 Remember (Knowledge):** Understand the key concepts and principles of ABAP programming.
- **CO2 Understand (Comprehension):** Acquires skills for writing basic ABAP code effectively.
- **CO3 Apply (Application):** Learn to utilize the ABAP workbench tools for coding and debugging.
- **CO4 Analyze (Analysis):** Analyze the different SAP module for its effective implementation.
- **CO5 Evaluate (Evaluation):** Gain proficiency in using control flow structures to guide program execution.

Module1:

Overall introduction to ERP

Introduction SAP R/3 architecture, Introduction to SAP ABAP/4

ABAP/4 editor (Focus on the functionalities of new ABAP editor) Data

types, Output statements

Writing small programs

Arithmetic operations, String operations Control

statements

Parameters

OpenSQL – statements (insert, modify, delete, update). Simple

reporting

Selection screens

Transaction code creation

Data Dictionary

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Tables • Data element • Domain • Structures • Search helps • Views | <ul style="list-style-type: none"> • Type Groups • Table maintenance generator and T-code creation • Primary and foreign keys. • Check and value tables. |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Reporting:

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Debugging techniques. <ul style="list-style-type: none"> • Breakpoint creation. • Watchpoint creation. • Internal tables. <ul style="list-style-type: none"> • Declaration • Processing. • Control Break Statements. • Modularization techniques. <ul style="list-style-type: none"> • Includes. • Subroutines. | <ul style="list-style-type: none"> • Emphasize on the usage of New Debugger. • Population. • Function modules. • Macros |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|

- Variants.
- Conversionexits.
- Forallentriesandjoins(innerandleftouter).
- Messageclasscreation&messagetypesandhandlingmessages.
- Eventsfor classicalreports.
- Eventsforinteractivereports.
- Hideand hotspot.
- Creatingandhandling buttons.
- Menupainter.

ALV

- TypesofALV
- SimplereporttodisplaysimpleALVListusingFunctionModules
- InteractiveALVReports.
- AddingnewbuttonsintheALVtoolbarandhandlingevents.
- WorkingwithALVusingclasses(List,Gridand Tree).
- UsageoflatestclasslibraryinECC6.0forALV.

DIALOGPROGRAMMING

- Introductiontoscreenpainteranddialog programming.
 - Flowlogic
 - PAI
 - PBO
 - Screenesigning
 - Programminginobjectbrowser
 - Fieldvalidations
 - Creationof
 - NormalScreens
 - SubScreens
 - DynamicScreen.
 - CallScreen
 - SetScreen
 - Processingoflistfromtransactionandviceversa.
 - Screenshotanditsfields.
 - Lockobjects.
- POV
 - POH
 - TableControls
 - TabStrips
 - LeavetoScreen
 - LeaveScreen

Module2:

InterfaceProgramming

- WhyDataTransfers
 - IntroductiontoBDC.
 - FileHandling.
 - Presentationserver.
 - Recordings.
 - MethodsinBDC.
 - Calltransaction.
 - ErrorHandlinginCallTransaction.
 - HandlingTableControlsinBDCandScreenResolutions.
 - MassUpdation.
 - Vendor master.
 - LegacySystemMigrationWorkbench(LSMW)
 - Differentmethods.
 - StepstoCreateanLSMW Project.
- Applicationserver.
 - Sessionmethod.
 - Customer master.
 - Flatfilecreation.
 - Uploadingdata.

SAPScripts

- Introduction.
 - LayoutSets.
 - SAPScriptElements.
- Modifyingstandardlayoutsets(by using subroutines).
 - Uploadinglogo.

Semester:	IV	Assessment&Evaluation Pattern			L/W*	Credits
PaperCategory:	MajorMandatory12					
PaperName:	SoftwareTesting	ESE*	ISE*	Total	3	2
PaperCode:	23BCASE241	30	20	50		

Course Objectives:

- Introducebasic conceptsofsoftwaretesting
- Understandwhite box,blockbox,objectoriented,webbasedandcloudtesting
- Understandtheimportanceofsoftwarequality &assurancesoftwaredevelopment

LearningOutcomes:Afterthecompletionofthiscourse,thestudentsshouldbeableto:

- **CO1Remember(Knowledge):** List arangeofdifferent softwaretestingtechniquesandstrategies and be able to apply specific(automated) unit testing method to the projects.
- **CO2Understand(Comprehension):** Distinguishcharacteristicsofstructuraltestingmethods.
- **CO3Apply(Application):**Demonstratethe integrationtestingwhichaimsto uncoverinteraction and compatibility problems as early as possible.
- **CO4Analyze(Analysis):**Discussabout thefunctionalandsystemtestingmethods.
- **CO5Evaluate(Evaluation):**Demonstratevariousissuesforobjectorientedtesting

Module1:**IntroductionToSoftwareTesting:**

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

WhiteBoxTesting (WBT): IntroductiontoWBT,Advantages&DisadvantagesofWBT.

- StaticTechniques:InformalReviews,Walkthroughs,TechnicalReviews,Inspection
- Dynamic Techniques or Structural Techniques: Statement Coverage Testing, Branch Coverage Testing, Path Coverage Testing, Conditional Coverage, Loop Coverage Testing

BlackBoxTechniques:IntroductiontoBBT,AdvantagesandDisadvantagesofBBT

BoundaryValueAnalysis,EquivalenceClassPartition,StateTransition,CauseEffectiveGraph, Decision Table, Use Case Testing

- ExperiencedBasedTechniques:Errorguessing,Exploratorytesting

LevelsofTesting

- FunctionalTesting:SystemTesting,Smoke Testing,
- IntegrationTesting&types-Top-Down, Bottom-Up,Non-Incremental
- AcceptanceTesting-AlphaandBeta
- RegressionTestingandtypes-Unit/Retest,Regional, Full
- NonFunctionalTesting: AdhocTesting,Recovery Testing
- PerformanceTestingandtypes:LoadTesting,StressTesting,Volume&SoakTesting

Module2:

- QARole&Responsibility,DifferentWayofDevelopingasoftware-AgileVsWaterfall
- ProjectIntroduction,RequirementAnalysis,JiraInstallation,AgileProcess
- IntroductiontoJira,UserStories,Defects:Backlogs,UserStories,Epic
- JiraUsreStories&SprintPlanning
- CompleteRequirementcreationinJiraBasedonthe project.
- TestCaseandTestPlanCreation
- FunctionalTesting, UI Testing,TestingonStoreNavigationPage
- ConceptofBoundaryvalueanalysisandEquivalenceportioningmethod
- WritingDefect,DefectLifeCycle
- DifferentTypeoftesting, DifferenttypeofEnvironment
- APITesting:Introduction,APITypes&theirdifferences,Realttimeexample

RecommendedBooks:

- TheartofSoftwareTesting–GlenfordJ.Myers
- LessonslernedinSoftwareTesting–CemKaner,JamesBach,BretPettichord
- APractitioner’sGuideto SoftwareTestDesign-LeeCopel

NEPCurriculum:w.e.fJune2023						
Programme:BCAII(Level5.0)						
Semester:	IV	Assessment&Evaluation			L/W*	Credits
PaperCategory:	SEC3	Pattern				
PaperName:	BusinessAnalytics	ESE*	ISE*	Total	3	2
PaperCode:	23BCAAE241	30	20	50		

Course Objectives:

- To help students in understanding how the managers use business analytics for managerial decision making

Course Outcomes:

- The students will be familiar with the practices of analyzing and reporting the business data useful for the insights of business growth and development.

Module1:

- Understanding Business Analytics Introduction:** Meaning of Analytics - Evolution of Analytics - Need of Analytics – Business Analysis vs. Business Analytics - Categorization of Analytical Models - Data Scientist vs. Data Engineer vs. Business Analyst - Business Analytics in Practice - Types of Data - Role of Business Analyst.
- Dealing with Data and Data Science Data:** Data Collection - Data Management - Big Data Management - Organization/Sources of Data - Importance of Data Quality - Dealing with Missing or Incomplete Data - Data Visualization - Data Classification.

Module2:

- Data Mining and Machine Learning Data Mining:** The Origins of Data Mining - Data Mining Tasks - OLAP and Multidimensional Data Analysis - Basic Concept of Association Analysis and Cluster Analysis. Machine Learning: History and Evolution - AI Evolution - Statistics vs. Data Mining vs. Data Analytics vs. Data Science - Supervised Learning - Unsupervised Learning – Reinforcement Learning - Frameworks for Building Machine Learning Systems.
- Applications of Business Analytics:** Overview of Business Analytics Applications: Financial Analytics - Marketing Analytics – HR Analytics - Supply Chain Analytics - Retail Industry - Sales Analytics - Web & Social Media Analytics - Healthcare Analytics - Energy Analytics - Transportation Analytics - Lending Analytics – Sports Analytics - Future of Business Analytics.

Recommended Books:

- James REvans, Business Analytics, Global Edition, Pearson Education UDinesh Kumar,
- Business Analytics, Wiley India Pvt. Ltd., New Delhi
- Ger Koole, An Introduction to Business Analytics, Lulu.com, 2019
- J.D. Camm, J.J. Cochran, M.J. Fry, J.W. Ohlmann, D.R. Anderson, D.J. Sweeney, T.A. Williams Essentials of Business Analytics, 2e; Cengage Learning.
- Vipin Kumar, Introduction to Data Mining, Pang Ning Tan, Michael Steinbach, Pearson Education India
- Bhimasankaram Pochiraju, Sridhar Seshadri, Essentials of Business Analytics: An Introduction to the Methodology and its Application, Springer

NEPCurriculum:w.e.fJune2023						
Programme:BCAII(Level5.0)						
Semester:	IV	Assessment&Evaluation			L/W*	Credits
PaperCategory:	CEP1	Pattern				
PaperName:	DigitalMarketing	ESE*	ISE*	Total	3	2
PaperCode:	23BCACE241	30	20	50		

Course Objective:

- Thiscourseaimsto familiarizestudentswiththeconceptofdigitalmarketingand itscurrent and future evolutions.
- Itfurtheraimsto beableto equipstudentswiththeabilitytounderstandandsubsequentlycreate strategic and targeted campaigns using digital media tools.

Course Outcomes:

Attheendofthiscourse,studentswouldbeableto:

- Understandtheconceptofdigitalmarketinganditsreal-worlditerations
- Articulateinnovative insightsofdigitalmarketingenablingacompetitive edge
- Understandhowtoreateandrundigitalmediabasedcampaigns
- Identifyandutilizevarioustoolssuchassocialmediaetc.

Module1–

- Fundamentals ofDigitalmarketing &ItsSignificance, Traditionalmarketing Vs DigitalMarketing, Evolution of Digital Marketing, Fundamentals of Social Media Marketing& its significance, NecessityofSocialmediaMarketing, BuildingaSuccessfulstrategy:GoalSetting, Implementation.
- FacebookMarketing:FacebookforBusiness,FacebookInsight,DifferenttypesofAdformats, Setting up Facebook Advertising Account
- LinkedInMarketing:ImportanceofLinkedInpresence,LinkedInStrategy,Content Strategy, LinkedIn analysis
- YouTubeAdvertising:- YouTubeChannels,YouTubeAds,TypeofVideos

Module2-

- WebsitePlanning&Development- Website, TypesofWebsites, Phasesofwebsitedevelopment, Keywords: Selection process
- Domain&WebHosting:- Domain, TypesofDomain, WheretobuyDomain, Webhosting, Howto buy Webhosting
- Introduction to SEO, How Search engine works, SEO Phases, HistoryOf SEO, How SEO Works, What isGooglebot(GoogleCrawler),TypesOfSEOtechnique, Keywords, KeywordPlannertools

HIRACHANDNEMCHANDCOLLEGE OF COMMERCE, SOALPUR
(Autonomous College)
BCA Nature of Question Paper for Choice Based Credit System (CBCS)
Semester Pattern
Computer Science & Information Technology (w.e.f. June 2024)

Date:

Time: -2hrs.

Total Marks - 30

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

Q.1: Fill in the blanks and rewrite the following sentences: (06)

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

Q.2: Write short note/Short answer/Short problem any three from the following: (06)

- A
- B
- C
- D

Q. 3 Solve the following (Long answer/Problem) (06)

- A
- B

Q. 4 Answer the following (Any two) (06)

- A
- B
- C

Q. 5 Answer the following (Anyone) (06)

- A
- B
- C

HIRACHANDNEMCHANDCOLLEGE OF COMMERCE, SOALPUR
(Autonomous College)
BCA Nature of Question Paper for Choice Based Credit System (CBCS)
Semester Pattern
Computer Science & Information Technology (w.e.f. June 2024)

Date:

Time: - 2hrs.

Total Marks - 60

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: (06)

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

B) Fill in the Blanks: (06)

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

Q.2: Answer Any Six of the Following: (12)

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)
- i)
- j)

Q.3:A) Write short notes on Any Two of the following: (06)

- a)
- b)
- c)

B) (06)

Q.4: A) Answer the following: (06)

- a)
- b)

B) (06)

Q.5: Attempt Any Three of the following: (12)

- 1.
- 2.
- 3.
- 4.

HIRACHANDNEMCHANDCOLLEGE OF COMMERCE, SOALPUR
(Autonomous College)
BCA Nature of Question Paper for Choice Based Credit System (CBCS)
Semester Pattern
Computer Science & Information Technology (w.e.f. June 2024)
Laboratory Course

Date:

Time: - 2hrs.

Total Marks - 60

Instructions: 1. Students need to solve any 4 questions
2. Each question carries 10 marks.
3. 20 marks is for viva-voce

- 1.
- 2.
- 3.
- 4.
- 5.