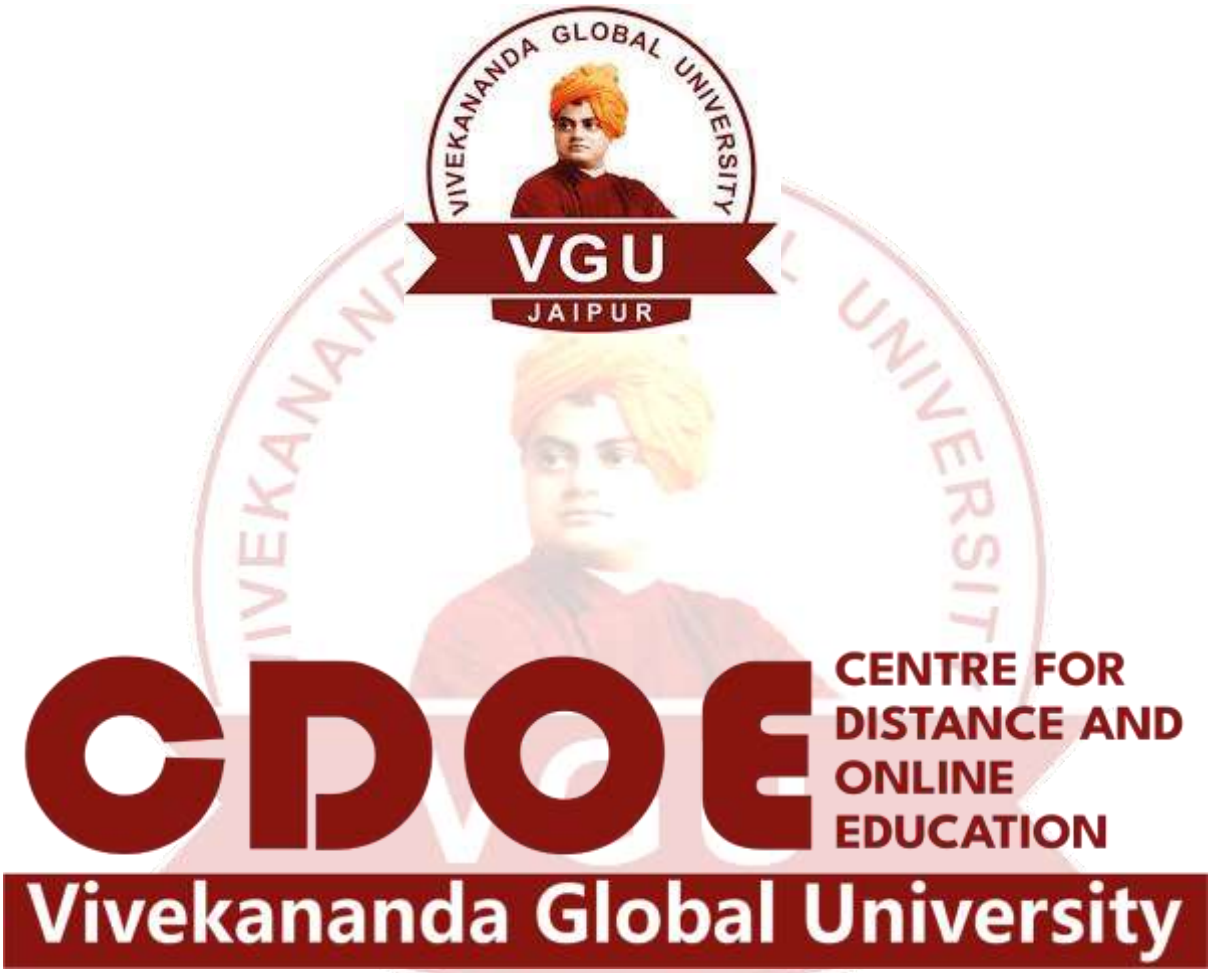
VIVEKANANDA GLOBAL UNIVERSITY



Syllabus of Bachelor of Computer Applications

PROGRAMME STRUCTURE AND DETAILED SYLLABUS
PROGRAMME STRUCTURE

SEMESTER 1					
Course Code	**Course Category**	**Title**	**Internal**	**External**	**Credits**
MAT 195	Core Course	Basic Mathematics	30	70	4
BCA 101	Core Course	Fundamental of C	30	70	4
CA 102	Core Course	Basic Electronics	30	70	4
CA 103	Core Course	Principle of Programming Languages	30	70	4
BCA 104	Practical Course	Fundamentals of C Lab	30	70	4
BCA 105	Core Course	PC Software and Automation	30	70	2
BCA EL 1		Elective 1	30	70	2
		TOTAL			**24**
SEMESTER 2					
BCA 201	Core Course	Object Oriented Programming with C++	30	70	4
BCA 202	Core Course	Data Structures and Algorithms	30	70	4
BCA 203	Core Course	Management information system	30	70	4
BCA 204	Core Course	Object Oriented Programming with C++ Lab	30	70	4
BCA 205	Practical Course	Data Structures Lab	30	70	4
BCA 206	Core Course	Soft Skill and Professional Aptitude	30	70	2
BCA EL2		Elective 2	30	70	2

		TOTAL			**24**
SEMESTER 3					
BCA 301	Core Course	Database Management Systems	30	70	4
BCA 302	Core Course	Computer Networks	30	70	4
BCA 303	Core Course	Internet Web Technology	30	70	4
BCA EL 3		Elective 3	30	70	2
BCA EL 4		Elective 4	30	70	2
BCA 304	Practical Course	Database Management Systems Lab	30	70	4
BCA 305	Practical Course	Internet & Web Programming Lab	30	70	4
		TOTAL			**24**
SEMESTER 4					
BCA 401	Core Course	Programming in Java	30	70	4
BCA 402	Core Course	Operating System	30	70	4
BCA 403	Core Course	Computer Graphics and Visualization	30	70	4
BCA EL 5		Elective 5	30	70	2
BCA EL 6		Elective 6	30	70	2
BCA 404	Practical Course	Computer Graphics Lab	30	70	4
BCA 405	Practical Course	Programming in Java Lab	30	70	4
		TOTAL			**24**
SEMESTER 5					
BCA 501	Core Course	Software Engineering	30	70	4

BCA 502	Practical Course	Software Engineering Lab	30	70	4
BCA 503	Core Course	Python Programming	30	70	4
BCA 504	Practical Course	Python Programming Lab	30	70	4
BCA EL 7		Elective 7	30	70	2
BCA EL 8		Elective 8	30	70	2
BCA 505	Practical Course	Project Formulation and Appraisal			4
		TOTAL			**24**
SEMESTER 6					
BCA 601		MAJOR PROJECT			14
BCA EL 9		Elective 9	30	70	2
BCA EL 10		Elective 10	30	70	2
		Total			**18**
		Grand Total			**138**

Semester	Course Code	Title	Internal	External	Credits
Semester 1	BCA EL 1	Elective 1- Multimedia System	30	70	2
Semester 2	BCA EL 2	Elective 2- Basic Program in Entrepreneurship	30	70	2
Semester 3	BCA EL 3	Elective 3- Discrete Mathematics	30	70	2
	BCA EL 4	Elective 4- Artificial Intelligence	30	70	2
Semester 4	BCA EL 5	Elective 5- Machine Learning	30	70	2
	BCA EL 6	Elective 6- Information System Security	30	70	2
Semester 5	BCA EL 7	Elective 7- Distributed Systems	30	70	2
	BCA EL 8	Elective 8- Real Time Systems	30	70	2
Semester 6	BCA EL 9	Elective 9- Cybercrime and IT Law	30	70	2
	BCA EL 10	Elective 10- Software Project Management	30	70	2

Detailed syllabus of BCA Program
Semester I
Course Code: MAT 195 - Basic Mathematics

Learning Objectives:

- Solve business arithmetic operations with fractions to do business problems, and be able to select which math method needs to be used to do problems
- Use Matrix Algebra and its applications to perform different calculations which are otherwise complex and time consuming
- Use differential and integral calculus to do business calculations, trend analysis, study market fluctuations and be able to differentiate which math method should be used for different problems

Unit 1: Determinants**:** Definition, Minors, Cofactors, And Properties of Determinants

Unit 2: Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices

Unit 3: Adjoint, Inverse, Cramers Rule, Rank of Matrix Dependence of Vectors, Eigen Vectors of a Matrix, Caley-Hamilton Theorem (without proof).

Unit 4: Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions

Unit 5: Continuity at a Point, Continuity Over an Interval, Intermediate Value Theorem, Type of Discontinuities

Unit 6: Derivative, Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions.

Unit 7: Definition of polynomial in one variable with example, Standard form of a quadratic equation $ax^2+bx+c=0, a\neq0,$

Unit 8: Solution of quadratic equation(only real roots) by factorization, By completing the square and by using quadratic formula, Relationship between discriminant and nature of roots..

Unit 9: Basics: Frequency distribution, Graphical representation of frequency distribution. Mean, Median, Mode and other measures of Central Tendency

Unit 10: Measures of Dispersion: Dispersion, Standard Deviations, Variance, Correlation and regression

Unit 11: Correlation: Measure of Karl's Pearson's coefficient of correlation

Unit 12: Regression: Regression analysis, Properties of regression lines.

Unit 13: Definition of a vector in 2 and 3 Dimensions; Double and Triple Scalar and Vector Product and physical interpretation of area and volume.

Unit 14: Practical exercises

Text/Reference Books:

1. B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed., 1998.
2. Shanti Narayan, "Integral Calculus", S. Chand & Company, 1999
3. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company, 9th Revised Edition, 2001.
4. Shanti Narayan, "Differential Calculus", S.Chand & Company, 1998.
5. Mathematics XI &XII, R.D. Sharma, Dhanpat Rai Publications.
6. Probability, Statistics and Queueing theory: Allen.

Course Code: BCA 101 - FUNDAMENTALS OF C

Learning objectives:

- Be able to implement, test, debug, and document programs in C
- Understand low-level input and output routines
- Program with pointers and arrays, perform pointer arithmetic, and use the preprocessor
- Be able to write programs that perform explicit memory management
- Understand how to write and use functions, how the stack is used to implement function calls, and parameter passing options
- Understand and use the common data structures typically found in C programs -namely arrays, strings, lists, trees, and hash tables

Unit 1: Programming: What is a program? What is a programming language? Steps in Programming, Skills needed to do programming, A little introduction to C, Writing a Program

Unit 2: Types of Programming: Fundamentals of a Programming Language, Different Programming Techniques, Procedural Programming, Modular Programming, Object Oriented Programming, Getting started with compiler**.**

Unit 3: Forming Words and Sentences: Words and Sentences in C Language: Alphabets in C, Keywords in C, Rules of forming Words in C language

Unit 4: Data Types: Data Variables, Data Types and Rules for naming and declaring data, variables, Basic Data Types in C, Constants, Comments in C

Unit 5: Input/Output Instructions: Types of instructions, Data Manipulation Instructions, Input/Output Instructions, Flow Control Instructions

Unit 6: Decision Control: Decision Control Instructions, If, if-else, If-else-if, Nested if-else

Unit 7: Loop Control: Loop Control Instructions, For Loop, While Loop, Do While, Selection Instructions

Unit 8: Arrays: What is an array? Array Declaration, Array Initialization, Accessing individual elements of an array,

Unit 9: Two-dimensional Array: Two Dimensional Arrays, Passing an array element to a function, Rules of using an array

Unit 10: Functions: Why use Functions, Components of Function, Name of a function, Body of a function, Local variables of a function

Unit 11: Passing Parameters: Parameters or Arguments to a function, Return Values, Prototype of a function

Unit 12: Pointers and Strings: What is a pointer? Declaring a Pointer variable, initializing a pointer variable, Using a Pointer Variable, Pointer Arithmetic, Pointers and array, passing an entire array to a function, What are strings? String I/O, String Manipulation Functions

Unit 13: Structures: Declaring and Accessing Structure, variables Uses of Structures, Unions Storage Classes and Scoping: Automatic, Register, External, Static, Scope of a Variable

Unit 14: Command Line and File Input/Output: Command-line arguments, File Input and Output, Combining Command-line Arguments and File I/O.

Text/Reference Books:

1. Brian W. Kernighan, Dennis M. Ritchie, "The C Programming Language"
2. K. N. King, "C Programming: A Modern Approach" Prentice-Hall
3. Stephen Prata, "C Primer Plus" published by Sams
4. Steve Oualline, "Practical C Programming" O'Reilly Media
5. Yashwant Kanetkar, " Let us C" BPB Publications, Yashwant Kanetkar, "Pointers in C" BPB Publications

Course Code: BCA 102 - BASIC ELECTRONICS

Learning objectives:

- Analyse and understand the concepts of different types of electronic devices
- Describe the working principles of electronic devices
- Understanding the construction of FET and working principle of FET circuits
- Understand the problem solving techniques Op Amp based circuits and design Op Amp based application circuits
- Understand the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates

Unit 1: Electric Current, Electromotive force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction

Unit 2: Lenz's Law, Kirchhoff's laws, Network Sources, Resistive, Inductive and capacitive Networks, Series Parallel Circuits.

Unit 3: Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behaviour of the PN Junction, PN Junction Diode

Unit 4: Zener Diode, Photovoltaic Cell, Rectifiers, L, C, & L-C filters.

Unit 5: Transistor, Modes of operation, Characteristics, Current components, Current gains: alpha, beta and gamma. CE, CB and CC configuration

Unit 6: Transistor as an Amplifier. Field Effect Transistor; JFET and MOSFET.

Unit 7: Representation of Data: Digital versus Analog, Digital number system (binary, octal, decimal and hexadecimal numbers)

Unit 8: Conversion from one form to another, fractional numbers and signed numbers, Complements

Unit 9: Arithmetic operations on binary numbers, Fixed point and floating point representations

Unit 10: Boolean algebra, Logic Gates and Their Truth Tables.

Unit 11: Introduction, IEEE Spectrum for Communication Systems

Unit 12: Types of Communication, Amplitude and frequency Modulation

Unit 13: Introduction to Transducers: Thermocouple

Unit 14: RTD, Strain Gauges, Load Cell.

Text / Reference Books:

1. Basic Electrical and Electronics Engineering by Sukhija and Nagsarkar, Oxford Publication
2. Basic Electrical & Electronics Engineering by Kothari, Nagrath, TMH
3. Electronic devices & circuits theory, R.L. Boylestad, Louis Nashelsky , Pearson education
4. Millman, Electronics Devices and Circuits, TMH
5. Basic Electronics Engineering by Vijay Baru et al, Dream Tech, New Delhi
6. Fundamentals of Electrical and Electronics Engineering by Ghosh, Smarajit, PHI India

Course Code BCA 103: PRINCIPLE OF PROGRAMMING LANGUAGES

Learning objectives:

- To introduce several different paradigms of programming.
- To gain experience with these paradigms by using example programming languages.
- To understand concepts of syntax, translation, abstraction, and implementation.

Unit 1: Definition, History, Features. Issue in Language Design: Structure and Operation of computer

Unit 2: Language Paradigms, Efficiency, and Regularity

Unit 3: Issues in Language Translation: Syntax, Semantics, Stages analysis and synthesis.

Unit 4: Specification and Implementation of Elementary and Structured Data Types

Unit 5: Type equivalence, checking and conversion. Array, Structure, Union.

Unit 6: Sequence control with Expressions, Conditional Statements

Unit 7: Loops, Exception handling

Unit 8: Subprogram definition and activation, simple and recursive subprogram

Unit 9: subprogram environment, Parameter passing mechanism**.**

Unit 10: Abstract Data type, information hiding, encapsulation, type definition

Unit 11: Static and Stack-Based Storage management

Unit 12: Fixed and Variable size heap storage management.

Unit 13: Introduction, parallel processing and programming language

Unit 14: Threads, semaphore, monitor, message passing.

Text/Reference Books:

1. Concepts of Programming Language, Robert W. Sebesta, Addison Wesley, pearson Education Asia, 1999.
2. Introduction to Computer Science, Ramon A. Mata-Toledo and Pauline K. Cushman, Mc Graw Hill International Edition.
3. Programming Languages, D. Appleby and JJ Vande Kopple: Tata Mc Graw Hill, India.
4. How to Program C, Deitel and Deitel, Addison Wesley, Pearson Education Asia, 1999.

Course Code BCA 104 - FUNDAMENTAL OF C LAB

Learning objectives:

1. Understand the logic for a given problem.
2. Write the algorithm of a given problem.
3. Draw a flow chart of a given problem.
4. Recognize and understand the syntax and construction of C programming code.
5. Gain experience of procedural language programming.
6. Know the steps involved in compiling, linking and debugging C code**.**

Basic Calculation:

1. Write a c program to display your Name, address and city in different lines.
2. Write a c program to perform all airthmatic operations.
3. Write a c program to convert the Fahrenheit into centigrade. Formula c= (F-32)/1.8
4. Write a c program to calculate the simple interest.
5. Write a c program to calculate the compound interest.
6. Write a program in C to display sum of first N natural numbers.
7. Write a c program to find the roots of the quadratic equation.

Conditional Statements-1

1. Write a C – program which used to determine type of triangle based on sides. Measure of sides input by the user. To check whether the triangle is isosceles, scalene or equilateral triangle. Hint: If all the sides are equal than equilateral, If any two sides are equal than isosceles otherwise scalene.
2. Write a program in C to which allow user to enter any arithmetic operator (+ - * /) and two integer values and display result according to selection of operator.

Conditional Statements-2

3. Write a program in C to calculate gross salary of employee using : 1. Gross Salary = Basic Pay + DA + HRA – PF. 2. DA = 30% If Basic Pay < 5000 otherwise DA = 45% of the Basic Pay. 3. HRA = 15% of Basic Pay. 4. PF = 12% of Basic Pay. Only basic pay will input by the user. Display Gross salary – DA – HRA – PF and basic salary
4. Student should fulfill the following criteria for admission: Mathematics >= 50 Physics >= 45 Chemistry >= 60 Total of all subject >= 170 OR Total of Mathematics + Physics >= 120 Accept the marks of all the three subjects from the user and check if the student is eligible for admission.

5. Write a program in C for grade calculation using if…else if ladder and switch Statement. Accept marks of 3 subjects calculate total and based on it calculate Grade.

Loop Programs 1

1. Program to display first N prime numbers. N is input by the user.
2. Program to display A to Z in upper case or lower case according to user selection.
3. Program which used to print A to Z and Z to A.

Loop Programs 2

4. Program which ask for party to user until the user say yes (Using While)
5. Program which ask for party to user until the user say yes (Using Do While)

Loop Programs 3

6. Program which check that whether the given number is palindrome or not.
7. Program to check that the given number is Armstrong or not.
8. Program which will display next nearest prime number of given integer number. For example next nearest prime of 5 is 7, for 8 is 11, for 7 is 11 (Using Do while)

Course Code BCA 105 - PC SOFTWARE & AUTOMATION LAB

Learning outcomes

- Work effectively with a range of current, standard, Office Productivity software applications.
- Evaluate, select and use office productivity software appropriate to a given situation.
- Apply basic adult learning and assessment principles in the design, development, and presentation of material produced by office productivity applications.
- Demonstrate employability skills and a commitment to professionalism.
- Operate a variety of advanced spreadsheet, operating system and word processing functions.

List of Practicals

Understanding a Personal Computer and how it operates

a. Given a PC Diagram into its components, name its various components and list their functions

b. Identification of various parts of a computer and peripherals

MS-WORD

a. File Management: Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, giving password protection for a fil
b. Page set up: Setting margins, tab setting, ruler, indenting
c. Editing a document: - Entering text, Cut, copy, paste using tool- bars

Work books:

a. Managing workbooks (create, open, close, save), working in work books, selecting the cells, choosing commands, data entry techniques, formula, creation and links, controlling calculations, working with arrays
b. Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet.
c. Creating a chart:-Working with chart types, changing data in chart, formatting a chart, use chart to analyze data

MS-Excel

a. How to change view of worksheet, outlining a worksheet, customize workspace, using templates to create default workbooks, protecting work book
b. Exchange data with other application: linking and embedding, embedding objects, linking to other applications, import, and export document.

Internet and its Applications

(a) Log-in to internet (b) Navigation for information seeking on internet (c) Browsing and down loading of information from internet (d) Sending and receiving e-mail

Semester 2
Course Code BCA 201 - OBJECT ORIENTED PROGRAMMING WITH C++

Learning objectives:

- 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.

Unit 1: Different paradigms for problem solving, need for OOP, differences between OOP and Procedure oriented programming, Abstraction, Overview of OOP principles, Encapsulation, Inheritance and Polymorphism.

Unit 2: C++ BASICS: Structure of a C++ program, Data types, Declaration of variables, Expressions, Operators, Operator Precedence

Unit 3: Evaluation of expressions, Type conversions, Pointers, Arrays, Pointers and Arrays, Strings, Structures, References

Unit 4: Flow control statement- if, switch, while, for, do, break, continue, goto statements.

Unit 5: Functions-Scope of variables, Parameter passing, Default arguments, inline functions, Recursive functions, Pointers to functions.

Unit 6: Dynamic memory allocation and de-allocation operators-new and delete, Pre-processor directives.

Unit 7: C++ Classes And Data Abstraction: Class definition, Class structure, Class objects, Class scope, this pointer, Friends to a class

Unit 8: Static class members, Constant member functions, Constructors and Destructors, Dynamic creation and destruction of objects

Unit 9: Data abstraction, ADT and information hiding.

Unit 10: Function overloading, Operator overloading, Generic programming necessity of templates, Function templates and class templates.

Unit 11: Inheritance: Defining a class hierarchy, Different forms of inheritance, Defining the Base and Derived classes

Unit 12: Access to the base class members, Base and Derived class construction, Destructors, Virtual base class.

Unit 13: Static and Dynamic bindings, Base and Derived class virtual functions

Unit 14: Dynamic binding through virtual functions, Virtual function call mechanism, Pure virtual functions, Abstract classes, Implications of polymorphic use of classes, Virtual destructors.

Text/Reference Books:

1. Problem solving with C++, The OOP, 4th Edition, Walter Savitch, Pearson Education.
2. C++, The Complete Reference, 4th Edition, Herbert Schildt, TMH.
3. C++ Primer, 3rd Edition, S.B.Lippman and J.Lajoie, Pearson Education.
4. The C++ Programming Language, 3rd Edition, B.Stroutstrup, Pearson Education.
5. Object Oriented Programming in C++, 3rd Edition, R.Lafore, Galgotia Publications pvt ltd.

Course Code BCA 202 - DATA STRUCTURE AND ALGORITHMS

Learning objectives:

- To understand the basic concept of data structures for storage and retrieval of
- ordered or unordered data.
- To learn about arrays, linked lists, binary trees, heaps, and hash tables.

Unit 1: Definition of data structures and abstract data types. Static and Dynamic implementations.
Unit 2: Examples and real life applications, Data Structures: Arrays, Address calculation in a single and multi dimensional array. Sparse matrices
Unit 3: Definition, Array based implementation of stacks, Linked List based implementation of stacks, Examples: Infix, postfix, prefix representation
Unit 4: Applications: Mathematical expression Evaluation Definition: Queues & Lists: Array based implementation of Queues / Lists,
Unit 5: Linked List implementation of Queues / Lists, Circular implementation of Queues and singly linked Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority queues, Applications
Unit 6: Definition of trees and Binary trees, Properties of Binary trees and Implementation, Binary Traversal - preorder, post order, in order traversal, Binary Search Trees, Implementations,
Unit 7: Threaded trees, Balanced multi way search trees, AVL Trees, Implementations, Applications Definition of Undirected and Directed Graphs and Networks
Unit 8: The Array based implementation of graphs, Adjacency matrix, path matrix implementation, The Linked List representation of graphs, Shortest path Algorithm, Graph Traversal – Breadth first Traversal
Unit 9: Depth first Traversal, Connectivity of graphs; Connected components of graphs, Weighted Graphs, Applications.
Unit 10: Introduction, Sorting by exchange, selection, insertions, Bubble sort, Selection sort, Insertion sort, Pseudo code algorithm and their C++ implementation
Unit 11: Efficiency of above algorithms, Shell sort, Performance of shell sort, Merge sort, Merging of sorted arrays, The merge sort Algorithms, Quick sort Algorithm.
Unit 12: A partitioning strategy, Heap sort, Heap Construction
Unit 13: Heap sort, bottom – up, Top – down Heap sort approach, Radix sort, Straight Sequential

Search, Array implementations

Unit 14: Linked List representations, Binary Search, non – recursive Algorithms, recursive Algorithms, Indexed Sequential Search

Text/Reference Books:

1. Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline by TMH

2. Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub.

3. Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman, Original edition, Addison-Wesley, 1999, Low Priced Edition.

4. Fundamentals of Data structures by Ellis Horowitz &SartajSahni, Pub, 1983,AW

Course Code BCA 203 - MANAGEMENT INFORMATION SYSTEM

Learning objectives

- Evaluate the role of information systems in today's competitive business environment.
- Define an information system from both a technical and business perspective and distinguish between computer literacy and information systems literacy.
- Assess the relationship between the digital firm, electronic commerce, electronic business and internet technology.
- Identify the major management challenges to building and using information systems in organizations.
- Identify managerial risks related to information system organization processing and utilizing.

Unit 1: Introduction, Definition, Need of MIS, Managing in the Internet Era, Managing Information Systems in Organization-the IT interaction model

Unit 2: Challenges for the manager-what information to build?-how much to spend on information systems?-what level of capabilities should be created with information systems?

Unit 3: how centralized should the services be?-what security levels are required?-what is technology road map for the organization?

Unit 4: Introduction, data and information- measuring data, information as a resource, information in organizational functions

Unit 5: types of information technology, types of information systems- transaction processing systems-management information systems

Unit 6: Introduction, Decision making with MIS-Tactical decisions-operational decisions-strategic decisions

Unit 7: communication in organizations- types of communication- examples of communications in organizations

Unit 8: decision making with communication technology, Decision Support Systems: Introduction, Understanding DSS- MIS and DSS-Decision making-types of decisions

Unit 9: Analytics and Business Intelligence- BI techniques

Unit 10: SCM, CRAM AND INTERNATIONAL SYSTEMS: Introduction, Supply Chain Management Systems, Customer Relationships Management Systems

Unit 11: Challenges of Enterprise Systems Implementations- Managing the implementation, International Information Systems-Outsourcing and off-shoring

Unit 12: Introduction, Social Dynamics of the Internet, Services of the Internet- Blogs-Social Networks, Technology of the Internet- Twitter-Rating-Tagging/folksonomies

Unit 13: Social issues-Media impact-Collaboration-Emergence of order, Social Networks in the Enterprise

Unit 14: Challenges of Managing the IT function- Modern IT environment-Centralization versus Decentralization-IT security-Technology selection, Vendor Management- vendor selection-vendor contracts and service levels-Ongoing relationship management- vendor retention or termination

Text/Reference Books:

1. Management Information Systems, Jawadekar, Tata McGraw Hill
2. Management Information Systems, Davis and Olson, Tata McGraw Hill
3. Analysis and Design of Information Systems, Rajaraman, Prentice Hall

Course Code BCA 204: OBJECT ORIENTED PROGRAMMING LAB WITH C++

Learning Outcomes

- The working of OOPS programming approach.
- The knowledge of object oriented programming style.
- The basic concepts involved in computer programming.
- Important programming aspects i.e object, class, inheritance and polymorphism.
- Knowledge with respect to the software development phase of OOPS.

1. Create a user defined function (any) and use it inside the program.
2. Implement "call by value" & "call by reference " function call techniques by using any user defined functions.
3. Implement the working of classes and objects by using any real world object.
4. Create a Stack object model in C++ & also make use of default and parameterized constructor to make the class more flexible in use.
5. Make all the member functions, including constructors, non-inline in the above class.
6. Create any user defined class using the concept of static data and member functions.
7. Create a Class or program implementing the concept of passing and returning object to/from member functions.
8. WAP to implement polymorphism through function overloading (Area of different shapes).
9. Create a user defined type Complex and do all the Complex number arithmetic. And also make use of operator overloading.
10. Implement single level inheritance by using Student and Marks class.
11. Implement multilevel inheritance by using the Stack class.
12. Demonstrate the calling mechanism of constructors and destructors in Multilevel Inheritance.
13. Create generic Stack model for storing different types of data.
14. Create a user defined type Matrix and perform all matrix operations. Also make use of operator overloading.
15. Implement the concept of Abstract classes and virtual functions by using Shape, Rectangle and Triangle class.

Course Code BCA 205 - DATA STRUCTURE LAB

Learning Outcomes

- Implementing Stack, Queue , Linked List , Binary tree
- Sorting and Searching Techniques
- Divide and Conquer, Dynamic Programming methods
- Greedy method , Traversals and Backtracking

1. Program on array searching, sorting (Bubble sort, Quick sort, Marge sort etc.)
2. Program to insert element at desire position, replacing element, deletion in array.
3. Various matrices operations.
4. Various strings programs.
5. Implementation of stack and queue using array
6. Implementation of stack and queue using link lists
7. Implementation of circular queue using link lists.
8. Polynomial addition, multiplication.
9. Two-way link lists programs.
10. Infix to postfix/prefix conversion.
11. BST implementation (addition, deletion, searching).
12. Stack ADT (array implementation) Implementing basic operation of stack (push, pop) using array implementation

Course Credit BCA 206- Soft Skill and Professional Aptitude

Learning Objectives:

- strong practical orientation to building and improving their skills in communication
- effective use of English, business correspondence, presentations, team building, leadership, time management, group discussions, interviews, and inter-personal communication

Unit 1: Importance & Benefits of IPR, Developing Interpersonal Abilities, Team Building- Definition and Types, Team work skills, Qualities of a Team Player

Unit 2: Leadership- Understanding the qualities of a Good Leader, 4 Factors of Leadership, Bring out the Leader in You

Unit 3: Concepts of Resume, Curriculum Vitae and Bio-data, Resume – Information and Details, Sample Resume and Template, Cover Letter- Cover letter Writing, Sample Cover letter and Template

Unit 4: Basic Personal Hygiene, Professional Attire – Men& Women, Interview Etiquette Guide, Telephonic Interview- Importance and Preparation, Advantages and Disadvantages, Things to Remember, Video Interview- Preparation and Practice, Guide to a Successful Video Interview, Importance and Types of Personal Interviews, FAQs with Answers

Unit 5: Group Discussion Guide, Topics for Group Discussion, Mock GD

Unit 6: Guide to Successful Extempore, Extempore Topics, Practice Session

Text/Reference Books:

1. Business communication Design, Angell, Pamela, Mcgraw-Hill, New York.
2. Grammar Finder, Eastwood, John, Oxford university press.
3. Effective technical communication, Mitra, K. Barun, Oxford university press.
4. Communicate to conquer: A handbook of group discussion and interviews, PHI learning, New Delhi.

Semester 3
Course Code BCA 301 : DATABASE MANAGEMENT SYSTEM

Learning objectives:

- Introduce the management of database systems and understand the fundamentals of relational systems including data models, database architectures, and database manipulations.
- Provide knowledge about relational database model.
- Learn the basic concepts of databases in general with an emphasis on relational databases, modelling techniques and writing queries.
- Understand Normalization techniques, Transaction processing, Concurrency Control techniques and Recovery of databases against crashes are also covered.

Unit 1: Database Systems versus File Systems, View of Data, Data Models, database languages, Database Users and Administrators. Transaction Management

Unit 2: Decision Support Systems, Components of a Database management System. Distributed Processing and Client- Server Architecture.

Unit 3: Entity-Relationship Model – Basic Concepts, Constraints, Keys, Design Issues, E-R Diagrams.

Unit 4: Structures of relational databases, Integrity Constraints, Logical database Design, Tables, Views, Data Dictionary. Relational Algebra, Relational Calculus.

Unit 5: SQL – Basic Structures, Query Handling, Embedded SQL, Open Database Connectivity (ODBC), Java Database Connectivity (JDBC), Triggers, Security and Authorization.

Unit 6: Query By Example (QBE), User Interfaces and Tools, Forms and Graphical User Interfaces. Report Generators. Overview of Relational Query Optimization.

Unit 7: Functional Dependencies, Multi-valued Dependencies, Normal Forms, Decomposition into Normalized Relations

Unit 8: Physical Database Design – File Structures. Object-Relational Databases – Nested Relations, Complex Data types, Object-Relational Features in SQL:1999.

Unit 9: World Wide Web, Client Side Scripting and Applets, Web Servers and Sessions, Services, Server Side Scripting.

Unit 10: XML – Structure of XML Data, XML Document Schema, XQuery, Storage of XML

Data, XML Applications.

Unit 11: Fundamental Concepts of Transaction Management, Concurrency Control

Unit 12: Recovery Systems, Data Analysis and OLAP.

Unit 13: Introduction to Data Mining, Data Farming, Data Warehousing, Spatial and Geographic Databases, Temporal databases and Multimedia Databases.

Unit 14: Minor Project

Text / Reference Books:

1. Date C J, " An Introduction to Database Systems", Addison Wesley
2. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley
4. O'Neil, Databases, Elsevier Pub.
5. Leon & Leon,": Database Management Systems", Vikas Publishing House
6. Bipin C. Desai, " An Introduction to Database Systems", Gagotia Publications
7. Majumdar & Bhattacharya, "Database Management System", TMH (14)
8. Ramkrishnan, Gehrke, " Database Management System", McGraw Hill
9. Kroenke, " Database Processing Fundamentals , Design and Implementation" Pearson Education.
10. D.Ulman, "Principles of Database and Knowledge base System", Computer Science Press.
11. Maheshwari Jain.'DBMS: Complete Practical Approach", Firewall Media, New Delhi

Course Code BCA 302 COMPUTER NETWORKS

Learning objectives

- Basics of networking and networking technology
- Networking and its underlying principles.
- Fundamentals of layered models, devices used in networks and their wireless connectivity.
- The ways to troubleshoot network related issues.
- Protocols, standards, and the models associated with networking technology and their troubleshooting mechanisms.

Unit 1: OSI, TCP/IP and other networks models, Network Topologies WAN, LAN, MAN.Token Bus, Token Ring, FDDI

Unit 2: IEEE standards 802.2, 802.3

Unit 3: Hubs, Bridges, Routers Gateways

Unit 4: Transmission Media: Transmission of signals through twisted pair, Coaxial cable, optical fibre.

Unit 5: Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window.

Unit 6: Pure and slotted Aloha, Throughput analysis of pure and slotted Aloha.

Unit 7: Virtual circuit and Datagram subnets-Routing algorithm shortest path routing

Unit 8: Network layer in the Internet: IPv4 & IPv6 Protocols.

Unit 9: Congestion Control Algorithms.

Unit 10: Terminology, Frequency, spectrum, bandwidth

Unit 11: Unit analog and digital transmission, Transmission impairments.

Unit 12: Wireless Transmission: Antenna and antenna gain, introduction to terrestrial and satellite microwave, Propagation of wireless signals, free space loss for LOS communication.

Unit 13: Introduction to FDM, TDM and CDM

Unit 14: Multiple Accesses: Performance of FDMA-FM-FDMA, Single channel per carrier. TDMA frame structure TDMA Frame efficiency, TDMA super frame structure.

Text/Reference Books:

1. Computer Network, Leon And Garcia, TMH
2. Data Communication And Networking(Sie), Forouzan, TMH
3. Computer Network, Tanenbaum, Pearson
4. Computer Networking, Kurose, Pearson
5. Computer Networking And Internet, Halsell, Pearson
6. Digital Telephony, 3rd Ed, James Irvine & David Harle, Wiley

Course Code BCA 303 - INTERNET & WEB TECHNOLOGIES

Learning objectives

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

Unit 1: Introduction, Evolution of Internet, Internet Applications, Internet Protocol -TCP/IP, UDP, HTTP, Secure Http(https)

Unit 2: Internet Addressing – Addressing Scheme – Ipv4 & IPv6, Network Byte Order

Unit 3: Domain, Name Server, and IP Addresses, Mapping, Internet Service Providers, Types Of Connectivity Such As Dial-Up, Broad band, WiFi

Unit 4: Introduction, HTML tags, Dtd(Document Type Definition, Basic Html Elements, Tags and usages

Unit 5: HTML Standards, Cascading Style Sheets: Syntax, Class Selector

Unit 6: Approaches To Dynamic Pages: Cgi, Java Applets, Plug Ins, Active X

Unit 7: Java Script Object Model, Variables-Constant – Expressions, Conditions- Relational Operators, Data Types

Unit 8: Flow Control, Unit Functions & Objects-events and event handlers

Unit 9: What is XML – Basic Standards Schema Standards, Linking & Presentation Standards

Unit 10: Standards that build on XML, Generating XML data, writing a simple XML File

Unit 11: Types of Viruses, Client Server Security Threats, Data & Message Security

Unit 12: Various electronic payment systems, Introduction to EDI,

Unit 13: Encrypted Documents and Emails, Firewalls: Hardened Firewall Hosts

Unit 14: assignment/mini project

Text/Reference Books:

1. Web Technology - N.P. Gopalan, J.Akilandeswari
2. Internet Technology and Web Design - ISRD Group
3. HTML and Web designing - Kris Jamsa and Konrad King
4. HTML for Beginners - Firuza Aibava- Second Edition

Course Code BCA 304- DATABASE MANAGEMENT SYSTEM LAB

Learning objectives:

- Introduce the management of database systems and understand the fundamentals of relational systems including data models, database architectures, and database manipulations.
- Provide knowledge about relational database model.
- Learn the basic concepts of databases in general with an emphasis on relational databases, modelling techniques and writing queries.
- Understand Normalization techniques, Transaction processing, Concurrency Control techniques and Recovery of databases against crashes are also covered.

Student can use My Sql (preferred open source DBMS) or any other Commercial DBMS tool (MS-Access / ORACLE) at backend and C++ (preferred) VB/JAVA at front end.

1. (a) Write a C++ program to store students records (roll no, name, father name) of a class using file handling.(Using C++ and File handling).

(b) Re-write program 1, using any DBMS and any compatible language.(C++/MySQL) (VB and MS-Access)

2. Database creation/ deletion, table creation/ deletion.

(a) Write a program to take a string as input from user. Create a database of same name. Now ask user to input two more string, create two tables of these names in above database.

(b) Write a program, which ask user to enter database name and table name to delete. If database exist and table exist then delete that table.

3. Write a program, which ask user to enter a valid SQL query and display the result of that query.

4. Write a program in C++ to parse the user entered query and check the validity of query.
(Only SELECT query with WHERE clause)

5 - 6. Create a database db1, having two tables t1 (id, name, age) and t2 (id, subject, marks).

(a) Write a query to display name and age of given id (id should be asked as input).

(b) Write a query to display average age of all students.

(c) Write a query to display mark-sheet of any student (whose id is given as input).

(d) Display list of all students sorted by the total marks in all subjects.

7 - 8. Design a Loan Approval and Repayment System to handle Customer's Application for Loan and handle loan repayments by depositing installments and reducing balances.

9 -10. Design a Video Library Management System for managing issue and return of Video tapes/CD and manage customer's queries.

Course Code BCA 305: INTERNET & WEB PROGRAMMING LAB

Learning objectives

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

Unit 1- INTRODUCTION TO HTML: What is HTML, HTML Documents, Basic structure of an HTML document, creating an HTML document, Mark up Tags, Heading-Paragraphs,Line Breaks,HTML Tags.

Unit 2- INTRODUCTION TO CASCADING STYLE SHEETS: Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts),Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding, Properties, Margin properties) , CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color, Creating page Layout and Site Designs.

Unit 3- INTRODUCTION TO PHP: Basics of PHP, PHP tags, connectivity with MySQL database, embedding of PHP tags in HTML

Unit 4- INTRODUCTION TO WORDPRESS: development in wordpress press environment, wizard, Installation, Configure wordpress: Using the WordPress dashboard, Managing content in the WordPress dashboard, Types of users, The WordPress settings panel, Reading and writing settings, Permalinks and RSS feeds, Creating and managing posts, Setting up post categories, Creating and managing pages, Managing comments,Installing and updating plugins, Customising WordPress themes, WordPress theme options

Unit 5- INTRODUCTION TO WEB PUBLISHING OR HOSTING: Local server hosting, hosting on web, cpanel, file transfer

Unit 6- SEARCH ENGINE OPTIMIZATION: concepts of SEO, Web analytical tools, google dorks

Semester 4

Course Code BCA 401- PROGRAMMING IN JAVA

Learning Outcomes

- To understand the principles and concepts of object oriented programming
- To learn multithreading concepts
- To Store and retrieve the information from Files.
- To Implements various application like banking, inventory, etc.

Unit 1: Introduction to Object Orientated Programming, Abstraction, Object Oriented Programming Principles

Unit 2: Features of JAVA, Introduction to Java byte code, Java Virtual machine.

Unit 3: PROGRAM ELEMENTS: Primitive data types, variables, assignment, arithmetic, short circuit logical operators, Arithmetic operators, bit wise operators, relational operators

Unit 4: Boolean logic operators, the assignment operators, operator precedence, Decision and control statements, arrays.

Unit 5: CONTROL STATEMENTS - Java's Selection Statements, if statement, switch statement, Iteration Statements, while, do-while, for, for-each

Unit 6: Nested Loops, Jump Statements, Using break, Using continue, return.

Unit 7: OBJECTS AND CLASSES - Objects, constructors, returning and passing objects as parameter, Nested and inner classes, Single and Multilevel Inheritance

Unit 8: Extended classes, Access Control, usage of super, Overloading and overriding methods, Abstract classes, Using final with inheritance.

Unit 9: PACKAGE AND INTERFACES: Defining package, concept of CLASSPATH, access modifiers, importing package, Defining and implementing interfaces.

Unit 10: String constructors, special string operations, character extraction, searching and comparing strings, string Buffer class.

Unit 11: EXCEPTION HANDLING: Exception handling fundamentals, Exception types, uncaught exceptions, try, catch and multiple catch statements. Usage of throw, throws and finally

Unit 12: FILE HANDLING: I/O streams, File I/O.

Unit 13: CONCURRENCY - Processes and Threads, Thread Objects, Defining and Starting a Thread

Unit 14: Pausing Execution with Sleep, Interrupts, Joins, Synchronization. APPLET: Applet Fundamentals, using paint method and drawing polygons.

Text/Reference Books:

1. Herbert Schildt: JAVA 2 - The Complete Reference, TMH, Delhi

2. Deitel: How to Program JAVA, PHI

3. U.K. Chakraborty and D.G. Dastidar: Software and Systems – An Introduction, Wheeler Publishing, Delhi.

4. Joseph O'Neil and Herb Schildt: Teach Yourself JAVA, TMH, Delhi.

Course Code BCA 402 OPERATING SYSTEM

Learning Outcomes

- To learn different types of Operating Systems
- To Perform Scheduling and memory management.
- To Handle Components of Operating System and Deadlocks.

Unit 1: OS Concepts – Evolution of OS, OS Structures- Kernel, Shell, General Structure of MSDOS, Windows 2000, Linux. Introduction- UNIX and ANSI Standards: The ANSI C Standard

Unit 2- The ANSI/ISO C++ Standards, Difference between ANSI C and C++, The POSIX Standards.In troduction and need of operating system, layered architecture/logical structure of perating system,

Unit 3- Type of OS, operating system as resource manager and virtual machine, OS services, BIOS, System Calls/Monitor Calls, Firmware- BIOS, Boot Strap Loader.

Unit 4: - Process & Threads – Process States - Process Control Block. Process Scheduling – Operations on Processes, Threads, CPU Scheduler – Preemptive and Non- Preemptive; Dispatcher, Scheduling Criteria, Scheduling Algorithms – Process Management in UNIX.

Unit 5 UNIX Processes - The Environment of a UNIX Process: Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries

Unit 6- Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes. Process Control

Unit 7 - Concurrent Processes, Co-operating Processes, Precedence Graph, Hierarchy of Processes, Critical Section Problem. Two process solution, Synchronization Hardware, Semaphores – Deadlock- detection, handling, prevention, avoidance, recovery, Starvation, Critical Regions, Monitors, Inter process communication.

Unit 8 Objectives and functions, Simple Resident Monitor Program (No design), Overlays – Swapping; Schemes – Paging – Simple, Multi-level Paging; Internal and External Fragmentation

Unit 9- Virtual Memory Concept, Demand Paging - Page Interrupt Fault, Page Replacement Algorithms; Segmentation – Simple, Multi-level, Segmentation with Paging, Memory Management in UNIX.

Unit 10: - Virtual Memory– Concept, virtual address space, paging scheme, pure segmentation and segmentation with paging scheme hardware support and implementation details, memory fragmentation,

Unit 11- Overview of IPC Methods, Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores. Interprocess Communication –

Unit 12- Shared Memory, Client-Server Properties, Stream Pipes, Passing File Descriptors, An Open Server-Version 1, Client-Server Connection Functions.

Unit 13 - Files and Directories – Directory Structure –Directory Implementation – Linear List - Hash Table.

Unit 14- Device Management: Dedicated, Shared and Virtual Devices - Serial Access Devices, Direct Access Devices, Direct Access Storage Devices – Channels and Control Units – Disk Scheduling methods.

Text/Reference Books:

1. Operating Systems Concepts – Silberschatz, Galvin, Wiley Publications (2008)
2. Modern Operating Systems - Andrew S. Tenenbaum, Pearson Education Asia / PHI (2005)
3. UNIX System Programming Using C++,by Terrence Chan: Prentice Hall India, 1999.
4. Advanced Programming in UNIX Environment, by W. Richard Stevens: 2nd Ed, Pearson Education, 2005.
5. Operating Systems – William Stallings, Pearson Education Asia (2002)

BCA 403: COMPUTER GRAPHICS & VISUALIZATION

Learning Outcomes

- To provide main notions of graphics
- To learn Formal framework to draw basic elements
- To study graphics system along with completeness

Unit 1: History of computer graphics, applications, graphics pipeline, physical and synthetic images, synthetic camera, modeling

Unit 2: animation, rendering, relation to computer vision and image processing, review of basic mathematical objects (points, vectors, matrix methods)

Unit 3: OpenGL architecture, primitives and attributes, simple modeling and rendering of two- and three-dimensional geometric objects

Unit 4: indexed and RGB color models, frame buffer, double buffering

Unit 5: GLUT, interaction, events and callbacks, picking.

Unit 6: GEOMETRIC TRANSFORMATIONS - Homogeneous coordinates, affine transformations (translation, rotation, scaling, shear)

Unit 7: concatenation, matrix stacks and use of model view matrix in OpenGL for these operations.

Unit 8: Viewing - Classical three dimensional viewing, computer viewing, specifying views

Unit 9: parallel and perspective projective transformations; Visibility- z-Buffer

Unit 10: BSP trees, Open-GL culling, hidden-surface algorithms.

Unit 11: SHADING - Light sources, illumination model, Gouraud and Phong shading for polygons.

Unit 12: Rasterization- Line segment and polygon clipping, 3D clipping, scan conversion, polygonal fill

Unit 13: Bresenham's algorithm. Discrete Techniques- Texture mapping, compositing, textures in OpenGL; Ray Tracing- Recursive ray tracer, ray-sphere intersection

Unit 14: REPRESENTATION AND VISUALIZATION - Bezier curves and surfaces, B-splines, visualization, interpolation, marching squares algorithm

Text / Reference Books:

1. Edward Angel, Interactive Computer Graphics. A Top-Down Approach Using OpenGL (fifth Edition), Pearson Education, 2008
2. Donald Hearn and Pauline Baker, Computer Graphics with OpenGL (third edition), Prentice Hall, 2003
3. F. S. Hill Jr. and S. M. Kelley, Computer Graphics using OpenGL (third edition), Prentice Hall, 2006
4. Peter Shirley and Steve Marschner, Computer Graphics (first edition), A. K. Peters, 2010

Course Code BCA 404: COMPUTER GRAPHICS LAB

Learning Outcomes

- To provide main notions of graphics
- To learn Formal framework to draw basic elements
- To study graphics system along with completeness

1. Implementation of line generation using slope's method, DDA and Bresenham's algorithms.

2. Implementation of circle generation using Mid-point method and Bresenham's algorithm.

3. Implementation of ellipse generation using Mid-point method.

4. Implementation of polygon filling using Flood-fill, Boundary-fill and Scan-line algorithms.

5. Implementation of 2D transformation: Translation, Scaling, Rotation, Mirror Reflection and Shearing (write a menu driven program).

6. Implementation of Line Clipping using Cohen-Sutherland algorithm and Bisection Method.

7. Implementation of Polygon Clipping using Sutherland-Hodgman algorithm.

8. Implementation of 3D geometric transformations: Translation, Scalind and rotation.

9. Implementation of Curve generation using Interpolation methods.

10. Implementation of Curve generation using B-spline and Bezier curves.

11. Implementation of any one of Back face removal algorithms such as Depth-Buffer algorithm, Painter's algorithm, Warnock's algorithm, Scan-line algorithm)

Course Code BCA 405: PROGRAMMING IN JAVA LAB

Learning Outcomes

- To learn & practice the Object-Oriented concepts like Inheritance, Overloading etc.
- To learn & practice Interfaces and Packages
- To learn & practice Java applet programming

Programs in JAVA:

1. Creation of classes and use of different types of functions.
2. Count the number of objects created for a class using static member function.
3. Write programs on interfaces.
4. Write programs on packages.
5. Write programs using function overloading.
6. Programs using inheritance
7. Programs using IO streams.
8. Programs using files.
9. Write a program using exception handling mechanism.
10. Programs using AWT
11. Programs on swing.
12. Programs using JDBC

Semester 5
Course Code BCA 501: SOFTWARE ENGINEERING

Learning objectives:

- Basic knowledge and understanding of the analysis and design of complex systems.
- Ability to apply software engineering principles and techniques.
- Ability to develop, maintain and evaluate large-scale software systems.
- To produce efficient, reliable, robust and cost-effective software solutions.
- Ability to perform independent research and analysis.
- To communicate and coordinate competently by listening, speaking, reading and writing english for technical and general purposes.

Unit 1: Introduction to software Engineering, Software characteristics, Software components, Software applications

Unit 2- Software Engineering Principles, Software metrics and measurement, monitoring and control.

Unit 3- Software development life-cycle, Water fall model, prototyping model, Incremental model, Iterative enhancement Model, Spiral model.

Unit 4- Requirements Elicitation Techniques, Requirements analysis

Unit 5- Models for Requirements analysis, requirements specification, requirements validation.

Unit 6 DESIGN PRINCIPLES: Problem partitioning, abstraction. Top down and bottom up – design, structured approach. Functional versus object oriented approach of design

Unit 7- Design specification, Cohesiveness and Coupling. Overview of SA/SD Methodology, structured analysis, data flow diagrams, extending DFD to structure chart.

Unit 8 Verification and validation, code inspection, test plan, test case specification

Unit 9- Level of testing: Unit, Integration Testing, Top down and bottom up integration testing, Alpha and Beta testing

Unit 10- System testing and debugging. functional testing, structural testing, Software testing strategies.

Unit 11- Software Maintenance: Structured Vs. unstructured maintenance, Maintenance Models, Configuration Management, Reverse Engineering, Software Re-engineering

Unit 12- Project planning and Project scheduling. Software Metrics: Size Metrics like LOC, Token Count, Function Count.

Unit 13- Cost estimation using models like COCOMO. Risk management activities.

Unit 14- Software Reliability and Quality Assurance: Reliability issues, Reliability metrics, reliability models, Software quality, ISO 9000 certification for software industry, SEI capability maturity model.

Text / Reference Books:

1. R.S. Pressman, Software Engineering: A Practitioner's Approach, McGraw-Hill, Ed 7, 2010.
2. P. Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House, Edition 3, 2011.
3. R. Mall, Fundamentals of Software Engineering, Prentice-Hall of India, 3rd Edition, 2009.
4. I. Sommerville, Software engineering (9th edition), Addison Wesley, 2010

Course Code BCA 502 : SOFTWARE ENGINEERING LAB

Learning Outcomes

- To prepare SRS document, design document, test cases and software configuration management and risk management related document.
- Develop function oriented and object oriented software design using tools like rational rose.
- To perform unit testing and integration testing.
- Apply various white box and black box testing techniques
- Able to track the progress of a project using Openproj tool.

In this lab first 8 experiments are to practice software engineering techniques. Use any open source CASE tool. Many of them are available at www.sourceforge.net. You can choose any other CASE tool, as per choice.

Language: C++ / JAVA Design Approach : Object Oriented

These designing can be done on any automation system e.g. library management system, billing system, payroll system, bus reservation system, gas agency management system, book-shop management system, students management system.

1. Do feasibility study?
2. Document all the requirements as specified by customer in Software Requirement Specification
3. Design sequence diagrams for project
4. Design Collaboration diagram
5. Design Data Flow Diagram for the project
6. Design Entity Relation Diagram for the project
7. Design Class diagram
8. Design at least 10 test cases for each Unit.
9. -10: Code and test the project, which you have designed in last 8 labs.

Course Code BCA 503 PYTHON PROGRAMMING

Learning 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

Unit 1: Introduction, What is Python, Origin, Comparison, Comments, Operators, Variables and Assignment, Numbers, Strings, Lists and Tuples

Unit 2: Dictionaries, if Statement, while Loop, for Loop and the range, Built-in Function

Unit 3: Files and the open() Built-in Function, Errors and Exceptions, Functions, Classes, Units.

Unit 4: Statements and Syntax, Variable Assignment, Identifiers

Unit 5: Basic Style Guidelines, Memory Management, Python Application Examples.

Unit 6: Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators

Unit 7: Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types.

Unit 8: Introduction to Numbers, Integers, Floating Point Real numbers, Complex Numbers, Operators, Built-in Functions.

Unit 9: Sequences: Strings, Lists, and Tuples, Sequences, Strings, Strings and Operators, String-only Operators, Built-in Functions, String Built-in Methods, Special Features of Strings.

Unit 10: Operators, Built-in Functions, List Type Built-in Methods, Special Features of Lists

Unit 11: Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples.

Unit 12: Conditionals and Loops:-if statement, else Statement, else if Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement, else Statement.

Unit 13: File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files

Unit 14: Command-line Arguments, File System, File Execution, Persistent Storage Units

Text/Reference Books:

- Core Python Programming, Chun, J Wesley, 2nd Edition, Pearson,2010
- Head First Python, Barry, Paul, 2nd Edition, O Rielly, 2010.
- Learning Python, Lutz, Mark, 4th Edition, O Rielly, 2009.

Course Code BCA 504: PYTHON PROGRAMMING LAB

Learning 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

1. Learner will get guided to set of exercises to Implement a sequential search,
2. create a calculator program,
3. Explore string functions,
4. Implement Selection Sort,
5. Implement Stack,
6. Read and write into a file,
7. Demonstrate usage of basic regular expression,
8. Demonstrate use of advanced regular expressions for data validation,
9. Demonstrate use of List Demonstrate use of Dictionaries,
10. Create Comma Separate Files (CSV), Load CSV files into internal Data Structure,
11. Write script to work like a SQL SELECT statement for internal Data Structure made in earlier exercise,
12. Write script to work SQL Inner Join for an internal Data Structure made in earlier exercise

Course Code BCA 505: PROJECT FORMULATION AND APPRAISAL

Learning Outcomes

- Know the concept of Project Formulation
- Learn the significance of Project Formulation
- Identify the elements of Project Formulation
- Evaluate the common errors in Project Formulation
- Identify difference between Project Formulation and DPR
- Understand Environmental Impact Analysis

Unit 1: Project attributes; project life cycle; role of managers; Management scheduling; Gantt charts; CPM; PERT; crashing; Generation of project ideas – resource allocation;

Unit 2: Environment analysis – PEST analysis, porter's model; analysis of strategic capabilities value chain, BCG matrix, flexibility

Unit 3: Market appraisal; technical appraisal; environmental appraisal; evaluating intangibles, social appraisal – SCBA, UNIDO, LM, CSR,

Unit 4: FINANCIAL APPRAISAL**:** Time value of money; cost of capital – equity, debt, preference; weighted average cost; marginal and average cost

Unit 5: Capital budgeting – investment appraisal techniques; NPY; IRR; Payback period; replacement decisions; selection of exact discount factor – problems, inflation, taxation

Unit 6: single probability analysis; sensitivity analysis; break even analysis, Certainty equivalent; uncertainty analysis, simulation; decision tree model; risk and utility.

References & Text Books

1. KhatuaSitangshu. *Project Management and Appraisal*, Oxford University Press
2. Pandey, I.M. *Financial Management*. Vikas Publishing House
3. Prasanna, Chandra. *Financial Management*. Tata McGraw-Hill
4. Maheshwari, S .N. &Maheshwari, S. K. *Advanced Management Accounting Vol.1 & Vol.2*. Vikas Publishing House
5. Paresh Shah. *Management Accounting*. Oxford University Press

Semester 6
Course Code BCA 601: MAJOR PROJECT

Learning Outcomes

- To simulate real life situations of engineering and impact adequate training to give students confidence to face and tackle any problem in the field is developed.
- Synthesizing and applying prior knowledge to designing and implementing solutions-to open-ended computational problems while considering multiple realistic constraints.

To improve the professional competency and research aptitude by touching the areas which otherwise not covered by theory or laboratory classes. Students will take up a project that aims to develop the work practice in students to apply theoretical and practical tools/techniques to solve real life problems related to industry and current research.

Completion of project and presentation before a jury is intended to facilitate the transition from the thorough theoretical education, dispensed in this online degree programme, into an industrial professional career.

Semester 1
Course Code BCA EL_1: MULTIMEDIA SYSTEM

Learning Objectives:

- be able to critically analyse and synthesise the key components of multimedia technologies including text, graphics, voice, video and animation;
- be able to evaluate the role of multimedia technologies in the online and web environment;
- be able to define the characteristics of each media type and describe their application;
- be able to develop, edit and improve interactive web pages that incorporate a variety of digital media such as graphics, voice, animation and video;
- be able to critically evaluate the implications of copyright in the use of multimedia;
- be able to research and analyse the protocols, standards and representation techniques used for storage and transmission of multimedia information.

Unit 1: Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Communication and Entertainment products and Stages of Multimedia Projects, Multimedia hardware

Unit 2- Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools., Multimedia Building Blocks Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.

Unit 3: Data Compression Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher Order Modelling.

Unit 4: Finite Context Modelling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression, Compression ratio loss less & lossy compression. Speech Compression & Synthesis Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression.

Unit 5: Multiple monitors, bitmaps, Vector drawing, lossy graphic compression, image file format animations Images standards, JPEG Compression, Zig-Zag Coding, Multimedia Database.

Unit 6: Content based retrieval for text and images, Video: Video representation, Colours, Video Compression, MPEG standards, MHEG Standard Video Streaming on net, Video Conferencing, Multimedia Broadcast Services, Indexing and retrieval of Video Database, Recent development

in Multimedia

Text/Reference Books:

1. Tay Vaughan “Multimedia, Making IT Work” Osborne TMH.
2. Buford “Multimedia Systems” Addison Wesley.
3. Aagrawal & Tiwari “Multimedia Systems” Excel.
4. Sleinreitz “Multimedia System” Addison Wesley.

Semester 2
Course Code BCA EL 2 - BASIC PROGRAM IN ENTREPRENEURSHIP

Learning objectives:

- The goal of this Program is to provide a space and platform for discovery, both self – discovery and opportunity discovery.
- Students will discover their strengths in terms of an entrepreneurial founding team and learn basics such as opportunity discovery, prototyping, business plans, challenges etc.

Unit 1: Identification and classification of ideas. Entrepreneurial opportunities, environment scanning, Market assessment.

Unit 2: Value Proposition, Product and Service; Market segmentation, Product Life cycle; BCG Matrix, Environmental Scanning and SWOT analysis

Unit 3: Components of an ideal business plan – market plan, financial plan, operational plan, and HR plan.

Unit 4: Concept to Creation, Minimum Viable Product (MVP), Teething Problems of startup

Unit 5: Organizing and Marketing a Startup Selling on the web, launching e-commerce, Starting and growing an Enterprise, Growth Path

Unit 6: Students have to prepare a detailed business plan selecting a product(s), Presentation of such business plans and submission after necessary corrections suggested by subject faculty

References:

Online Courses through MOOC, Classroom learning through an experienced Facilitator/Faculty on campus (Games, Exercises, Videos, and Practical Experiences)

1. Tendon ,C: Environment and Entrepreneur; Cliugh Publications, Allahabad.
2. Siner A David: Enterpreneural Megabuks; John Wiley and Sons, New York.
3. Srivastava S. B: A Practical Guide to Industrial Entrepreneurs; Sultan Chand and Sons, New Delhi.
4. Prasanna Chandra: Protect Preparation, Appraisal, Implementation; Tata McGraw Hill. New Delhi.
5. Paudey I.M: Venture Capital - The Indian Experience; Prentice Hall of India. New Delhi
6. Holt: Entrepreneurship-New Venture Creation; Prentice Hall of India. New Delhi

Semester 3
Course Code BCA EL 3 - DISCRETE MATHEMATICS

Learning Objectives

- Analyze logical propositions via truth tables.
- Understand sets and perform operations and algebra on sets.
- Determine properties of relations, identify equivalence and partial order relations, sketch relations.
- Identify functions and determine their properties., Define graphs, digraphs and trees, and identify their main properties.
- Evaluate combinations and permutations on sets.

Unit 1: Propositional Logic – Propositional equivalences-Predicates and quantifiers-Nested Quantifiers

Unit 2: Rules of inference-introduction to Proofs-Proof Methods and strategy

Unit 3: Mathematical inductions-Strong induction and well ordering- The basics of counting-The pigeonhole principle

Unit 4: Permutations and combinations-Recurrence relations-Solving Linear recurrence relations-generating functions-inclusion and exclusion and applications.

Unit 5: Algebraic systems-Semi groups and monoids-Groups-Subgroups and homomorphisms-Cosets and Lagrange's theorem- Ring & Fields (Definitions and examples

Unit 6: Partial ordering-Posets-Lattices as Posets- Properties of lattices-Lattices as Algebraic systems –Sub lattices –direct product and Homomorphism-Some Special lattices-Boolean Algebra

Text Books and References

1. Applied Discrete Structures, Levasseur K. and Doerr A. Lulu.com 2017 978-1105559297
2. Discrete Mathematics for Computing, Haggarty R. Pearson 2002 978-0201730470

BCA EL 4 - ARTIFICIAL INTELLIGENCE

Learning objectives

- Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
- Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
- Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool**.**

Unit 1: What is intelligence? Foundations of artificial intelligence (AI). History of AI; Problem Solving- Formulating problems, problem types, states and operators, state space, search strategies.

Unit 2: INFORMED SEARCH STRATEGIES - Best first search, A* algorithm, heuristic functions, Iterative deepening A*(IDA), small memory A*(SMA), Game playing - Perfect decision game, imperfect decision game, evaluation function, alpha-beta pruning

Unit 3: Representation, Inference, Propositional Logic, predicate logic (first order logic), logical reasoning, forward chaining, backward chaining; AI languages and tools - Lisp, Prolog, CLIPS.

Unit 4: Planning- Basic representation of plans, partial order planning, planning in the blocks world, hierarchical planning, conditional planning, representation of resource constraints, measures, temporal constraints

Unit 5: Basic probability, Bayes rule, Belief networks, Default reasoning, Fuzzy sets and fuzzy logic, Decision making- Utility theory, utility functions, Decision- theoretic expert systems. Decision trees, rule-based learning, current-best-hypothesis search, least-commitment search

Unit 6: Neural networks, reinforcement learning, genetic algorithms. Communication - Communication among agents, Natural language processing, formal grammar, parsing, grammar

Reference Books:

1. Stuart Russell and Peter Norvig. Artificial Intelligence – A Modern Approach, Pearson Education Press, 2001.
2. Kevin Knight, Elaine Rich, B. Nair, Artificial Intelligence, McGraw Hill, 2008.
3. George F. Luger, Artificial Intelligence, Pearson Education, 2001.
4. Mils J. Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kauffman, 2002

Semester 4

Course Code BCA EL 5 MACHINE LEARNING

Learning Objectives

- Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
- Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
- Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
- Be able to design and implement various machine learning algorithms in a range of real-world applications.

Unit 1: Introduction to Machine learning – Statistical Learning – types of Machine Learning – learning models: geometric, probabilistic and logistic models

Unit 2: Introduction to supervised, unsupervised and reinforcement learning – model evaluation – model implementation – model accuracy indicators.

Unit 3: Introduction to parametric machine learning method, assumptions of parametric machine learning methods, linear model and its assumptions, simple linear regression, scatter diagram

Unit 4: Simple linear Regression parameter estimation, properties of regression parameters, Analysis of variance and partial t test, estimation of σ^2, Interval Estimation of the Mean Response, R Square, Adjusted R Square, Normality of response variable, prediction of new observations, Confidence interval for β_0, β_1 and σ^2.

Unit 5: Multiple linear regression model, Least - Squares Estimation of the Regression Coefficients, Geometrical Interpretation of Least Squares, Properties of the Least Squares Estimators, Estimation of σ2, Inadequacy of Scatter Diagrams in Multiple Regression, Maximum Likelihood Estimation. Assumptions of Multiple linear regression variables, general equation of multiple linear regression

Unit 6: Introduction to multicollinearity, homoscedasticity, autocorrelation, effects of multicollinearity, homoscedasticity and auto autocorrelation in parameter estimation, techniques to handle multicollinearity, homoscedasticity and auto autocorrelation for better model.

Reference Text:

Introduction to Linear Regression Analysis, Fifth Edition DOUGLAS C. MONTGOMERY, ELIZABETH A. PECK, G. GEOFFREY VINING, A JOHN WILEY & SONS, INC., PUBLICATION

Course Code BCA EL 6 - INFORMATION SYSTEM SECURITY

Learning Outcomes

- To apply knowledge of computing and mathematics appropriate to Information Systems and Technology.
- To use current techniques, skills, and tools necessary for Information Systems and Technology.
- To analyze a problem, and identify and define computing requirements appropriate to its solution.
- To function effectively on teams to accomplish a common goal.
- An understanding of security issues and responsibilities related to Information Systems and Technology.

Unit 1: Introduction to security attacks, services and mechanism, introduction to cryptography –Conventional Encryption: Conventional encryption model, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block ciphers.

Unit 2: Introduction modular arithmetic, Euler's theorem, Euclid's Algorithm, Chinese Remainder theorem. BLOCK CIPHER ALGORITHM**S:** Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, data encryption standard (DES), strength of DES, differential and linear crypt analysis of DES, block cipher modes of operations, triple DES,

Unit 3: Strength of IDEA. PUBLIC KEY ALGORITHM**S:** Principals of public key crypto systems, RSA algorithm, security of RSA, key management

Unit 4: Diffle-Hellman key exchange algorithm, introductory idea of Elliptic curve cryptography, Elganel encryption. MESSAGE AUTHENTICATION: Authentication requirements, authentication functions, message authentication code

Unit 5: Hash functions, birthday attacks, security of hash functions and MACS, MD5 message digest algorithm, secure hash algorithm (SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS).

Unit 6: Kerberos and X.509, directory authentication service, electronic mail security-pretty good privacy (PGP), S/MIME. Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management.

Text/Reference Books:

- Computer Security, Dictergouman, John Wiley & Sons
- Computer Security: Art and Science, Mathew Bishop, Addison-Wisley
- Introduction to computer Security- Mathew Bishop, Addison-Wisley
- Network security, Kaufman, Perlman and Speciner, Pearson Education
- Cryptography and Network Security, william Stallings, Pearson Education
- William Stallings, “Cryptography and Network Security: Principals and Practice”, Prentice Hall, New Jersy.
- Johannes A. Buchmann, “Introduction to Cryptography”, Springer-Verlag.

Semester 5
Course Code BCA EL 7 DISTRIBUTED SYSTEMS

Learning Outcomes

- Outline the potential benefits of distributed systems
- Summarize the major security issues associated with distributed systems along with the range of techniques available for increasing system security
- Apply standard design principles in the construction of these systems
- Select appropriate approaches for building a range of distributed systems, including some that employ middleware

Unit 1: Definition, Issues, Examples of Distributed systems, Trends in Distributed system, Challenges of Distributed system & Approaches, Focus on resource sharing.

Unit 2: DEADLOCK DETECTION - System model, resource vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

Unit 3: DISTRIBUTED OBJECTS AND REMOTE INVOCATION - Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study. Overview of security techniques, distributed file system, file service architecture, Sun Network File System, The Andrew File System, Recent advances.

Unit 4: Introduction to communication protocols, balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm.

Unit 5: CASE STUDY: CORBA services.

Unit 6: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control, Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

Text/Reference Books:

1. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.

2. Gerald Tel, "Distributed Algorithms", Cambridge University Press

3. William Stalling, Distributed System, Addision Wesley

Course Code BCA EL 8 - REAL TIME SYSTEMS

Learning Outcomes

- To study the basic of tasks and scheduling
- To understand programming languages and databases
- To analyze real time communication
- To analyze evaluation techniques and reliability models for Hardware Redundancy
- To understand clock synchronization

Unit 1: Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Deadlines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

Unit 2: REAL TIME SCHEDULING - Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

Unit 3: Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols,

Unit 4: Stack Based Priority-Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects.

Unit 5: Multiprocessor and Distributed System Model, Multiprocessor Priority-Ceiling Protocol, Schedulability of Fixed-Priority End-to-End Periodic Tasks, Scheduling Algorithms for End-to-End Periodic Tasks, End-to-End Tasks in Heterogeneous Systems, Predictability and Validation of Dynamic Multiprocessor Systems, Scheduling of Tasks with Temporal Distance Constraints.

Unit 6: Model of Real Time Communication, Priority-Based Service and Weighted Round- Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols, Real Time Protocols, Communication in Multicomputer System, An Overview of Real Time Operating Systems.

Text/Reference Books:

1. Real Time Systems by Jane W. S. Liu, Pearson Education Publication.
2. Real-Time Systems: Scheduling, Analysis, and Verification by Prof. Albert M. K.Cheng, John Wiley and Sons Publications.
3. Real Time System, Poonam Singh, DhanpatRai

Semester 6
Course Code BCA EL 9- CYBER CRIME & CYBER LAWS

Learning objectives

- Protect and defend computer systems and networks from cybersecurity attacks.
- Characterize privacy, legal and ethical issues of information security.
- Identify vulnerabilities critical to the information assets of an organization.
- Define the security controls sufficient to provide a required level of confidentiality, integrity, and availability in an organization's computer systems and networks.

Unit 1: Introduction- Computers and its Impact in Society, Overview of Computer and Web Technology, Statistics of digital world, Need for Cyber Law, Cyber Jurisprudence at International and Indian Level, Indian IT act 2000, Indian IT act 2008 amendment, important amendment in IT act 2008.

Unit 2: Cyber Law International Perspectives:- UN & International Telecommunication Union (ITU) Initiatives, Council of Europe: Budapest Convention on Cybercrimes, Asia-Pacific Economic Cooperation (APEC) , Organization for Economic Co-operation and Development (OECD),World Bank, Commonwealth of Nations.

Unit 3: Constitutional & Human Rights Issues in Cyberspace:- Freedom of Speech and Expression in Cyberspace , Right to Access Cyberspace: Access to Internet , Right to Privacy. Right to Data Protection.

Unit 4: Cyber Crimes & Legal Framework: Definition, Cyber Crimes against Individuals, Institution and State

Unit 5- Hacking & cracking, Digital Forgery ,Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud, Cyber terrorism, Cyber Defamation, Different offences under IT Act, 2000, Cyber laws and law enforcement.

Unit 6- Interface with Copyright Law, Interface with Patent Law, Trademarks & Domain Names Related issues, domain squatting

Text/Reference Books:

1. Computer Law, Chris Reed & John Angel, OUP, New York, (2007).
2. Cyber Laws, Justice Yatindra Singh, Universal Law Publishing Co, New Delhi, (2012)
3. Legal Dimensions of Cyber Space, Verma S, K, Mittal Raman, Indian Law Institute, New Delhi, (2004)
4. Cyber Law, JonthanRosenoer, Springer, New York, (1997).
5. Information Technology Act, 2000, S. R. Bhansali, , University Book House Pvt. Ltd., Jaipur (2003).
6. Cyber Crimes and Law Enforcement, Vasu Deva, Commonwealth Publishers, (2013)

Course Code BCA EL 10 - SOFTWARE PROJECT MANAGEMENT

Learning objectives

- Identify the different project contexts and suggest an appropriate management strategy.
- Practice the role of professional ethics unsuccessful software development.
- Identify and describe the key phases of project management.
- Determine an appropriate project management approach through an evaluation of the business context and scope of the project.

Unit 1: The management spectrum of the Project. The W5HH principle, Critical Practices Metrics, Process and Project: Metrics in the process and project Domains, software measurements, metrics for software quality, integrating metrics within software process, establishing a software metrics program.

Unit 2 Observations, Project Planning Process, Software Scope and Feasibility, Resources, Software Project Estimation, Decomposition techniques, empirical estimation models, estimation for object oriented projects, estimation for Agile Development and Web Engineering Projects, The make/buy Decision.

Unit 3 Reactive V/S Proactive Risk Strategies, Software Risks, Risk identification, Risk projection, Risk refinement, Risk mitigation, monitoring and management, The RMMM plan.

Unit 4- Quality Concepts, Software Quality Assurances, Software Review, Formal Technical Reviews,Formal Approaches to SQA, Statistical Software Quality Assurances, Change Management: Software Configuration Management

Unit 5- The SCM Repository, SCM Process, Configuration Management for Web Engineering.

Unit 6 PROJECT EXECUTION AND CONTROL: The Review Process, Planning, Overview and Preparation for execution. One- Person Review, Guidelines for Review in Projects, Data Collection Analysis and Control Guidelines. Project Tracking, Activity Tracking, Defect Tracking, Issues Tracking, Status Reports.

Text/Reference Books:

1. R.S. Pressman, Software Engineering, TMH, 7th Edition.
2. PankajJalote, Software Project Management in Practice, Addison-Wesley.
3. B.Hughes& M. Cotterell, Software Project Management, TMH.