B.Sc
Computer Science

Curriculum and Syllabus

(Based on Choice Based Credit System)

Effective from the Academic year

2018-2019

Department of Computer Science

School of Computing Sciences

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

PEO 1: Graduates are prepared to be employed in IT industries by providing expected domain Knowledge.

PEO 2: Graduates are provided with practical training, hands-on and project experience to meet the industrial needs.

PEO 3: Graduates are motivated in career and entrepreneurial skill development to become global leaders.

PEO 4: Graduates are trained to demonstrate creativity, develop innovative ideas and. to Work in teams to accomplish a common goal.

PEO 5: Graduates are addressed with social issues and guided to operate problems with solutions.

PROGRAM OUTCOMES (PO)

PO 1: Critical Thinking: Apply knowledge of Computer Science to identify, analyze problems and to provide effective solution in the area of Computing.

PO 2: Computing Skills and Ethics: Analyze a problem, and identify and define the computing requirements appropriate to its solution.

PO 3: Analytical skill: Ability to design, develop algorithms and provide software solutions to cater the industrial needs.

PO 4: Modern Tool Usage: Use current techniques, skills, and tools necessary for computing practices

PO 5: Employability Skills: Inculcate skills to excel in the fields of Information Technology and its Enabled services, Government and Private sectors, Teaching and Research.

PO6: Ethics: Insists ethical responsibilities, human and professional values and make their contribution to the society.

PO7: Self Directed and Life-long Learning: Engaged in lifelong learning to equip them to the changing environment and be prepared to take-up mastering programmes.

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO 1: Professionally trained in the areas of programming, multimedia, animation, web designing, networking and to acquire knowledge in various domain based electives.

PSO 2: Abet students to communicate effectively and to improve their competency skills to solve real time problems.

PSO 3: The ability to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies.

Board of Studies Members

Chairman   : **Dr.P.Swaminathan**, Dean,

                                  School of Computing Sciences,

                                  Vels Institute of Science, Technology and Advanced Studies,

                                  Chennai.

Internal Board Member   : 1. **Dr.P.Mayilvahanan**, Professor,

                                  Department of Computer Applications,

                                  School of Computing Sciences,

                                  Vels Institute of Science, Technology and Advanced Studies,

                                  Chennai.

                              2. **Dr.S.Prasanna**, HOD,

                                  Department of Computer Applications,

                                  School of Computing Sciences,

                                  Vels Institute of Science, Technology and Advanced Studies,

                                  Chennai.

                              3. **Dr.Kamalakannan**, HOD,

                                  Department of Information Technology,

                                  School of Computing Sciences,

                                  Vels Institute of Science, Technology and Advanced Studies,

                                  Chennai.

                              4. **Dr.K.Kalaiselvi**, HOD,

                                  Department of Computer Science,

                                  School of Computing Sciences,

                                  Vels Institute of Science, Technology and Advanced Studies,

                                  Chennai.

External Member   **: Dr.K.R.Ananthapadmanaban**, Professor & HOD,

         Department of Computer Science,

         SRM Arts and Science College, Chennai.

Industry Member   **: Dr.P.Magesh Kumar**,

         Calibsoft Technologies Pvt Ltd., Chennai.

Special Invitees   **: Dr.Jothi Venkateswaran**, HOD,

         Department of Computer Science,

         Presidency College, Chennai.

Alumni Member   **: Mr.R.Balamurugan**, SCOPUS Ltd, Chennai.

B.Sc. COMPUTER SCIENCE

CURRICULUM

Total number of Credits: 140

Category	Code No.	Course	Lecture	Tutorial	Practical	Credits
SEMESTER I						
LANG		Tamil- I/ Hindi-I / French-I	5	0	0	5
ENG		English- I	5	0	0	5
CORE		Programming Logic	3	0	0	3
CORE		Digital Logic Fundamentals	3	0	0	3
CORE		Mathematics- I	3	0	0	4
CORE		PC Software Lab	0	0	4	2
CORE		Digital Logic Fundamentals Lab	0	0	4	2
		TOTAL	19	0	8	24

Category	Code No.	Course	Lecture	Tutorial	Practical	Credits
SEMESTER II						
LANG		Tamil- II / Hindi-II / French- II	5	0	0	5
ENG		English- II	5	0	0	5
CORE		Programming in C & its Applications	3	0	0	3
CORE		Database Management System	3	0	0	3
CORE		Mathematics - II	3	0	0	4
CORE		Programming in C Lab	0	0	4	2
CORE		RDBMS Lab	0	0	4	2
		TOTAL	19	0	8	24

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER III						
LANG		Tamil- III / Hindi -III/ French-III	5	0	0	5
ENG		English - III	5	0	0	5
CORE		Object Oriented Programming Languages	4	0	0	4
CORE		Modern Operating System	3	0	0	3
CORE		Statistics – I	3	0	0	4
CORE		Object Oriented Programming Lab	0	0	4	2
SEC		Soft Skills – I	2	0	0	2
		TOTAL	22	0	4	25

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER IV						
LANG		Tamil - IV / Hindi / French	5	0	0	5
ENG		English – IV	5	0	0	5
CORE		Advanced Java	4	0	0	4
CORE		Statistics – II	4	0	0	4
CORE		Advanced Java Lab	0	0	4	2
AECC		Environmental Studies	2	0	0	2
SEC		Soft Skills – II	2	0	0	2
		TOTAL	22	0	4	24

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER V						
DSE		Discipline Specific Elective-I	4	0	0	3
DSE		Discipline Specific Elective-II	3	0	0	3
DSE		Discipline Specific Elective-III	4	0	0	4
DSE		Discipline Specific Elective-IV	3	0	0	3
DSE		Discipline Specific Elective –I Lab	0	0	4	2
DSE		Discipline Specific Elective-II Lab	0	0	4	2
GE		Generic Elective-I	3	0	0	2
SEC		NSS	2	0	0	2
		TOTAL	19	0	8	21

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER VI						
DSE		Discipline Specific Elective-V	4	0	0	4
DSE		Discipline Specific Elective-VI	4	0	0	4
DSE		Discipline Specific Elective-VII	4	0	0	4
DSE		Discipline Specific Elective-VII Lab	0	0	4	2
GE		Generic Elective-II	3	0	0	2
SEC/VAC		Ethics and Values	2	0	0	2
DE		Project Work	0	0	8	4
		TOTAL	17	0	12	22

List of Discipline Specific Elective Courses

	Open Source Technology
	Mobile Computing
	Data Communication and Networks
	Big Data Analytics
	DOT Net Programming
	Data Mining
	Computer Architecture
	Programming with Python
	Microprocessor and its Applications
	Software Project Management
	Cryptography & Network Security
	Artificial Neural Networks
	Object Oriented Software Engineering
	Design and Analysis of Algorithm
	Machine Learning
	Open Source Technology Lab
	DOT Net Programming Lab
	Programming with Python Lab
	Microprocessor Lab

List of Generic Elective Courses

	Consumer Affairs
	Disaster Management
	Professional Ethics
	Environmental Studies
	Human Rights

List of Skill Enhancement Courses

	NSS
	Personality Development
	Ethics and Values
	Soft skills – I
	Soft skills-II

List of Ability Enhancement Compulsory Courses

	Tamil Paper – I
	Tamil Paper – II
	Tamil Paper – III
	Tamil Paper – IV
	French Paper-I
	French Paper-II
	French Paper-III
	French Paper-IV
	Hindi Paper-I
	Hindi Paper-II
	Hindi Paper-III
	Hindi Paper-IV
	English Paper-I
	English Paper-II
	English Paper-III
	English Paper-IV

Syllabus
Core Courses

18BCS001　　　　　　　PROGRAMMING LOGIC   3 0 0 3

Course Objective: To provide a fundamental knowledge of Computers and improve the programming ability which includes evolution of computers and its various components and applications.

Course Outcomes:

CO-1: To Gain the knowledge of components of computer.

CO-2: Ability to understand the classification and generation of computers.

CO-3: To Learn the concept of operating system and types of software.

CO-4: Ability to write algorithms and to draw flowcharts.

CO-5: To understand the concepts of Input and Output devices.

CO-6: Able to classify the primary and secondary memory.

CO-7: To analyze the concept of internet.

CO-8: To study the importance of web portal.

CO-9: To experience the programs by using MS-Office tools.

CO-10: To develop the simple C programs.

UNIT I　　　EVOLUTION OF COMPUTERS　　　　　　　　　　　9

　　Generations, Types of computers, Computer system Characteristics, Basic components of a Digital Computer - Control unit, ALU, Input/output Functions and memory, Memory addressing capability of a CPU, Word length of a computer, processing speed of a computer, Computer Classification.

UNIT II　　　SOFTWARE AND ITS NEED　　　　　　　　　　　9

　　Types of Software - System software, Application software, System Software - Operating System, Utility Program, Algorithms , Flow Charts - Symbols, Rules for making Flow chart, Programming languages, Assemblers, Compilers and Interpreter, computer Applications in Business.

UNIT III   INPUT/OUTPUT UNITS   9

Keyboard, Mouse, Trackball, Joystick, Digitizing tablet, Scanners, Digital Camera, MICR, OCR, OMR, Bar-code Reader, Voice Recognition, Light pen, Touch Screen, Monitors and types of monitor, Printers & types - Daisy wheel, Dot Matrix, Inkjet, Laser, Line Printer, Plotter, Sound Card and Speakers. Memory - RAM, ROM and other types of memory, Storage fundamentals, Primary vs. Secondary Data Storage, Various Storage Devices.

UNIT IV   INTERNET AND ITS BASICS   9

Introduction to Internet, Connecting to the Internet Hardware , Software & ISPs, Search Engines, Web Portals, Online Shopping, Email – Types of email, Compose and send a Message. Reply to a message, working with emails.

UNIT V   CASE STUDY   9

Working with spread sheets – documents – power point presentation. Writing algorithms and draw the flow charts for simple c programs. Analyse the logic and flow of programs.

Total Periods: 45 hours

Books for References:

1. B. Ram,Computer Fundamentals,New Age International Publishers

2. S.K.Basandra,Computers Today,Galgotia Publications.

3. P. K. Sinha,Computer Fundamentals, BPB Publication

18BCS002   DIGITAL LOGIC FUNDAMENTALS   3 0 0 3

Course Objective: To understand the concept of digital systems, to operate on various Number systems and simplify Boolean functions and to distinguish logical and combinational circuits.

Course Outcomes:

CO-1: Understand digital number system and their conversion.

CO-2: Familiar in design, control and applications of logic gates.

CO-3: Knowledge to apply the laws of Boolean algebra to simplify Boolean algebra expression and use K-Map for reduction of Boolean algebraic expression.

CO-4: Formulate and apply De-Morgan's law

CO-5: Realize the design and implementation of Combinational logic circuits

CO-6: Design and evaluate arithmetic building blocks

CO-7: Develop skills to analyze, design and implement various sequential logic circuits.

CO-8: Acquire basic idea about Register.

CO-9: Discuss design of real time applications using Boolean algebra.

CO-10: Gain practical knowledge about the usage of combinational circuits

UNIT I   NUMBER SYSTEM AND CODES   9

Why Binary– binary to decimal – decimal to binary – octal – Hexa decimal –ASCII code – Excess-3 Code – Gray Code – transistor inverter – OR gates – AND gates –BooleanAlgebra– NOR gates – NAND gates.

UNIT II   BOOLEAN ALGEBRA   9

Boolean Law and theorems –sum of product method – K-Map truth tables – Pairs, Quads, Octets – K-Map simplifications – Don't care – product of sum method – product of sum simplifications.

UNIT III   COMBINATIONAL LOGIC CIRCUIT   9

Multiplexers –Demultiplexers – Decoders – Encoders – Code Converters – Parity Generators & Checkers – PAL – PLA.

UNIT IV   SEQUENTIAL LOGIC CIRCUIT   9

Sequential Logic: RS, JK, D and T Flip-Flops – Edge-Triggered – Master – Slave Flip-Flops. Registers: Shift Registers – Types of Shift Registers, Counters: Asynchronous Counters- Ripple – Synchronous Counters – Shift Counters.

UNIT V   CASE STUDY   9

Design of automated cafeteria machine to dispense coffee - design of rocket firing circuit, design of two floor elevator - design of building alarm device - control for water pumping device.

Total: 45hours

Books for References:

1. D.P. Leach & A.P. Malvino,Digital Principles and Application, THM Fifth Edition –2002

2. M.M. Mano, Digital Logic and Computer Design, PHI,2001

3. T.C. Bartee, Digital Computer Fundamentals, 6th Edition, Tata McGraw Hill,1991

4. Digital Principles and Design – Donald d.Givone, Tata McGraw – Hill Publishing Company Limited, 2004.

5. Online URL: www.tutorialspoint.com/computer_logical_organization

6. Online URL: www.geeksforgeeks.org/digital-electronics-logic-design-tutorials

18BCS003 **PC SOFTWARE LAB** **0 0 4 2**

Course Objective: The student learns to work in macros, mail merge, formatting document in word, working with charts, functions in excel and database creation for various applications in access. Applying sound effects and animation to images in power point can be easily done by students.

MS-Word

1. Working with formatting Document using different styles and table.
2. Working with mail merge
3. Working with macros.

Ms- Excel

4. Working with formatting, protection, goal seek and scenarios in worksheet
5. Working with Import external data, sort &filter, functions in worksheet
6. Working with types of charts
7. Working with calculations in various applications

Ms- Access

8. Working with inventory system with report
9. Working with payroll system with report
10. Working with Student information system with report

Ms- PowerPoint

11. Create text and images with various effects
12. Create animation and sound effects

18BCS004   DIGITAL LOGIC FUNDAMENTALS LAB   0 0 4 2

Course Objective: To understand the fundamentals of logic gates and its use in implementing basic Boolean functions, implement and verify the function of combinational logic circuit.

1. Verification of truth table for AND, OR, NOT Gates.
2. Verification of truth table for NAND, NOR, XOR Gates.
3. Realization of NOT, AND Gates only with NAND Gate.
4. Realization of OR, XOR Gates only with NAND Gate.
5. Realization of NOT, AND Gates only with NOR Gate.
6. Realization of OR, XOR Gates only with NAND Gate.
7. Verification of associative law for AND, OR Gates.
8. Verification of De-Morgan's law.
9. K-map reduction and logic circuit implementation.
10. Implementation of half-adder.
11. Implementation of full-adder.
12. Implementation of shift-register

18BCS005 PROGRAMMING IN C AND ITS APPLICATIONS 3 0 0 3

Course Objective: The learner understands the basic concepts of programming languages. Also can learn reading and writing of data using arrays and pointers. This approaches a proper method for File Manipulations such as creating, processing, opening and closing.

Course Outcomes:

CO-1: To gain the knowledge of the structured programming and basic syntax of'C' language.

CO-2: To learn the fundamental operators, data types and all library functions.

CO-3: Understand the various features such as Flow control and controlstructures.

CO-4: Gain experience of implementing C language.

CO-5: To understand the concepts of functions and its types.

CO-6: Expertise the programs by using storage classes.

CO-7: Develop and execute the 'C' programs for various types of Arrays andStrings.

CO-8: Analyze and construct the programs for Bitwise operators, Union andStructure concept.

CO-9: To write C programs with the concept of pointers, pointers & Arrays,Pointers & Files.

CO-10: Construct a file program with various operations like create, open and close process.

UNIT I   INTRODUCTION   9

History of C - Importance of C - Basic structure of C - overview of C – C fundamentals: Character Set - C primitive input output - Identifier and Keywords – Tokens- Declaration. Data Types - Constants - Variables - Expressions – Statements- Library Functions.

UNIT II   OPERATORS AND CONTROL STATEMENT   9

Operators: Arithmetic, Unary, Relational and Logical, Assignment And Conditional Operators- Comma Operator - Bit Wise Operators - Flow Of Control   If, If Else, While, Do-While, For Loop, Nested Control Structures - Switch, Break And Continue, Go To Statements.

UNIT III   FUNCTIONS AND STORAGE CLASSES   9

Functions –Definition – Types of functions - Passing Arguments – Recursions- Storage Classes - Automatic, External, Static, Register Variables.

UNIT IV   ARRAYS AND STRUCTURES   9

Arrays - Defining And Processing of Arrays-Types of Arrays- 2D Arrays-3D Arrays – Multi-Dimension Arrays- Passing Arrays To Functions - Structures – Defining and processing of Structure - Passing Structures To Functions - Self-Referential Structures – Unions.

UNITVPOINTERS AND FILES   9

Pointers - Declarations - Passing Pointers to Functions - Operation in Pointers-Files:Creating,Processing, Openingand Closing a Data File- Case Studies.

Total: 45 hours

Reference Books:

1. Programming in ANSI C, E.Balaguruswamy, TMH Publishing Company Ltd, 7th Edition, 2017.

2. Let us C solutions, Yashavantkanetkar, 15th Edition, Kindle edition (2016) from BPB Publications.

3. The Complete Reference in C, H. Schildt, C, TMH, 4th Edition, 2017.

18BCS006   **DATA BASE MANAGEMENT SYSTEM**   **3 0 0 3**

Course Objective:

- This course introduces the basic concepts of Database Management System, the Structured Query Language (SQL) and PLSQL.
- The students gain knowledge about Database, Data models, Relational Algebra, Normalization, SQL, PL/SQL and Stored Procedure.

Course Outcomes:

CO - 1: To understand the basics of Database concepts and its advantages.

CO - 2: To understand the concepts like Architecture, Dictionary, DBA.

CO - 3: To understand the basics of Data models.

CO - 4: Ability to Understand RDBMS concepts.

CO – 5: To understand the concepts of Relational Algebra.

CO – 6: Become proficient in Normalization concepts and its anomalies.

CO – 7: Become proficient in using database query language, i.e., SQL.

CO - 8: To understand the concepts of Data Access, Functions

CO - 9: Become proficient in using Procedural Language. i.e., PL/SQL

CO - 10: To understand the topics of Stored Procedures

UNIT I   **INTRODUCTION**   **9**

DBMS Definition, Characteristics of DBMS ,Application and advantages of DBMS, Instances , Schemas and Database States, Three Levels of Architecture , Data Independence, DBMS languages, Data Dictionary, Database Users, Data Administrators.

UNIT II   **DATA MODELS**   **9**

Data Models, types and their comparison, Entity Relationship Model, Entity Types, Entity Sets, Attributes and its types, Keys, E-R Diagram, Data Integrity, RDBMS –Concept, Components and Codd's rules.

UNITIII   **RELATIONAL ALGEBRA AND NORMALIZATION**   **9**

Relational Algebra (selection, projection, union, intersection, Cartesian product, Different types of join like theta join, equi-join, natural join, outer join) Functional Dependencies, Good & Bad Decomposition, Anomalies as a database: A consequences of bad design, Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF.

UNIT IV   INTRODUCTION TO SQL   9

Introduction to SQL: DDL, DML, and DCL statements, Creating Tables, Adding Constraints, Altering Tables, Update, Insert, Delete & various Form of SELECT- Simple, Using Special Operators for Data Access. Aggregate functions, Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins) Functions.

UNIT V   PL/SQL   9

Introduction to PL/SQL (blocks of PL/SQL, Variables, constants), Control Structure Introduction to Stored Procedures, Functions, Cursor and Triggers-Case Study.

Total:45Hours.

Books for References:

1. R.Elmasri, S.B.Navathe, Fundamentals of Database systems, Fifth Edition,Pearson Education,2008,New Delhi.
2. A. Silberschatz, H. F. Korth, S.Sudharsan, Database System Concepts,Sixth Edition, Tata McGraw Hill, 2011, New Delhi
3. C. J. Date, Introduction to Database Systems, Fifth Edition, Pearson Education, 2005, New Delhi.
4. Ivan Bayross, SQL,PL/SQL, The programming language of Oracle, Second Revised Edition, BPB Publication

18BCS007   **PROGRAMMING IN C LAB**   **0 0 4 2**

Course Objective: This course is emphasizes the nature of C language using many applications and helps to understand the need to choose the language for solving the problem. The students can understand the art of computer programming.

1. a) Write a program to print first ten natural numbers.

b) Write a program to find greatest of three numbers.

2. Write a program to find grade of a list of students given their marks.

3. Write a program to find gross salary of a person.

4. Write a program for counting the number of vowels, consonants, words, white spaces in a line of text and array of lines.

5. Write a program for palindrome.

6. Write a program for Fibonacci sequence.

7. Write a program to find GCD of two numbers.

8. Write a program to find NCR and NPR.

9. a)Write a program to find Towers of Hanoi.

b) Write a program to find Maximum & Minimum.

10. Write a program for a) sin(x).

11. Write a program for Cos(x).

12. Write a program for Addition and Subtraction of Matrix.

18BCS008   **RDBMS LAB**   **0 0 4 2**

Course Objective:

- To give a good formal foundation on the relational model of data.
- To present SQL and procedural interfaces to SQL comprehensively.
- To present the concepts and techniques relating to query processing by SQL engines.
- To present the concepts and techniques relating to ODBC and its implementations.

1. Write a Program to create table and insert values using DDL Commands.
2. Write a Program to implement DML commands.
3. Write a Program on Types of Data Constraints.
4. Write a Program on Joins.
5. Write a Program on group-by clause and order-by clause.
6. Write a Program on different functions (aggregate, math and string).
7. Write a Program on different types of sub queries.
8. Write a Program on different SET Operations.
9. Write a Program on implementing Factorial, Fibonacci Series using PL/SQL.
10. Write a Program to implement triggers and cursors.
11. Write a program that creates the function and calculating area of circle.
12. Write a program that uses the concept of user defined exception

18BCS009 OBJECT ORIENTED PROGRAMMING LANGUAGES 4 00 4

Course Objective: The course provides insight knowledge about object oriented programming concepts and programming language in C++ and JAVA.

Course Outcome:

CO-1: Develop an in-depth understanding of functional, logic, and object-oriented programming paradigms

CO-2: An understanding of the concepts of inheritance and polymorphism and ability to overload operators in C++.

CO-3: An understanding of the difference between function overloading and function overriding

CO-4: An ability to incorporate exception handling in object-oriented programs

CO-5: An ability to use template classes and the STL library in C++

CO-6: An ability to write object-oriented programs of moderate complexity in C++

CO-7: Learn syntax, features of, and how to utilize the Standard Template Library. Learn other features of the C++ language including templates, exceptions, forms of casting, conversions, covering all features of the language.

CO-8: An ability to write object-oriented programs of moderate complexity in Java.

CO-9: An understanding the concepts of class, objects and methods in java and strings.

CO-10: An ability to create packages, accessing a package and adding a class to package and threads.

UNIT I   OBJECT ORIENTED PROGRAMMING AND BASICS OF C++   15

Principles Of Object Oriented Programming – Beginning With C++ - Applications Of C++ -Tokens –Keywords- Expressions – Data Types – Storage Classes – Operators –Manipulators-Type Cast Operator – Arrays –Strings-Control Structures – Operator Overloading -Functions In C++ - Function Prototyping – Call by Reference – Inline Functions –Recursion – Function Overloading **–** Friend And Virtual Function.

UNIT II   CLASSES AND OBJECTS AND OPERATOR OVERLOADING   15

Introduction – Classes And Objects – Constructors –Parameterized Constructors – Copy Constructor – Dynamic Constructors – Destructors – Introduction To Operator Overloading – Overloading Unary Operator – Overloading Binary Operator – Type Conversions.

UNIT III   INHERITANCE AND POLYMORPHISM   15

Introduction- Defining Derived Classes - Inheritance – Types Of Inheritance – Abstract Classes - Introduction to Virtual Functions - Pure Virtual Function-Polymorphism – Exception Handling.

UNIT IV   JAVA INTRODUCTION, ARRAYS AND STRINGS   15

Java Evolution - Overview Of Java Language – Constants – Variables – Data Types – Operators And Expressions – Class, Objects And Methods – Arrays, Strings And Vectors.

UNIT V   PACKAGES AND MULTITHREADING   15

Introduction – Java API Packages – Creating Packages – Accessing a Package – Adding a Class To a package – Multithreading – Creating Threads - Life Cycle of a Thread – Thread Exceptions –Inter –Thread Communication.

Total: 75 Hours

Reference Books

1. Paul Deitel and Harvey Deitel, "C++ How to Program", Nineth Edition, Prentice Hall, 2015.

2. Herbert Schildt, "Java The complete reference", Eighth Edition, McGraw Hill Professional, 2011.

3. Balagurusamy E., "Object oriented programming using C++ and JAVA", First Edition, Tata McGraw–Hill Education 2012.

18BCS010   MODERN OPERATING SYSTEMS   3 0 0 3

Course Objective: To study and apply concepts relating to operating systems, such as concurrency and control of asynchronous processes, deadlocks, memory management, multiprocessor and real time systems and case study on Linux and Windows.

Course Outcomes:

CO-1: Understand about structures and history of operating systems and design issues associated with operating systems.

CO-2: Understanding various process management concepts including scheduling, synchronization.

CO-3: Ability to analyze the concepts of memory management techniques including virtual memory.

CO-4: Learn about File systems and directories.

CO-5: Understand about deadlock, deadlock avoidance and prevention.

CO-6: Learn about multiprocessor, multicomputer and implementation of distributed system.

CO-7: Study about the task and characteristics of real time systems and task scheduling.

CO-8: Implement Event driven scheduling and analyses the system resources sharing among the users.

CO-9: To provide support for distributed and networked applications in Linux environment and to know the basic concept of Linux scripting.

CO-10: To know about new mobile operating system and ability to implement applications inWindow8.

UNIT I   INTRODUCTION   9

Introduction to Operating System: History of Operating Systems - Operating System Concepts - System Calls - Operating System Structure – Processes and Threads **-** Processes – Threads –Inter Process Communication – Scheduling - Classical IPC Problems.

UNITII   MEMORY MANAGEMENT   9

A Memory Abstraction: Address Spaces - Virtual Memory - Page Replacement Algorithms - Design Issues for Paging Systems - Implementation Issues - Segmentation - File Systems: Files – Directories.

UNIT III   DEADLOCKS AND MULTIPLE PROCESSOR SYSTEMS   9

Introduction to Deadlocks: Deadlock Detection and Recovery - Deadlock Avoidance - Deadlock Prevention – Multiprocessors – Multicomputer - Distributed Systems.

UNIT IV   REAL TIME OPERATING SYSTEMS   9

Types of Real Time Tasks : Timing Constraints - Modeling Timing Constraints - Task Scheduling - Types of Tasks and Their Characteristics - Clock Driven Scheduling - Hybrid Schedulers, Event Driven – Scheduling: EDF Scheduling - Rate Monotonic Algorithm - Resource Handling - Resource Sharing – Scheduling Real Time Tasks in Distributed Systems.

UNIT V   CASE STUDY   9

Case Study on Linux and Android: History of UNIX and Linux, Linux Overview, Processes in Linux, Memory Management in Linux, I/O in Linux, Linux File System, and Security in Linux. Mobile OS - Android.Case Study on Windows 8: History of Windows -Through Windows 8.1, Programming Windows, System Structure, Processes and Threads in Windows, Memory Management, Caching in Windows, I/O in Windows, Security in Windows 8.

Total: 45 Hours

Books for References:

1. Andrew S. Tanenbaum , Herbert Bos "Modern Operating Systems" , Pearson Education, 4th Edition, March 2014
2. Rajib Mall, "Real-Time Systems: Theory and Practice", Pearson Education India, 2009

18BCS011 OBJECT ORIENTED PROGRAMMING LANGUAGES LAB0 0 4 2

Course Objective: The purpose of this course is to introduce to students to the field of programming using C++ and Java. Be able to use the Java SDK environment to create, debug and run simple Java programs.

1. Design C++ classes with static members, methods with default arguments.
2. Implement complex number class with necessary operator overloading and type conversions such as integer to complex, double to complex, complex to double etc using C++.
3. Manage bank account using inheritance concept using C++
4. Design stack and queue classes with necessary exception handling using C++.
5. Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc
6. Programs illustrating various data types in java.
7. Programs to implement method overloading in java.
8. Programs illustrating the implementation of various forms of inheritance (single, hierarchical, multilevel).
9. Programs to implement polymorphism and method overriding in java.
10. Programs implementing exception handling.
11. Programs to illustrate interfaces in java.
12. Programs to create package in java.

18BCS012   ADVANCED JAVA   4 0 0 4

Course Objective:

This course gives an insight into advanced features of Java which concentrates in Jave Beans, EJB, RMI, JSP, ORB Protocol; Java beans API, writing RMI clients –Pushing data from RMI Servlet.

COURSE OUTCOME(S):

After completing this course, the student will be able to

CO-1: Demonstrate the principles of Java Web Server

CO-2: Make a brief understanding about Applet TO Servlet

CO-3: Familiarize with the concepts Java Server Pages, javamail and J2EE

CO-4: Understandability in java messaging services transactions

CO-5: Understand the concept of Remote Method Invocation Implementation.

CO-6: Demonstrate the usage of ORB protocol

CO-7: Gain knowledge about Enterprise Java Bean design and implementation along with tipsand tricks to develop EJB

CO-8: Gain necessary knowledge in java bean development kit.

CO-9: Acquire necessary knowledge about Case study in various areas.

CO-10: Understand the concepts in web applications and JSP web applications

Unit I   SERVLET   9

      Overview – The Java Web Server – Your First Servlet – Servlet Chaining – Server Side Includes- Session Management – Security – HTML Forms – Using JDBC In Servlets – Applet To Servlet Communication.

Unit II JSP   9

      Introduction JSP-Examining MVC And JSP -JSP Scripting Elements & Directives-Working With Variables Scopes-Error Pages - Using Java Beans In JSP Working With Java Mail-Understanding Protocols In Javamail-Components-Javamail API-Integrating Into J2EE-Understanding Java Messaging Services-Transactions.

Unit III RMI   9

       Overview – Developing Applications With RMI:Declaring& Implementing Remote Interfaces-Stubs &Skeletons,Registering Remote Objects,Writing RMI Clients –Pushing Data From RMI Servlet – RMI Over Inter-ORB Protocol

Unit IV JAVA BEANS   9

The Software Component Assembly Model- The Java Beans Development Kit-Developing Beans – Notable Beans – Java Beans API.EJB Architecture- EJB Requirements – Design and Implementation – EJB Session Beans- EJB Entity Beans.

Unit V   CASE STUDY   9

Case study- Web Application Development (Using Servlets) - JSP Web Application Development - XML - The Data Carriers - Business Component Development with JavaBeans Technology- Networking - Managing the Distributed System- Spring - The Super Container of Java Objects - Hibernate - The Powerful ORM Library

Total Periods: 45 hours

Books for References:

1. J2EE   1.4   Bible,J.McGovern,RAdatia,Y.Fain,Wiley-dreamtech   India   Pvt.Ltd, NewDelhi,2003.

2. Java 2 Complete Reference, H. Schildt, 5th Edition, Tata McGraw-Hill,NewDelhi,2002.

3. Java Servlets, K. Moss, Second edition, Tata McGraw Hill, New Delhi, 1999.

4. Inside Servlets, D. R.Callaway,Addison Wesley, Boston,1999.

5. Java Beans from the Ground Up,JosephO‟Neil, Tata McGraw Hill, New Delhi.

6. Enterprise JavaBeans, TomValesky,Addison Wesley,1998.

7. Core Java Vol II Advanced Features, Cay S Horstmann& Gary Cornell, Addison Wesley.

18BCS013   ADVANCED JAVA LAB0 0 4 2

Course Objective: This course gives practical training in HTML to Servlet Communication, JSP Beans used to create JSP program, RMI to create Web Services, Email creation and manipulation, Web applications and Session management is done by students.

1. HTML to Servlet Communications

2. Servlet to HTML Communication

3. Applet to Servlet Communication

4. Servlet to Applet Communication

5. Designing online applications with JSP

6. Creating JSP program using JavaBeans

7. Working with Enterprise JavaBeans

8. Performing Java Database Connectivity.

9. Creating Web services with RMI.

10. Creating and Sending Email with Java

11. Building web applications

12. Finding Simple Interest using Session Management.

Syllabus

Discipline Specific Electives

18BCS101   OPEN SOURCE TECHNOLOGY   4 0 0 4

Course Objectives: To demonstrate different open source technology like Linux, PHP & MySQL with different packages. To lustrate Linux commands for programming. To explore programs of PHP with MySQL connection.

Course Outcomes:

CO-1: To execute Linux basic commands for programming.

CO-2: To explore different open source technology like Linux, PHP & MySQL with different packages.

CO-3: To explore functions of PHP.

CO-4: To understand the String functions.

CO-5: To understand the concepts of Arrays.

CO-6: To understand the concepts objects.

CO-7: Able to create a database and table.

CO-8: Able to work with multiple tables.

CO-9: To understand the concepts of connecting and MySQL.

CO-10: To be well versed in creating an application using PHP and MySQL.

UNIT I   INTRODUCTION TO OPEN SOURCE   15

Open Source Definition, The distribution terms of open source software, open source technology importance Free and open Source Software (FOSS), LAMP(Linux, Apache, MySQL, PHP, Python, and Perl) Benefits , Perspective of Open Source software Linux and Open Source, basic commands of Linux. Introduction to PHP – what does PHP Do? – a brief history of PHP – language basics – lexical structure – data types – variables – expressions and operators – flow control statements – including code – embedding PHP in web pages.

UNIT II   FUNCTIONS & STRINGS   15

Functions & Strings: Calling a function – defining a function – variable scope – function parameters – return values – variable functions anonymous function. Strings: Accessing individual characters – cleaning strings – encoding and escaping – comparing strings – manipulating and searching strings – regular expression.

UNIT III   ARRAYS & OBJECTS   15

   Arrays and Objects : Indexed Vs associative arrays – identifying elements of an array – storing data in arrays – multidimensional arrays – extracting multiple values – converting between arrays and variables – traversing arrays – sorting. Objects: Creating an object – accessing properties and methods – declaring a class – introspection.

UNIT IV   MYSQL AN OVERVIEW   15

   Introduction – Entering queries – Creating and using a database – Creating and selecting a database – creating a table – loading data into a table – Retrieving information from a table – selecting all data – selecting particular rows – selecting particular columns – sorting rows – date calculations – working with NULL values – pattern matching – counting rows – using more than one tables.

UNIT V   CASE STUDY   15

   Designing a simple application using PHP and MYSQL to query the database, modify the data, retrieve or delete the data and to display the results.

                       TOTAL: 75 hours

Books for References:

1. Red Hat Linux Bible by Christopher Negus. Wiley Publishing ISBN: 0-7645-4333-4 ,2010 Edition
2. Sams,Teach yourself PHP, MySQL and Apache all in one by Julie C Meloni. SAMS Publication, Fifth Edition
3. RasmusLerdorf, Kevin Tatroe, Bob Kaehms, RicMcGredy (2002), Programming PHP, O'REILLY (SPD), First edition.
4. Lee Babin, Nathan A. Good, Frank M. Kromann, Jon Stephens (2005), "PHP 5 Recipes, A problem solution approach", après Special edition.
5. PHP & MYSQL in easy steps by MCGrawHill Indian edition, First Edition
6. The Complete Reference PHP by Steven HolznerMCGrawHill, Indian edition, First Edition
7. https://www.tutorialspoint.com//cakephp/cakephp_form_handling.htm
8. http://www.php.net/tut.php
9. https://www.w3schools.com/php/default.asp

18BCS102 **MOBILE COMPUTING** **4 0 0 4**

Course Objective:

This course introduces the basic concepts of mobile computing, communication systems, mobile and wireless devices, GSM – Architecture – Routing Strategies –TCP.

Course Outcomes:

CO-1: Introduce various wireless systems and standards and their basic operation cases.

CO-2: Learn to model radio signal propagation issues and analyze their impact on communication system performance.

CO-3: To understand how the various signal processing and coding techniques of GSM and its Architecture.

CO-4: To understand the techniques of radio spectrum allocation in multi-user systems and their impact on networks capacity.

CO- 5: To have depth knowledge about various wireless LAN techniques.

CO-6: To learn to simulate wireless networks and analyze the simulation results.

CO-7: To appreciate the contribution of Wireless Communication networks to overall technological growth.

CO-8: To understand the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.

CO-9: To provide the student with an understanding of advanced multiple access techniques

CO-10: To provide the student with an understanding of diversity reception techniques

UNIT I INTRODUCTION 15

Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing –Wireless Transmissions –Multiplexing – Spread Spectrum and Cellular Systems- Medium Access Control – Comparisons.

UNIT II TELECOMMUNICATION SYSTEMS 15

GSM – Architecture – Sessions –Protocols – Hand Over and Security – UMTS and IMT – 2000 – Satellite Systems - Types of Satellite System - Routing- Localization.

UNIT III   WIRELESS LAN   15

IEEE S02.11: System Architecture-Protocol Architecture, Physical Layer, 802.11b and 802.11a– Hiper LAN: WATM, BRAN, HYPERLAN2 – Bluetooth: User Scenarios, Architecture, Radio Layer, Base band Layer, Link Manager Protocol, L2CAP, Security, SDP – Security and Link Management.

UNIT IV   MOBILE NETWORK LAYER   15

Mobile IP – Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies.

UNIT V   MOBILE TRANSPORT LAYER   15

Congestion Control – Implication of TCP Improvement – Mobility – Indirect – Snooping – Mobile – Transaction oriented TCP - TCP over wireless – Performance - Case study analysis: Smart Phone Enhanced Shopping, Advances on Sensors for Health Systems.

TOTAL: 75 Hours

Books for References:

1. Mobile Communications, J. Schiller, Pearson Education, Delhi, 2nd edition,2003.

2. Principles of Mobile Computing, Hansmann, Merk, Nicklous, Stober,2nd Edition, Springer (India), 2004.

3. Principle of wireless Networks: A unified Approach, Pahalavan, Krishnamurthy, Pearson Education, Delhi, 2003.

4. Mobile and Wireless Design Essentials, Martyn Mallick,WileyDreamtech India Pvt. Ltd., New Delhi, 2004.

5. Wireless Communications and Networks, W.Stallings, 2 nd Edition, Pearson Education, Delhi, 2004.

18BCS103   DATA COMMUNICATION & NETWORKING 4 0 0 4

Course Objective: This course introduces the basic concepts of Data Communication & Networking , OSI Model, Layers of OSI Model, Parallel and serial transmission, Analog and digital network.

Course Outcomes:

CO-1: To understand the fundamental concepts of data communications and networking and able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities.

CO-2: Understand the purpose of network layered models, network communication using the layered concept, and able to compare and contrast Open System Interconnect (OSI) and the Internet Model.

CO-3: To analyze the various types of transmission media and services.

CO-4: Show clear and unambiguous understanding of analog transmission of digital and analog data , methods, and the procedures involved in converting digital data and analog low-pass to band-pass analog signals (Modulation – ASK, FSK, PSK, AM, FM, PM). Recognize the advantages and limitations of modulation systems.

CO-5: Can effectively discuss that bandwidth utilization in TDM, FDM, and WDM.

CO-6: Compare and contrast cyclic redundancy check and checksum in terms of implementation and performance.

CO-7: Understand the basic difference between data logical link control and media access control and realize the features of SMDS, switching techniques, ISDN, and ATM.

CO-8: To understand connecting LAN's, backbone networks, and virtual LAN's. Students should understand operations of bridges and the spanning tree algorithm, Repeaters, Bridges, and Gateways.

CO-9: To design, calculate, and apply subnet masks and addresses to fulfill networking requirements.

CO-10: To analyze the features and operations of various application layer protocols such as Http, DNS, and SMTP. Understand distance vector routing and link state routing.

UNIT I   PROTOCOLS & MEDIA   15

Introduction to data communication – Network protocols & standards – Line configuration – Topology – Transmission mode – Categories of networks – OSI model – Layers of OSI model – Transmission media – Guided media – Unguided media.

UNIT II   SIGNALS & ERRORS   15

Analog and digital signals – Encoding and modulation – Parallel and serial transmission – DTE/DCE – Types of errors – Error detection and correction – Data link control – Line discipline – Flow control – Error control.

UNIT III   MULTIPLEXING & SWITCHING   15

Multiplexing – Types of multiplexing – LAN – Project 802 – Ethernet – Token bus – Token ring – FDDI – MAN – IEEE 802.6 – Circuit switching – Packet switching.

UNIT IV   ISDN & ATM   15

History of analog and digital network – Access to ISDN – ISDN layers – Broadband ISDN – Packet layer protocol – ATM – ATM architecture – ATM layers – Congestion control – Leaky bucket algorithm.

UNIT V   NETWORK & APPLICATION LAYER   15

Repeaters – Bridges – Routers – Gateway – Routing algorithms – TCP/IP – Overview – Network layer – Transport and application layers of TCP/IP – DNS – SMTP – HTTP – WWW.

TOTAL: 75 Hours

Books for References:

1. Behrouz and Forouzan, "Data Communications and Networking", 2nd Edition, Tata McGraw Hill, 2007.

2. Andrew.S.Tanenbaum, "Computer Networks" , 4th Edition, Prentice Hall of India, 2008.

3. WilliamStallings, "Data and Computer Communication ", 6th Edition, Pearson Education, 2000.

18BCS104   **BIG DATA ANALYTICS**   **3 0 0 3**

Course Objective: To explore, design, and implement basic concepts of big data & analytics methodologies for analyzing structured and unstructured data with emphasis on the relationship between the Data Scientist and its application to the business needs.

Course Outcome:

 CO-1: Understand the fundamental concepts of big data platform and know about the basic concepts of nature and evolution of big data.

CO-2: To work with big data platform learn intelligent data analysis and compare old and modern data analytic tool.

CO-3: Understand the data streams concepts and stream computing.

CO-4: To explore on Big Data real time analytics platform applications.

CO-5: Learn about the advanced analytics techniques to gain knowledge of latest techniques.

CO-6: To understand the k means, naïve, decision tree, time series and text analysis.

CO-7: Learn the fundamental concepts like history and components of Hadoop.

CO-8: Become skilled at analyzing, scaling and streaming of Hadoop.

CO-9: Understand the framework of Visual data analysis techniques, interaction techniques.

CO-10: To learn tips and tricks for Big Data system and application case studies.

UNIT I   INTRODUCTION TO BIG DATA   9
Introduction to Big Data Platform – Challenges of Conventional Systems - Nature of Data-Evolution Of Analytic Scalability - Intelligent data analysis- Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools

UNIT II   MINING DATA STREAMS   9
Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing -Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream –Real time Analytics Platform (RTAP) Applications

UNIT III   ADVANCED ANALYTICS   9

Analyzing, Visualization and Exploring the Data, Statistics for Model Building and Evaluation, Advanced Analytics - K-means clustering, Association rules-Speedup, Linear Regression, Logistic Regression, Naïve Bayes, Decision Trees, Time Series Analysis, Text Analysis

UNIT IV   HADOOP   9

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop - Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming

UNIT V   FRAMEWORKS   9

Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

                                                            TOTAL: 45 Hours

Books for References:

1. Prajapati, Big Data Analytics with R and Hadoop, 2014
2. StephanKudyba, Big Data, Mining, and Analytics: Components of Strategic Decision Making,Auerbach Publications, March 12, 2014.
3. Michael Minelli (Author), Michele Chambers (Author), AmbigaDhiraj (Author), Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, 2013

18BCS105   **DOT NET PROGRAMMING**   **4 0 0 4**

Course Objective: This course introduces the fundamental concepts of VB.NET, ASP.NET, ADO.NET for web development, to produce dynamic Web pages and to built web sites, web applications and web services.

Course Outcomes:

CO-1: To understand and learn to maintain internet application server and dot net services.

CO-2: To program and debug applications using a variety of client side and server side technologies.

CO-3: To exhibit the knowledge of programming with basic building blocks of vb.net environment.

CO-4: To develop applications by using oops concepts such as polymorphism, inheritance in vb.net.

CO-5: To gain deep knowledge in different controls using web server, data list for developing applications in asp.net environment.

CO-6: To apply validation controls in developing online client page design for reservation, banking.

CO-7: To apply the features of all objects, caching and session management for every client.

CO-8: To authenticate web pages and to know how to develop event related with error free applications.

CO-9: To compare the functionalities of connected and disconnected architectures and also the reader and adapter classes of ado.net.

CO-10: To develop applications which connect asp.net client pages with database servers using ado.net classes.

UNIT I   **INTRODUCTION TO .NET TECHNOLOGIES**   **15**

Introduction Internet and Web Technologies-HTML Basics - Scripts- Client-side Vs Server-side Scripts – Advantages and Disadvantages of Client-side and Server-side Scripts - Client-side Technologies Overview - Server-side Technologies Overview History of the Platform of .NET - .NET Framework Components Overview with Focus on CLR, CTS.

UNIT II   VB.NET BUILDING BLOCKS   15

       Introduction VB.NET – VB Vs VB.NET – VB.NET Integrated Development Environment – Basic Keywords – Data Types – VB.NET statements – Conditionals - If Else – Select Case – Switch and Choose – Loops – Do –For Next – For Each Next – While – Windows Forms – Working with Controls – MDI –VB.NET Functions – OOPs in VB.NET.

UNIT III   INTRODUCTION TO ASP.NET AND ASP.NET CONTROLS   15

       Introduction to ASP.NET - Advantages of ASP.NET - ASP. NET Architecture - ASP.NET Page's Structure -Sample Program in ASP.NET - Page Events - HTML Server Controls - Basic Web Server Controls - Data List Web Server Controls - Validation Controls - Web User Controls in ASP.NET

UNIT IV   ADVANCED CONCEPTS IN ASP.NET & ADO.NET   15

       Request Object - Response Object -Code-Behind Feature of ASP.NET - Caching in ASP.NET - Output Caching -Fragment Caching - Data Caching - Session / State Management – Events and Abandon Method – Authentication in ASP.NET - Error Handling and Debugging - Tracing an Application- ADO Vs ADO.NET – Connected ADO.NET Architecture – Disconnected ADO.NET Architecture

UNIT V   SIMPLE APPLICATIONS USING DOT NET   15

       Case Studies- Hotel/Restaurants food order systems source code in VB.NET, Payroll System in VB.NET, Car Rental Website using ASP.NET, Fetching Host System name and IP address in ASP.NET, Online Shopping Website using ASP.NET.

TOTAL: 75 Hours

Reference Books:

1. Professional .NET Framework 2.0 **,**Joe Duffy, Wrox Publications, 2006 Edition.

2. Visual Basic.NET Programming – Black Book,StevenHolzner, Paraglyph Press and DreamTech Press, 2005Edition.

3. Professional ASP.NET 1.1, Alex, Wrox Publications, 2nd Edition, 2004.

4. ADO.NET Complete Reference, Michael Otey and DenielleOtey, Tata Macraw Hill Publication, 4th Edition, 2007.

5. http://www. projects.students3k.com/projects/mini-projects-in-asp-net.

18BCS106   **DATA MINING**   **3 0 0 3**

Course Objective:

- This course introduces the basic concepts of Data Mining.
- It gives in depth knowledge of data modelling strategy, Data Mining Algorithms, Knowledge Discovery in databases and web mining.

Course Outcomes:

CO-1: To learn basics of decision data warehouse and data mining algorithms.

CO-2: To understand basic data warehouse structure and to learn how to gather and analyze large sets of data to gain useful business understanding.

CO-3: To learn the concept of database technology evolutionary path which has led to the need for data mining and its applications.

CO-4: Examine the types of data to be mined and present a general classification of tasks and primitives to integrate a data mining system.

CO-5: Discover interesting patterns from large amounts of data to analyze and extract patterns to solve problems and make predictions of outcomes.

CO-6: Select and apply proper data mining algorithms to build analytical applications.

CO-7: Develop practical work of data mining techniques and design hypothesis based on the analysis to conceptualize a data mining solution to a practical problem.

CO-8: Design and implement of a data mining application using sample, realistic data sets and modern tools.

CO-9: To understand basic terms of data mining and algorithms to apply for real world business peoples.

CO-10: Design an effective web page by applying web mining.

UNIT I   FUNDAMENTALS   **9**

DATA PROCESSING: Data Mining – History – Strategies – Techniques – Applications – Challenges –Future- Types of Data – Data Warehouses – Data Processing - Quality Measure – OLAP – Data Mining Algorithms - Feature Extraction, Selection and construction – Missing Data and Techniques.

UNIT II   WEKA TOOL   9

Introduction – Installation- Visualization – filtering- selecting attributes- other popular packages. CLASSIFICATION TASK: Introduction – Decision trees – Naïve Bayes' classification- Artificial Neural Networks and Support Vector Machines.

UNIT III   MODEL EVALUATION TECHNIQUES   9

Accuracy Estimation- ROC-Lift Charts- Cost – Bagging and Boosting- Model Ranking Approach. ASSOCIATION RULE MINING: Concepts, Relevance, Functions of Association rule Mining – Apriori Algorithm- Strengths and Weaknesses of ARM- Applications.

UNIT IV   CLUSTERING AND ESTIMATION   9

CLUSTERING TASK: Introduction- Distance Measure – Types – KNN for clustering – validation - Strengths and Weaknesses of Algorithms – Applications. ESTIMATION TASK: Scatter Plots and Correlation – Linear regression Models – Logistic regression – Regression Analysis - Strengths and Weaknesses of Estimation- Applications.

UNIT V   MINING OF TIME SERIES   9

Fundamentals – Time series Models – Regression, Periodic Models – Strengths and Weaknesses of Time series Analysis – Applications. Case studies: Web mining – Educational data mining.

Total: 45 Hours

Books for References:

1. Shawkat Ali A B M, Saleh A. Wasimi, "Data Mining: Methods and Techniques", Third Indian Reprint, Cengage Learning, 2010.
2. Soman K. P., ShyamDiwakar, Ajay V. "Insight into Data Mining Theory and Practice" , Fifth Printing, PHI Learning, 2011.
3. https://www.cs.waikato.ac.nz/ml/weka/citing.html
4. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber, the Morgan Kaufmann Series in Data Management Systems, 3rd Edition, 2012.
5. Introduction to Data Mining, Michael Steinbach, Pang-Ning Tan, and Vipin Kumar, Pearson publication,2nd Edition, 2016.
6. Educational Data Mining Applications and Trends, Pena-Ayala, Alejandro(Ed.), Springer, 2014
7. www.autonlab.org/tutorials : Statistical Data mining Tutorials

8. www-db.standford.edu/`ullman/mining/mining.html : Data mining lecture notes

9. ocw.mit.edu /ocwweb/ slon-School-of-management/ 15-062Data-Mining Spring2003/ course home/ index.htm: MIT Data mining open courseware

10. www.kdnuggets.com: Data mining resources

18BCS107   **COMPUTER ARCHITECTURE**   **4 0 0 4**

Course Objective: This course introduces the basic concept of computer architecture, addressing modes, floating-point arithmetic operations, pipelining, hazards, parallelism, hierarchical memory system, direct memory access, I/O processors

Course Outcomes:

CO-1: To make students understand the basic structure and operation of digital computer.

CO-2: To understand the hardware-software interface.

CO-3: To understand the architecture of computers and to analyze the performance using various addressing modes.

CO-4: To familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.

CO-5: To expose the students to the concept of pipelining.

CO-6: To understand the concepts of hazards and exceptions.

CO-7: To impart knowledge about concept of parallelism.

CO-8: To familiarize the students with hierarchical memory system including cache memories and virtual memory.

CO-9: To expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

CO-10: To understand the knowledge about Direct Memory Access and interrupts.

UNIT I   OVERVIEW & INSTRUCTIONS   15

Eight ideas – Components of a computer system – Technology – Performance – Power wall – Uniprocessors to multiprocessors; Instructions – operations and operands – representing instructions – Logical operations – control operations – Addressing and addressing modes.

UNIT II   ARITHMETIC OPERATIONS   15

ALU - Addition and subtraction – Multiplication – Division – Floating Point operations – Subword parallelism.

UNIT III   PROCESSOR AND CONTROL UNIT   15

Basic MIPS implementation – Building datapath – Control Implementation scheme – Pipelining – Pipelined datapath and control – Handling Data hazards & Control hazards – Exceptions.

UNIT IV   PARALLELISM   15

Instruction-level-parallelism – Parallel processing challenges – Flynn's classification – Hardware multithreading – Multicore processors

UNIT V   MEMORY AND I/O SYSTEMS   15

Memory hierarchy - Memory technologies – Cache basics – Measuring and improving cache performance - Virtual memory, TLBs - Input/output system, programmed I/O, DMA and interrupts, I/O processors.

TOTAL: 75Hours

Books for References:

1. David A. Patterson and John L. Hennessey, "Computer organization and design", Morgan Kauffman / Elsevier, Fifth edition, 2014.

2. V.CarlHamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organisation", VI th edition, Mc Graw-Hill Inc, 2012.

3. William Stallings "Computer Organization and Architecture", Seventh Edition, Pearson Education, 2006.

4. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.

5. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", first edition, Tata McGraw Hill, New Delhi, 2005.

6. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata Mc Graw Hill, 1998.

7. http://nptel.ac.in/.

18BCS108   PROGRAMMING WITH PYTHON   3 0 0 3

Course Objective: To know the basics and to explore in depth knowledge of Python Programming in Decision making, Lists, Tuples, Dictionary and File Handling.

Course Outcomes:

CO-1: Developing algorithmic solutions to simple computational problems.

CO-2: Able to read, write and execute Python programs easily.

CO-3: Structuring real time Python programs for solving problems.

CO-4: To decompose a Python program into functions.

CO-5: Representing compound data using Python lists, tuples, and dictionaries.

CO-6: Reading and writing data from/to files in Python Programs.

CO-7: Identifying and repairing coding errors in a Program.

CO-8: Adapting and combining standard algorithms to solve a Given Problem.

CO-9: Learning to use different modules and create user module.

CO-10: Gaining thorough knowledge on implementation of Packages.

UNIT I   VALUES AND TYPES   9

Data types- Integer , Float, Boolean, String, And List- Variables, Expressions, Statements, Tuple Assignment, Precedence Of Operators, Comments, Modules And Functions, Function Definition And Use, Flow Of Execution, Parameters And Arguments.

UNIT II   CONDITIONALS AND ITERATION   9

Boolean Values And Operators, Conditional (If), Alternative (If-Else), Chained Conditional (If-Elif-Else)- Iteration- State, While, For, Break, Continue, Return Values, Parameters, Local and Global Scope, Function Composition, Recursion.

UNIT III   STRINGS, DICTIONARIES AND LISTS   9

String Slices, Immutability, String Functions and Methods, String Module- Lists as Arrays. Dictionary - Get Method - Lists- List Operations, List Slices, List Methods, List Loop, Mutability, Aliasing, Cloning Lists, List Parameters.

UNIT IV   TUPLES, FILES AND EXCEPTION   9

Tuple Assignment, Tuple As Return Value- Dictionaries: Operations And Methods- Advanced List Processing- Files And Exception -Text Files, Reading And Writing Files, Format Operator- Command Line Arguments, Errors And Exceptions, Handling Exceptions, Modules, Packages.

UNIT V   CASE STUDY   9

Building Regular Expression Powered Templating Engine-Customizing Loan Eligibility Process For Customers-Automate The School Details To Analyze Performance-Analyze Sales Outcome In Business.

TOTAL: 45 Hours

Books for References:

1. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011
2. John V Guttag, ―Introduction to Computation and Programming Using Python‘‘, Revised and expanded Edition, MIT Press , 2013
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, ―Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
4. Python for Informatics: Exploring Information,Dr.Charles.R. Severance, 2009.
5. www.py4inf.com
6. www.pythonlearn.com
7. https://www.tutorialspoint.com/python

18BCS109 MICROPROCESSORS AND ITS APPLICATIONS   4 0 0 4

Course Objective: To provide a fundamental knowledge of Microprocessors and to improve the ability to do assembly language program. To learn about other microprocessor standards such as Pentium.

Course Outcomes:

CO-1: To learn the basic concepts of 8086 microprocessor.

CO-2: To understand the components.

CO-3: To analyse the instruction set.

CO-4: Ability to understand the program development tools.

CO-5: To study the pin configuration and signals.

CO-6: To gain the knowledge of interrupt concepts.

CO-7: To learn about the other microprocessor standards.

CO-8: To analyse the Pentium processor.

CO-9: To Expertise in programming using 8085 processor.

CO-10: To learn real time microprocessor applications.

UNIT I   INTRODUCTION   15

Components of IBM PC: System Unit – Monitor – Input devices – Printer. Interfaces: I/O Buses – Parallel and Serial Ports- Universal Serial Bus.   Software Support General Organization of a Microcomputer: CPU-Buses-Memory-Input and Output Devices. 8086 Internal Architecture: The EU- The BIU.   Addressing Modes: Immediate Addressing Mode – Register Addressing Mode – Memory Addressing Mode – Port Addressing Mode.

UNIT II   ASSEMBLY LANGUAGE PROGRAMMING   15

Instructions: Data Transfer Instructions – Arithmetic Instructions –Bit manipulation Instructions – String Instructions- Branch Control Instructions – Iteration Control Instructions – Interrupt Instructions – Processor Control Instructions.   Assembly Language Programming: Program Development Tools – Assembler Directives.   Programming examples.

UNIT III   ADVANCED MICROPROCESSOR   15

Pins and Signals: Pin Configuration – Signals – Bus Cycles. Basic System Components: Clock Generator – Bus Buffering and DE multiplexing – Bus Controller – Address Decoders. Interrupts: Interrupt Vector Table- The 8086 Response to Interrupts – 8086 Interrupt Types – Priority to 8086 Interrupts. Direct Memory Access: Basic DMA Operation

UNIT IV   OTHER MICROPROCESSOR AND STANDARDS   15

Protected Mode Operation: Limitations of Real Mode Operation – Features of Protected Mode Operation – Memory Addressing in Protected Mode – Virtual Memory – Multitasking – Virtual Real Mode. The 80486 Microprocessor: Internal Blocks and Signals – Internal Registers – Instructions – Memory and I/O. The Pentium Microprocessor: Internal Blocks and Signals – Registers – Instructions – Memory and I/O. Pentium –MMX Microprocessor-The Pentium – Pro Microprocessor: Internal Structure – The Pentium – II Microprocessor.

UNIT V   CASE STUDY   15

Working with the sample assembly language programs – programs using arithmetic instructions, looping control instructions, interrupt instructions, process control instructions.

Total: 75 Hours

Books for References:

1. N. Mathivanan, Microprocessors, PC Hardware and Interfacing, Prentice Hall of India, 2007

2. M. Rafiquzzaman,Microprocessors Theory and Applications, Prentice Hall of India, 2008.

18BCS110   SOFTWARE PROJECT MANAGEMENT   3 0 0 3

Course Objective: The course gives an insight of the most commonly used software architecture and design patterns and their applications.

Course Outcomes:

CO-1: To understand Software Project Models and Software Management Concepts.

CO-2: To highlight the importance of software project management.

CO-3: To understand the various methods of Cost Estimation.

CO-4: To explore on the problems of software Estimation.

CO-5: Learn about Software Quality Management – Quality Factors, components and Plans.

CO-6: To understand Software Quality Metrics and Quality Assurance Standards.

CO-7: Learn about software configuration and risk management.

CO-8: To gain knowledge about the Software Metrics.

CO-9: To Understand the Strategic and Technical Assessment.

CO-10: To understand Project Evaluation Techniques

UNIT I   PROJECT CONCEPTS AND ITS MANAGEMENT   9

Project life cycle models-Software Management Process Framework: Phases, Artifacts, Workflows, Checkpoints – Software Management Disciplines: Planning / Project Organization and Responsibilities / Automation / Project Control – Modern Project Profiles

UNIT II   COST ESTIMATION   9

Problems in Software Estimation – Algorithmic Cost Estimation Process, Function Points, SLIM (Software Life cycle Management), COCOMO II (Constructive Cost Model)

UNIT III   SOFTWARE QUALITY MANAGEMENT   9

Software Quality Factors – Software Quality Components – Software Quality Plan– Software Quality Metrics – Software Quality Costs – Software Quality Assurance Standard – Certification – Assessment.

UNIT IV   SOFTWARE MANAGEMENT AND METRICS   9

Software Configuration Management – Risk Management**:** Risk Assessment: Identification / Analysis / Prioritization Software Metrics – Classification of Software Metrics: Product Metrics: Size Metrics, Complexity Metrics, Halstead's Product Metrics, Quality Metrics, and Process metrics.

UNIT V   PROJECT EVALUATION AND EMERGING TRENDS   9

Strategic Assessment–Technical Assessment–Cost Benefit Analysis–Cash Flow Forecasting–
Cost Benefit Evaluation Technique–Risk Evaluation–Software Effort Estimation. Emerging
Trends: Import of the internet on project Management – people Focused Process Models.

Total: 45 Hours

Books for References:

1. Ramesh Gopalaswamy , "Managing and global Software Projects", Tata McGraw Hill
Tenth Reprint, 2011.

2. Roger S.Pressman, "Software Engineering a Practitioner's Approach", 7thEdition,
McGraw Hill, 2010.

3. Daniel Galin, "Software Quality Assurance: from Theory to Implementation", Addison-
Wesley, 2003.

4. Bob hughes and Mike Cotterell, "Software Project Management" second edition, 1999.

5. Royce, W. "Software Project Management: A Unified Framework", Addison-Wesley,
1998.

18BCS111   CRYPTOGRAPHY AND NETWORK SECURITY   4 0 0 4

Course Objective: To understand the fundamentals of Cryptography, acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity. To understand the various key distribution and management schemes and to explore how to deploy encryption techniques to secure data in transit across data networks.

Course Outcomes:

CO-1: Identify computer and network security threats, classify the threats and develop a Security model to prevent, detect and recover from the attacks.

CO-2: Encrypt and decrypt messages using block ciphers, sign and verify messages using well known signature generation and verification algorithms.

CO-3: Knowledge and understanding of Basics of number theory, Key management, Public key cryptosystems, Message authentication, Hash functions and algorithms.

CO-4: To be familiar with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc).

CO-5: To be familiar with advanced security issues and technologies.

CO-6: Will develop their skills in the programming of symmetric and/or asymmetric ciphersand their use in the networks. ·

CO-7: Develop SSL or Firewall based solutions against security threats, employ accessControl techniques to the existing computer platforms such as Unix and Windows NT.

CO-8: Enable the students to develop security algorithms in the network.

CO-9: Identify E-mail-attacks and establishing keys privacy E-Mail attacks.

CO-10: Will learn protocols used in Web Security and Transport layer Security.

UNIT I   INTRODUCTION & NUMBER THEORY   15

Services, Mechanisms and attacks-the OSI security architecture-Network security model-Finite Fields and Number Theory: Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm - Finite fields - Polynomial Arithmetic – Prime numbers - Fermat's and Euler's theorem -Testing for primality -The Chinese remainder theorem- Discrete logarithms.

UNIT II   BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY   15

Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT III   HASH FUNCTIONS AND DIGITAL SIGNATURES15

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature &authentication Protocols.

UNIT IV   SECURITY PRACTICE & SYSTEM SECURITY   15

Authentication applications – Kerberos – X.509 Authentication services - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - Intruder – Intrusion detection system – Virus and related threats – Countermeasures   –   Firewalls   design   principles   –   Trusted   systems.

UNIT V   CASE STUDY ON E-MAIL, IP & WEB SECURITY   15

E-mail Security: Security Services for E-mail-attacks possible through E-mail - establishing keys privacy - authentication of the source - Message Integrity - Non-repudiation - Pretty Good Privacy - S/MIME. IPSecurity: Overview of IPSec - IP and IPv6 - Authentication Header - Encapsulation Security Payload (ESP) - Web Security: SSL/TLS Basic Protocol-computing the keys - Encoding-Secure Electronic Transaction (SET).

Total: 75 Hours

Books for References:

1. William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education, March 2013.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002.

18BCS112   ARTIFICIAL NEURAL NETWORKS   4 0 0 4

Course Objectives:

This course provides attractive applications of Artificial Neural Networks and provides Practical approach for using Artificial Neural Networks in various technical, Organizational and economic applications.

Course Outcomes:

CO-1: Able to understand the Architecture of different neural networks.

CO-2: Understand a wide variety of learning algorithms.

CO-3: Understand about supervised learning.

CO-4: Understand about unsupervised learning.

CO-4: Provide understanding of techniques and concepts.

CO-5: Understanding limitations of various learning algorithms.

CO-6: Provide a way to evaluate performance of learning algorithms.

CO-7: Apply the algorithms to a real-world problem, optimize the models learned.

CO-8: Provides knowledge about associative memory networks.

CO-9: Able to implement learning models for real life applications.

CO-10: Able to implement different concepts and algorithms for practical applications.

UNIT I   INTRODUCTION   15

History of Neural Networks- Structure and Functions of Biological and Artificial Neuron-Neural Network Architectures- Characteristics of ANN- Basic -Learning Laws and Methods.

UNIT II   SUPERVISED LEARNING   15

Single Layer Neural Network and architecture-McCulloch-Pitts Neuron Model-Learning Rules- Perceptron Model- Perceptron Convergence Theorem- Delta learning rule-ADALINE- Multi-Layer Neural Network and architecture- Back Propagation learning- Back Propagation algorithm.

UNIT III   UNSUPERVISED LEARNING-1   15

  Outstar Learning, Kohenen Self Organization Networks- Hamming Network and MAXNET- Learning Vector Quantization- Mexican hat.

UNIT IV   UNSUPERVISED LEARNING-2   15

  Counter Propagation Network -Full Counter Propagation network- Forward Only Counter Propagation Network- Adaptive Resonance Theory (ART) -Architecture, Algorithms.

UNIT V   ASSOCIATIVE MEMORY NETWORKS   15

Introduction, Auto Associative Memory -Hetero Associative Memory- Bidirectional Associative Memory (BAM) -Theory And Architecture- Case-Study: Hopfield Network- Introduction- Architecture Of Hopfield Network.

                  Total: 75 hours

Books for References:

1. B.Yegnanarayana "Artificial neural networks" PHI, New Delhi, 1st Edition.

2. S.N.Sivanandam, S.N.Deepa, "Introduction to Neural Networks using MATLAB 6.0", TATA McGraw- Hill publications,5th Edition.

3. J .M. Zurada, "Introduction to Artificial neural systems" –Jaico publishing, 4th Edition.

4. S.Rajasekaran and G.A.Vijayalakshmipai "Neural Networks. Fuzzy Logic and genetic Algorithms", 2nd Edition.

5. James A Freeman and Davis Skapura "Neural Networks Algorithm, applications and programming Techniques", Pearson Education, 2002.

6. Simon Hakins "Neural Networks" Pearson Education, 3rd Edition.

18BCS113   OBJECT ORIENTED SOFTWARE ENGINEERING4 0 0 4

Course Objective: This course introduces the basic concepts of software engineering concepts, UML, analysis object and dynamic model, system design activities, object design and implementation issues, software life cycle.

Course Outcomes:

CO-1: To learn and understand various OO concepts along with their applicability contexts.
CO-2: To identify domain objects, their properties, and relationships among them.
CO-3: To identify and model/represent domain constraints on the objects and (or) on their relationships.
CO-4: To develop design solutions for problems on various OO concepts.
CO-5: To learn various modeling techniques to model different perspectives of object-oriented software design. (UML)
CO-6: To understand the concept of analysis object and dynamic model.
CO-7: To learn software development life cycle for Object-Oriented solutions for Real-World Problems.
CO-8: To impart knowledge about object design and implementation issues.
CO-9: To learn OO design solutions for the recurring problems.
CO-10: To understand the knowledge about software life cycle.

UNIT I   INTRODUCTION   15

System Concepts – Software Engineering Concepts – Development Activities – Managing Software Development – Unified Modeling Language – Project Organization – Communication

UNIT II   ANALYSIS   15

Requirements Elicitation – Concepts – Activities – Management – Analysis Object Model – Analysis Dynamic Models

UNIT III   SYSTEM DESIGN   15

Decomposing the system – Overview of System Design – System Design Concepts – System Design Activities – Addressing Design Goals – Managing System Design

UNIT IV   **OBJECT DESIGN AND IMPLEMENTATION ISSUES**   **15**

Reusing Pattern Solutions – Specifying Interfaces – Mapping Models to Code – Testing

UNIT V   **MANAGING CHANGE**   **15**

Rationale Management – Configuration Management – Project Management – Software LifeCycle

TOTAL: 75 Hours

Books for References:

1. Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd edition, Pearson Education, 2004.

2. Craig Larman, Applying UML and Patterns, 3rd edition, Pearson Education, 2005.

3. Stephen Schach, Software Engineering 7th edition, McGraw-Hill, 2007.

18BCS114   DESIGN AND ANALYSIS OF ALGORITHM   4 0 0 4

Course Objective: This course gives insight into the design and analysis for divide and conquer, sorting, dynamic programming, backtracking, lower bound, knapsack, tree vertex splitting, biconnected problems.

Course Outcomes:

CO-1: Ability to Understand, Analyze the performance of recursive and non-recursive algorithms and use of asymptotic notations to measure the performance of algorithms.

CO-2: To prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains.

CO-3: Able to develop any new application with the help of data structures and algorithms.

CO-4: Ability to design the algorithm using greedy method

CO-5: Ability to develop applications using the concept of Dynamic programming

CO-6: Ability to develop gaming applications using backtracking.

CO-7: Apply branch and bound to Travelling sales person problem, 0/1 knapsack problem.

CO-8: To design algorithms using the Branch and Bound strategy, and recite algorithms that employs this strategy

CO-9: To compare, contrast, and choose appropriate algorithmic design techniques to present an algorithm that NP, NP-complete, and NP-hard.

CO-10: To synthesize efficient algorithms in common engineering design situations.

UNIT I   INTRODUCTION   15

 Introduction - Definition of Algorithm – pseudocode conventions – recursive algorithms – time and space complexity –big-"oh" notation – practical complexities – randomized algorithms – repeated element – primality testing **-** Divide and Conquer:General Method - Finding maximum and minimum – merge sort.

UNIT II   DIVIDE AND CONQUER METHOD   15

 Divide and conquer – Quicksort, Selection, Strassen's matrix multiplication – Greedy Method:General Method –knapsack problem - Tree vertex splitting - Job sequencing with deadlines – optimal storage on tapes.

UNIT III   DYNAMIC PROGRAMMING   15   Dynamic Programming: General Method - multistage graphs – all pairs shortest paths – single source shortest paths - String Editing – 0/1 knapsack.Search techniques for graphs –   DFS-BFS- connected components – biconnected components.

UNIT IV   BACKTRACKING ALGORITHM   15
        Back Tracking: General Method – 8-queens - Sum of subsets - Graph Coloring – Hamiltonian cycles. Branch and Bound: General Method - Traveling Salesperson problem.

UNIT V   LOWER BOUND ALGORITHM   15
        Lower Bound Theory:Comparison trees - Oracles and advisory arguments - Lower bounds through reduction - Basic Concepts of NP-Hard and NP-Complete problems- Case Studies - Determinants of Matrices with Polynomial Entries- Optimal Television Adverts as Knapsack Problem.

                                                        TOTAL: 75 Hours

Books for References:

1. E. Horowitz, S. Sahni and S. Rajasekaran, Computer Algorithms, Galgotia, New Delhi, 1999.

2. Fundamentals of Algorithms, G. Brassard and P. Bratley, PHI, New Delhi, 1997.

3. The design and analysis of Computer Algorithms, A.V. Aho, J.E. Hopcroft, J.D. Ullmann, Addison Wesley, 1974.

4. Introduction to the Design and Analysis of algorithms, S.E.Goodman and S.T.Hedetniemi, Tata McGraw Hill, 1977.

18BCS115   **MACHINE LEARNING**   **4 0 0 4**

Course Objective: This course provides basics for understanding underlying machine learning theory and to formulate machine learning problems corresponding to different applications.

Course Outcomes:

CO-1: Develop an appreciation for what is involved in learning models from data.

CO-2: Understand a wide variety of learning algorithms.

CO-3: Understand how to evaluate models generated from data.

CO-4: Provide understanding of techniques, mathematical concepts.

CO-5: Understanding limitations of various machine learning algorithms.

CO-6: Provide a way to evaluate performance of machine learning algorithms.

CO-7: Apply the algorithms to a real-world problem, optimize the models learned.

CO-8: Generate Report on the expected accuracy that can be achieved by applying the models.

CO-9: Able to implement deep learning models for language, vision, speech, decision making.

CO-10: Practice software implementation of different concepts and algorithms.

UNIT I   INTRODUCTION   15

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II   NEURAL NETWORKS AND GENETIC ALGORITHMS   15

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evalution and Learning.

UNIT III   BAYESIAN AND COMPUTATIONAL LEARNING   15

      Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV   INSTANT BASED LEARNING   15

      K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

UNIT V   ADVANCED LEARNING   15

      Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Case Study: Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task .

                             Total: 75 hours

Books for References:

1. Machine Learning – Tom M. Mitchell, - MGH, 1st Edition.

2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis,2nd Edition.

3. Understanding Machine Learning. Shai Shalev-Shwartz and Shai Ben-David.Cambridge University Press. 2017. [SS-2017]

4. The Elements of Statistical Learning. Trevor Hastie, Robert Tibshirani and Jerome Friedman.Second Edition. 2009. [TH-2009]

5. Foundations of Data Science. Avrim Blum, John Hopcroft and Ravindran Kannan. January 2017. [AB-2017]

6. Pattern Recognition and Machine Learning. Christopher Bishop. Springer. 2006. [CB-2006].

7. Machine Learning: A Probabilistic Perspective, K. Murphy, MIT Press, 2012.

18BCS116   **OPEN SOURCE TECHNOLOGY LAB**   **0 0 4 2**

Course Objectives: Able to do programs in PHP & MySQL with different packages and able to develop website with PHP to MySQL Database.

1. Write a PHP function to reverse an integer and a string and test these functions.
2. Write a PHP program for palindrome.
3. Develop a PHP program for Email Registration.
4. Write a PHP program to demonstrate the use of regular expression to compare two strings.
5. Write a PHP program using Looping and Control Structures.
6. Write a PHP program for cookies and sessions.
7. Write a PHP program to test internet tools for sending emails and accessing the content of a webpage.
8. Write a PHP program to demonstrate required field validations to validate that all input fields are required.
9. Write a PHP program to maintain student records using files.
10. Create a form for your college library entering student details for each student in the college.
11. Write a PHP program using forms to display Employee records stored in MySQL.
12. Create a student Registration in PHP and Save and Display the student Records using MySQL.
13. Write a program to read customer information like c_no, c_name, item_purchased and mob_no from customer table and display all this information in table format on output screen
14. Write a program that keeps track of how many times a visitor has loaded the page

18BCS117   DOT NET PROGRAMMING LAB   0 0 4 2

Course Objective: This course gives practical training in Network programming using Visual Basic Dot Net, ActiveX Data Object Dot Net, Active Server Pages Dot Net with various applications.

1. Program to demonstrate various conditional statements in VB.NET

2. Programs to demonstrate various looping statements in VB.NET

3. Create a simple Application that demonstrates various windows controls available in VB.NET

4. Program that makes use of functions in VB.NET

5. Deploying OOP Concepts using VB.NET

6. Web Application in ASP.NET for Login Processing

7. Demonstration of validation controls in ASP.NET

8. Deployment of Calendar Control in ASP.NET

9. Traversing and selecting a Product Name displayed in dropdown list, through coding in

The Form Load Event in ASP.NET

10. Creation of Web Application in ASP.NET for Conditions-based book issue in a Library

11. Deployment of Data Grid in ADO.NET for viewing product details.

12. Construction of Banking Application with Implementation of Web-user control for

   Dynamic Login Process

18BCS118   PROGRAMMING WITH PYTHON LAB   0 0 4 2

Course Objective: This Lab course will yield a complete knowledge on how to write basic programs and high level applications using concepts such as Functions, Variables, If Else Statements, For Loops, While Loops, Sorting and Searching using Python.

1. Write a program that takes a positive integer n and then produces n lines of output shown as follows.

> For example enter a size: 5
> *
> **
> ***
> ****
> *****

2. Write a function that takes an integer 'n' as input and calculates the value of

$$1 + 1/1! + 1/2! + 1/3! + \ldots + 1/n!$$

3. Write a function that takes an integer input and calculates the factorial of that number

4. Write a function that takes a string input and checks if it's a palindrome or not.

5. Write a program to generate Fibonacci series.

6. Write a program to check whether the input number is even or odd.

7. Write a program to compare three numbers and print the largest one.

8. Write a program to print factors of a given number.

9. Write a method to calculate GCD of two numbers.

10. Write a program to implement linear search on lists.

11. Write a program to sort a list using bubble sort.

12. Write a program to multiply two Matrices.

SOFT SKILL I

UNIT I   READING COMPREHENSION AND VOCABULARY   8

Definitions of reading – types of reading – oral reading – silent reading – reading process – classification of reading – nature of reading – Filling in the blanks – Cloze Exercises –Vocabulary building – Reading and answering question.

UNIT II   LISTENING AND ANSWERING QUESTION   8

Listening process – speaker – hearer – types of listening – transitional listening – critical listening – recreational listening – listening for appreciation – selective listening – intensive listening- extensive listening – listening and sequencing sentences – filling in the blanks – listening and answering questions.

UNIT III   GROUP DISCUSSION   8

Introduction – Why GD Part of a selection process – Structure of a GD-Strategies in GD – Team work – body language – Debating various points of views – interaction with peers.

UNIT IV   CONVERSATIONS   8

Introducing oneself and others, narrating events – making telephonic conversation – Giving instruction – Giving instruction- Expressing purposes and functions- obligation and preferences, Accepting offers and Counseling Face to face Conversations

UNIT V   SELF – INTRODUCTION AND ROLE PLAY   8

Introduction self and greetings- asking for information- offerings- requisitions- inviting – vocabulary building- asking for description.

Total: 40 hours

Text Books:

1.   Barun K. Mitra, "Personality Development and Soft Skills". Oxford University Press. New Delhi. 2011.

2.   S.P. Sharma, "Personalilty Development", Pustaq Mahal. New Delhi. 2010.

Reference Books:

1. Meenakshi Raman and Sangeetha Sharma, "Technical Communication", Oxford University Press. New Delhi, 2009.
2. A.S. Hornby: "Oxford Advanced Learner's Dictionary of Current English", Oxford University Press, 2007

SOFT SKILL II

UNIT I   **PRESENTATION SKILLS**   **8**

General presentation methods and developing presentation skill

UNIT II   **SOFT SKILLS(Time Management, Stress Management and Body Language)**   **8**

Time management: Importance, Plan and Execution, Default reason and rectification methods. Stress Management: Stress Impacts over Efficiency and how to manage. Body Language: Its importance and need

UNIT III   **RESUME / REPORT / LETTER WRITING**   **8**

Resume: Basic components of a resume, Preparation of a resume, Types of resume Report: How to prepare reports, reports components and structure Letter writing: types of letters, framing letters, basic structure, how to draft a letter

UNIT IV   **FREQUENTLY ASKED QUESTIONS**   **8**

UNIT V   **INTERVIEW SKILLS**   **8**

Aims of Interview expectations and how to fulfill, developing skills

Total: 40 hours

Text Books:
1.   Barun K. Mitra, "Personality Development and Soft Skills". Oxford University Press. New Delhi. 2011.
2.   S.P. Sharma, "Personalilty Development", Pustaq Mahal. New Delhi. 2010.

Reference Books:

1.   Meenakshi Raman and Sangeetha Sharma, "Technical Communication", Oxford University Press. New Delhi, 2009.
2.   A.S. Hornby: "Oxford Advanced Learner's Dictionary of Current English" Oxford University Press, 2007.