BCA COURSE STRUCTURE FOR 2018 – 2019 BATCH
(Syllabus for students admitted in the year 2018 – 2019)

Sem	Subject Code	Course	Subject Title	Hrs/ Week	Credits	Int. Mark	Ext. Mark	Total
I	U18TM1L1	Tamil I/*	nra;As;> ciueil> nkhopg;;gapw;rp	6	3	25	75	100
	U16EGPL1	English I	English Communication Skills-I	6	3	40	60	100
	U18CA101	Core I	Programming in C	7	5	25	75	100
	U18CA1P1	Core Prac. I	Programming in C Lab	4	3	40	60	100
	U14MAZ11	Allied I	Operations Research	5	4	25	75	100
	U14VL1:1/ U14VL1:2	Val. Edu	Value Education	2	2	25	75	100
	Total			**30**	**20**	**165**	**435**	**600**
II	U18TM2L2	Tamil II/*	nra;As;> rpWfijj;jpUl;L> nkhopg;;gapw;rp	6	3	25	75	100
	U16EGPL2	English II	English Communication Skills-II	6	3	40	60	100
	U18CA202	Core II	Programming in C++	4	4	25	75	100
	U18CA2P2	Core Prac. II	Programming in C++ Lab	3	3	40	60	100
	U18MAA22	Allied II	Numerical Methods	5	4	25	75	100
	U18MAA23	Allied III	Probability and Statistics	4	4	25	75	100
	U16EST21	Env. Stu	Environmental Studies	2	2	25	75	100
	Total			**30**	**23**	**190**	**510**	**700**
III	U18TM3L3	Tamil III/*	nra;As;> ehlfk;> nkhopg;;gapw;rp	6	3	25	75	100
	U16EGPL3	English III	English for Competitive Examinations	6	3	40	60	100
	U18CA303	Core III	Programming in JAVA	6	5	25	75	100
	U18CA3P3	Core Prac III	Programming in JAVA Lab	3	4	25	75	100
	U18CA3Y4	Allied IV	Digital Computer Fundamentals	5	3	40	60	100
	U18CA3S1	SBEC I	Internet Programming	2	2	25	75	100
	U18CA3E1	NMEC I	Fundamentals of Web Design	2	2	25	75	100
	Total			**30**	**22**	**190**	**510**	**700**
IV	U18TM4L4	Tamil IV/*	nra;As;> ehty;> nkhopg;;gapw;rp	6	3	25	75	100
	U16EGPL4	English IV	English through Literature	6	3	40	60	100
	U18CA404	Core IV	Database Concepts	5	4	25	75	100
	U18CA4P4	Core Prac IV	Database Concepts Lab	3	2	40	60	100
	U18CA4Y5	Allied V	Microprocessor and Microcontroller	5	3	25	75	100
	U18CA4Y6	**Allied VI**	**Computer Architecture and Organization**	3	3	25	75	100
	U18CA4E2	NMEC II	Working Principles of Internet	2	2	25	75	100
	Total			**30**	**20**	**190**	**510**	**700**
V	U18CA505	Core V	Programming in ASP.NET with C#	6	5	25	75	100
	U18CA506	Core VI	Operating Systems	6	5	25	75	100
	U18CA507	Core VII	Fundamentals of Data Structures and Algorithms	6	5	25	75	100
	U18CA5P5	Core Prac. V	Programming in ASP.NET with C# Lab	4	4	40	60	100
	U18CA5:1		Software Engineering					
	U18CA5:2	Elective I	**Management Information System**	6	5	25	75	100
	U18CA5:3		**Introduction to Internet of Things**					
	U18CAPS2	SBEC II	Soft Skills (Oral and Written Communication)	2	2	40	75	100
	Total			**30**	**26**	**180**	**435**	**600**
VI	U18CA608	Core VIII	Programming in PHP	5	5	25	75	100
	U18CA6:1		Computer Networks					
	U18CA6:2	Elective II	**Data Warehousing and Data Mining**	6	5	25	75	100
	U18CA6:3		**E Commerce and its Applications**					
	U18CA6P6	Core Prac. VI	Programming in PHP Lab	5	4	40	60	100
	U18CA6:4		**Software Testing and Quality Assurance**					
	U18CA6:5	Elective III	Multimedia System Design	6	5	25	75	100
	U18CA6:6		**Organizational Behaviour**					
	U18CA6PJ	Core Project	Project Work	6	5	40	60	100
	U18CA6S3	SBEC III	Programming in Android	2	2	25	75	100
	Total			**30**	**26**	**180**	**420**	**600**
	Extensive Activities				1			
	Gender Studies(U16GST61)				1	20	80	100
	Total			**180**	**140**	**1115**	**2900**	**4000**

S.No.	Courses	No. of Courses
1	Tamil	4
2	English	4
3	Allied	6
1	Core Courses	8
2	Core Practicals	6
3	Elective	3
4	Non Major Elective Course (NMEC)	2
5	Skill Based Courses	3
6	Value Education	1
7	Core Project	1
8	Environmental Studies	1
9	Extensive Activities	1
10	Gender Studies	1
Total		**41**

Non Major Elective Course offered by the Department:

    a)   Fundamentals of Web Design   - U18CA3E1

    b)   Working Principles of Internet   - U18CA4E2

BCA COURSE STRUCTURE FOR 2018 – 2019 BATCH ONWARDS
INDEX

Core - I: PROGRAMMING IN C

Objectives:
1. To learn the programming knowledge using C language.
2. To study the various concepts of C language.

Prerequisite: International 'A' Level/ Indian Higher Secondary Mathematics

UNIT-I: **12 hrs**
Fundamentals of Computers - Introduction to C: Overview of Compilers and Interpreters – Structure of a C program – **C Declarations:** Introduction – C Character Set – Delimiters –The C Keywords – Identifiers – Constants – Variables – Rules for defining variables – Data types – Declaring variables – Initializing variables – Type Conversion.

UNIT-II: **12 hrs**
Operators and Expressions: Comma and Conditional Operators – Arithmetic, Relational, Logical and Bitwise Operators - **The Input and Output in C:** Formatted Functions – Unformatted Functions – Commonly Used Library Functions - **Decision Statements:** if Statement – if…else Statement – Nested if…else Statement – The break Statement – The Continue Statement – The goto Statement – The switch Statement.

UNIT-III: **12 hrs**
Loop Control Statements: The for Loop – Nested for Loops – The while Loop – The do...while Loop - **Arrays:** Initializing – Definition – One-Dimensional Array – Two-Dimensional Array- **Strings:** Introduction – Declaration and Initialization of String – String Standard Functions.

UNIT-IV: **12 hrs**
Functions: Introduction – Definition of Function – Declaration of Function - Function Prototypes – The return Statement – Types of Functions – Call by Value and Reference - **Structure and Union:** Introduction – Features of Structures – Declaration and Initialization of Structures – Structures within Structure – typedef – Enumerated Data Types – Union.

UNIT-V: **12 hrs**
Pointers: Introduction – Features of Pointers – Pointer Declaration – Pointers and Arrays – Array of Pointers – Pointers to Pointers - **Files:** Introduction – Streams and File Types – Steps for File Operations – File I/O – Other File Function.

Text Book:
1. Ashok N Kamthane, *"Programming with ANSI and Turbo C"*, Pearson Education, 2011.

References:
1. Balagurusamy E., *"Programming in ANSI C"*, TMH, 5th Edition, 2010.
2. www.c4learn.com
3. www.cprogramming.com

Core Practical - I: PROGRAMMING IN C LAB

Objectives:
1. To enrich the practical knowledge in C programming.
2. To develop C programs.

Prerequisite: Knowledge about C programming Language.

Lab Exercises:

1. Simple Interest and Compound Interest.

2. Largest of Three Numbers.

3. Largest among n Numbers.

4. Ascending and Descending Order of Numbers.

5. Sorting of names in Alphabetical order.

6. Matrix Operations (Addition , Subtraction & Multiplication)

7. Addition of Two Numbers using Call by Value and Call by Reference.

8. Finding Factorials -Recursive function.

9. Generating Fibonacci numbers using recursive function.

10. String Manipulations without using recursive functions.

11. Palindrome using pointers.

12. Create bank account using Structures.

13. Prepare Student Mark List- File processing.

Core - II: PROGRAMMING IN C++

Objectives:
1. To impart knowledge in Object Oriented Programming.
2. To learn important concepts such Pointers, Constructors and Files.

Prerequisite: Knowledge about C programming Language.

UNIT-I: **12 hrs**
Introduction to C++: Evolution – Object Oriented Technology – Key Concepts – Advantages - **I/O in C++:** Streams in C++ – Formatted and Unformatted Console I/O Operations - Manipulators – Custom built I/O Objects - **C++ Declarations:** Keyword – Identifiers – Data Types in C++ - Type modifiers – Type Casting – Constants – Operators in C++.

UNIT-II: **12 hrs**
C++ Functions: Parts of Functions - Passing Arguments – Returning Values – Default Arguments – Inline Function – Function Overloading – Library Functions.

UNIT-III: **12 hrs**
Classes and Objects: Declaring Objects – Defining member functions - Data hiding and Encapsulation – Classes, Objects and Memory – Static Member Variable and Functions –Array of Objects - Object and Function Arguments – Friend functions – Recursive Member Function – Local Classes – Empty, Static and Const Classes – Member and Non-Member Functions –Overloading Member Functions - **Constructors and Destructors:** Characteristics – Applications – Overloading Constructors – Copy Constructors - Destructors – Calling Constructors and Destructors – Private Constructors and Destructors.

UNIT-IV: **12 hrs**
Operator Overloading: The Keyword Operator –Overloading Unary & Binary Operators – Type Conversion – Rules for Overloading Operators. **Inheritance:** Access Specifiers and Simple Inheritance –Types of Inheritance – Virtual Base Classes –Object as a Class member - Abstract Classes -Arrays of classes - **Binding, Polymorphism and Virtual Functions:** Binding in C++ -Pointer to derived class Objects –Virtual Functions - Array of Pointers – Abstract Classes – Virtual Functions in Derived Classes .

UNIT-V: **12 hrs**
Files in C++: File Stream Classes – Steps of File Operations –File Pointers and Manipulators – Sequential Read and Write Operations – Random Access Operations – Error handling Functions – Command Line arguments – **Exception Handling:** Principles –Exception Handling Mechanism –Catching Multiple Exceptions - Rethrowing and Specifying Exceptions - Exceptions in Constructors and Destructors - Controlling Uncaught Exception.

Text Book:
1. Ashok N. Kamthane, *"Object Oriented Programming with ANSI and Turbo C++"*, Pearson Education Pvt. Ltd., New Delhi, 2013.

References:
1. Balagurusamy E., *"Object Oriented Programming with C++"*, 6th Edition, TMH Publishing Company Ltd., New Delhi, 2013.
2. www.tutoriwal4us.com/cpp-program

Core Practical - II: PROGRAMMING IN C++ LAB

Objectives:
1. To learn Object Oriented Programming concepts.
2. To implement simple applications using OOPs concepts.

Prerequisite: Knowledge about C++ programming Language.

Lab Exercises:

1. **Default Arguments**
   (a) Write a C++ program to find out the Sum of the given Numbers using Default Argument.

2. **Reference Arguments**
   (a) Write a C++ program to Swap Two Numbers using Reference Arguments.

3. **Inline Functions**
   (a) Write a C++ program to Add and Multiply Two integer Numbers using Inline Functions.

4. **Function overloading**
   (a) Write a C++ program using Function Overloading.

5. **Class and objects**
   (a) Create Student Mark List
   (b) Create Employee Pay Roll

6. **Friend Function**
   (a)Write a C++ program to demonstrate the Friend Function.

7. **Constructor & Destructor**
   (a) Write a C++ program to initialize the Complex Number with zero, to initialize with the given values and to read the value.

8. **Operator Overloading**
   (a) Write a C++ program to Overload Unary Operators.
   (b) Write a C++ Program to Add Two Complex Numbers using Binary Operators.

9. **Inheritance**
   (a) Prepare Pay Roll of an Employee using Single Inheritance.
   (b) Prepare Student Mark List using Multilevel Inheritance.

10. **Virtual Function**
    (a) Demonstrate the use of Virtual Function (run time polymorphism) to find the Area of the Given Object.
    Base class : shape
    Subclass : circle, square, rectangle, triangle.

11. **Files**
    (a) Write a program to create a Student Mark List using File.

Core – III: PROGRAMMING IN JAVA

Objectives:
1. To create dynamic website using Java.
2. To design simple App using Android.

Prerequisite: Basic Knowledge about C, C++ programming Languages.

UNIT-I: **12 hrs**
FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING: Basic Concepts of Object-Oriented Programming – **JAVA EVOLUTION:** Java History – Java Features – CONSTANTS, VARIABLES AND DATA TYPES – **DECISION MAKING AND BRANCHING:** simple if statement – the if … else statement – nested if …else statement – the else … if ladder – DECISION MAKING AND LOOPING: the while statement – the do statement – the for statement.

UNIT-II: **12 hrs**
CLASSES AND OBJECTS: General Form of a Class – Creation of Objects –Usage of Constructors – 'this' Keyword- Constructor Overloading - Copy Constructors - Static Data Members - Static Methods - 'finalize()' Method.

UNIT-III: **12 hrs**
INHERITANCE AND POLYMORPHISM: Inheriting Variables in a Class – Inheriting Methods in a Class – Inheritance and Constructors – Abstract Classes – Final Classes - **INTERFACES AND PACKAGES:** Interfaces - Structure of an Interface – Implementation of an Interface – Interface Inheritance - Packages – Placing the Classes in a Package.

UNIT-IV: **12 hrs**
EXCEPTION HANDLING: Default Exception Handling – Exception and Error Classes – Catch Block Searching Pattern – 'Throw' Statement – 'Throws' Statement – Custom Exceptions - **THREADS:** Life Cycle of a Thread – Creating and Running Threads – Methods in the Thread Class – Setting the Priority of a Thread - **APPLETS:** The Life Cycle of an Applet – The Applet Class – Development and Execution of a Simple Applet – Syntax of Applet Tag.

UNIT-V: **12 hrs**
ABSTRACT WINDOWING TOOLKIT: Events – Listeners – Event Handling Methods – Inheritance Hierarchy of Control Classes - Windows and Frames – Menus – Dialogs – Mouse Events and their Listeners – Data Base Connectivity – JDBC-ODBC Connection.

Text Books:
1. C.MUTHU, *"Programming with JAVA"*, Vijay Nicole Imprints, Chennai, 2008.

References:
1. Balagurusamy.E, *"Programming with Java A Primer"*, Tata McGraw Hill, 5th Edition, 2015.
2. K.Rajkumar, **"*Java Programming*"**, Pearson Edition, 2013.
3. Herbert Schildt, *"JAVA 2 Complete Reference"*, TMH publications, 4th Edition, 2001.
4. www.tutorialspoint.com

Core Practical - III: PROGRAMMING IN JAVA LAB

Objectives:
1. To create dynamic website using Java.
2. To design simple Application using Swing.

Prerequisite: Fundamental Knowledge about Java.

Lab Exercises

1. **Classes and Objects**
   Write a Java program to create a class named "EMP with the empname, empno, department, salary, age, sex and create objects to access and display them.

2. **Method Overloading**
   Write a Java program to find the Area of Shapes (Square, Rectangle, Circle) using Method Overloading.

3. **Inheritance**
   Write a Java program to perform Inheritance using the following details:
   Design a mark sheet which has the following details Regno, StudName, DateOfBirth, YearofStudy, Total, Result using 2 classes as follows.
   Class 1: "Student" contains Regno, StudName, DateOfBirth and YearOfStudy
   Class 2: "Mark" contains Regno, subject1, subject2, subject3 and subject4.
   Methods: Total () and Result () to calculate total marks and results respectively. Class 2 (Mark) inherits the class 1 (Student).

4. **Packages**
   Create a package called Homepack. Insert two classes called Income and Expenditure in Homepack. The Expenditure class has variables to store value of food, clothing and educational expenses. The Income class has variables to store salary, allowance and rent. Create a class called Budget, which uses the class of this package to calculate the savings of the family.

5. **Interfaces**
   Create an Interface A. This interface contains a method add (). Create a class B and implement interface A, in class B, use add () method to add two Integer values and make this method to return an Integer value. Create a class C and implement interface A, in class C, use add () method to add two Float values and make this method to return a Float value.

6. **Exception Handling**
   (a) Create a try block that is likely to generate any 4 exceptions and then incorporate necessary catch blocks and handle them appropriately.
   (b) Write a Java program to create User Defined Exception.

7. **Multithreading**
   Write a Java program to create three Threads by extending Thread class. For thread1, set MAX_PRIORITY, for thread2, set MIN_PRIORITY and for thread3, set NORM_PRIORITY. Initially make the thread1 to sleep for 1000 ms and then make the thread1 to perform its task.

8. **Applet**
   Write an Applet program to design a Login form using AWT controls.

9. **JDBC**
   Write a java program to establish data base connection using JDBC and create a table, insert and select records using AWT controls.

Allied – IV: DIGITAL COMPUTER FUNDAMENTALS

Objectives:
1. To learn the basic operations of the computer.
2. To learn the digital circuit fundamentals, memories and equip the students with basic knowledge of digital electronics.

Prerequisite: Basic Operations on Computers/Simple Mathematical Knowledge.

UNIT-I: **10 hrs**
Number Systems: Binary Arithmetic (Addition, Subtraction, Multiplication, 1's and 2's complements, 9's Compliment, 10's Compliments and Subtraction using complements) – Binary Coded Decimal Number Representation. Conversions in Binary, Decimal, Octal, Hexadecimal - BCD Codes (8421 code, 2421 and 4221 codes, Excess-3 Code, Gray Code) - Binary Character Codes (ASCII & EBCDIC Codes).

UNIT-II: **10hrs**
Fundamental Concepts of Boolean Algebra – Basic Laws Of Boolean Algebra – evaluation of Expressions – De Morgan's Laws - **Logic Gates and Logic Circuits:** Basic logic gates – AND,OR, NAND, NOR, XOR, XNOR - Universal Gates - Logic circuits and Logic Expressions - Karnaugh Map Simplification – Sum of Products (SOP) & Product of Sum (POS).

UNIT-III: **10 hrs**
Arithmetic Circuits: Half Adder and Full adder - Four bit Binary Adder - Half Subtractor and Full subtractor - Four bit Adder/Subtractor Circuit - **Combination Circuits:** Multiplexer, De-multiplexer, Encoder and Decoder - **Flip-Flops:** SR, D, JK, T & Master Slave flops.

UNIT-IV: **10 hrs**
Registers – Shift Registers – Shift Left Register – Shift Right Register – Bi-directional Shift Register - **Counters** - Ring Counter - Shift Counter/Johnson's Counter - Asynchronous Counters - Synchronous Counters - **Memories:** Memory Addressing – ROM – Types of ROMs – RAM – Types of RAMs.

UNIT-V: **10 hrs**
D/A Conversion: Variable Resister Network – Binary Ladder **-** D/A & A/D Conversions - D/A Converter – A/D Converter - Simultaneous Conversion – Counter Method – Continuous A/D Conversion

Text Books:
1. Thomas C.Bartee, *"Digital Computer Fundamental"*, 6th Edition, Tata Mcgraw Hill, 2011.

References:
1. V.Vijayendran, *"Digital Fundamentals"*, S.Viswanathan (Printers & Publishers) Pvt Ltd, 1st Edition, Reprint, 2008.
2. Albert Paul Malvino, Donald P. Leach, *"Digital Principles and Applications"*, TMH Publishing Company Ltd, New Delhi, 4th Edition 1991.
3. www.tutorialspoint.com
4. www.laynetworks.com

SEMESTER: III   **HOURS : 2**
CODE: U18CA3S1   **CREDITS: 2**
SBEC – I: INTERNET PROGRAMMING

Objectives:
1. To learn the basic of HTML and CSS.
2. To design dynamic web sites using web designing tags.

Prerequisite: Fundamental Knowledge about any Programming Language.

UNIT-I: **5 hrs**
Getting Started with HTML – Formatting Text by using Tags – using Lists and Backgrounds – Creating Hyperlinks and Anchors – Introduction to Style Sheets – Formatting Text by using Style Sheets – Formatting Paragraphs by using Style Sheets.

UNIT-II: **5 hrs**
Creating Tables – Formatting Tables – Creating User Forms - **The Basics of Java Script:** Overview of Java Script – Object Oriented and Java Script – General Syntactic Characteristics – Primitives, Operations, and Expressions.

UNIT-III: **5 hrs**
Screen Output and Keyboard Input – Control Statements – Object Creation and Modification .**Java Script and XHTML Documents:** The Java Script Execution Environment – The Document Object Model –Element Access in Java Script.

UNIT-IV: **5 hrs**
Events and Event Handling: Handling Events from Body Elements – Handling Events from Button Elements - Handling Events from Text Box and Password Elements – The DOM 2 Event Model – The Navigator Object – DOM Tree Traversal and Modification.

UNIT-V: **5 hrs**
Introduction To XML: Introduction – The Syntax of XML – XML Document Structure – Document Type Definitions – Namespaces – XML Schemas – Displaying Raw XML Documents – Displaying XML Documents With CSS – XSLT Style Sheets – XML Processors.

Text Book:
1. Faithe Wempen, *"HTML5 Step by Step"*, Microsoft Press, 2011.
2. Robert W. Sebesta, *"Programming the World Wide Web"*, Pearson Education, Fourth Edition, 2009.

References:
1. Joel Sklar, *Principles of Web Design: The Web Technologies Series*, Fifth Edition, 2011.
2. www.w3schools.com

NMEC – I: FUNDAMENTALS OF WEB DESIGN

Objectives:
1. To learn about Internet and communication.
2. To provide fundamental knowledge in web page designing using HTML.

Prerequisite: Basic Knowledge about Internet and Communication.

UNIT-I: **5 hrs**
Introduction to the Internet: Computers in Business - Networking-Internet **- Internet Technologies:** Modem – Internet Addressing – Physical Connections – Telephone Lines

UNIT-II: **5 hrs**
Introduction to HTML: Designing a home page-History of HTML-HTML Generations-HTML Documents-Anchor Tag-Hyperlinks-**Designing the Body Section:** Images and Pictures

UNIT-III: **5 hrs**
List: Unordered Lists - Headings in a list – Ordered Lists-**Tables:** Table creation in HTML-Coloring Cells –**MARQUEE**

UNIT-IV: **5 hrs**
Frames: Frameset Definition - Frame Definition - Nested Framesets - **Forms**: Action Attribute-Method Attribute - Enctype Attribute-Drop Down List

UNIT-V: **5 hrs**
Audio: Audio on the web – Audio formats and browser support-**Video:** Playing videos in HTML – Problems, problems and solutions-HTML video using <embed>, <object>,<video> tags – HTML video using a Hyperlink**.**

Text Book:
   1. C Xavier, *"World Wide Web design with HTML"*, Tata Mc-Graw Hill, 2010.

References:
   1. Steven Holzner, *"HTML Black Book"*, Dreamtech Publishers, 2000.
   2. Jeremy Keith, *"HTML5 for Web Designers"*, A Book Apart Jeffrey Zeldmann, 2010.

Core – IV: DATABASE CONCEPTS

Objectives:
1. To learn the basic data base services in a dynamic and flexible environment.
2. To study SQL program.

Prerequisite: Knowledge about any Programming Language.

UNIT-I: **11 hrs**
Introduction to Database Systems: Basic Concepts and Definitions - Data Dictionary - Database - Database System - Data Administrator - Database Administrator - **Database System Architecture:** Three-level ANSI-SPARC Data Base Architecture - Data Independence – Mappings.

UNIT-II: **11 hrs**
Relational Query Languages: Query Language – **Structured Query Language:** Advantages and Disadvantages of SQL- Basic SQL Data Structure - SQL Data Types - SQL Operators - Data Definition Language - Data Query Language - Data Manipulation Language - Data Control Language - Data Administration Statements - Transaction Control Statements.

UNIT-III: **12 hrs**
Data Models: Record-Based Data Model-Object-Based Data Model-Physical Data Model-Hierarchical Data Model-Network Data Model- Relational Data Model-Object-Oriented Data Model-Comparisons between Data Model- **Entity-Relational Model:** Basic E-R Concepts – Conversion of E-R Model into Relations.

UNIT-IV: **10 hrs**
Normalization: Introduction – Normalization **-** Normal Forms - BCNF – Multi-value Dependencies and 4NF – Join Dependencies and 5NF- **Query Processing:** Introduction – Query Processing – Syntax Analyzer – Query Decomposition**.**

UNIT-V: **11 hrs**
Transaction Processing and Concurrency Control: Introduction - Transaction Concepts - Concurrency Control - Locking Methods for Concurrency Control – **Database Recovery System:** Database Recovery Concepts - Types of Database Failures - Types of Database Recovery.

Text Book:
1. S.K. Singh, *"Database Systems - Concepts, Design and Application"*, Pearson education, 1st edition, 2013.

References:
1. Jeffry D. Ullman, Jennifer Widom, *"A First Course in Database Systems"*, Addison Wesley Longman pvt. Ltd., Delhi, 2001.
2. Date.C.J, *"An Introduction to Database Systems"*, 8th Edition, Pearson Education, India, 2003.

Core Practical - IV: DATABASE CONCEPTS LAB

Objetives:
1. To create programs based on important concepts on RDBMS
2. To provide complete coverage of RDBMS concepts

Prerequisite: Basic Knowledge about DBMS.

Lab Exercises:

1. Creating, Updating, and inserting into databases and simple queries.

2. Uses of Select statement for queries using

    a. AND, OR, and NOT operators, WHERE clause

    b. UNION, INTERSECTION, MINUS

    c. Sorting and Grouping

3. Nested Queries using SQL

    a. Sub Queries

    b. Join

4. Built-in functions of SQL

5. Working with TCL Commands

6. Cursors, Triggers, Stored procedures and functions

7. Pay roll preparation

8. Mark List preparation

9. Splitting a table

10. Merging a table

Allied -V: MICROPROCESSOR AND MICROCONTROLLER

Objectives:
1. To impart knowledge about basic parts and functions of microprocessor.
2. To study basic concepts of microcontrollers.

Prerequisite: Knowledge about Digital Fundamentals, Memories and I/O Devices.

Unit-1:   **11 hrs**
Introduction: Evolution of Microprocessors – CPU – Memory – Semiconductor memory – Memory hierarchy - Buses – **Microprocessor Architecture:** Introduction – Intel 8085 – ALU – Timing and control unit – Registers – Pin configuration - Instruction Cycle – Fetch operation – Execute operation - Timing Diagram.

Unit-2:   **11 hrs**
Instruction Set of Intel 8085: Introduction - Instruction and Data Formats – Addressing Modes – Status Flags – Intel 8085 Instructions – Stack – Subroutines.

Unit-3:   **11 hrs**
Assembly Language Programming: Simple examples – Addition and Subtraction of 8 bit Binary numbers – Complements of 8 bit numbers – Shifting and masking of 8 bit numbers – Finding Largest Number in an Array – Arranging a Series of Numbers – 8 bit Multiplication and Division.

Unit-4:   **11 hrs**
Peripheral Devices and Their Interfacing: Address Space Partitioning – Memory and I/O Interfacing – Data Transfer Schemes – Interrupts of Intel 8085 – Interfacing Devices and I/O Devices – I/O Ports – Programmable DMA Controller – Programmable Interrupt Controller – Programmable Communication Interface.

Unit-5:   **11 hrs**
Microcontrollers: Single chip microcomputer – Intel 8051 series of microcontrollers – Intel 8096 series of microcontrollers – Thirty two-bit microcontrollers- The RUPI - 44 family of microcontrollers with on-chip communication controller - Embedded processor.

Text Book:
1. Badri Ram, *"Fundamentals of Microprocessors and Microcomputers"*, Dhanapat Rai Publications, New Delhi, 6th edition, 2013.

References:
1. Ramesh S Gaonkar, *"Microprocessors Architecture, Programming and Applications with the 8085/8080"*, Penram International Publishers, India, 1997.
2. www.8085microprocessor4u.blogspot.com
3. www.8085.codeplex.com

SEMESTER: IV   **HOURS : 3**
CODE: U18CA4Y6   **CREDITS: 3**

Allied - VI: COMPUTER ARCHITECTURE AND ORGANIZATION

Objectives:
1. To understand the fundamentals of Internet of Things.
2. To apply the concept of Internet of Things in the real world scenarios

Prerequisite: Basic Knowledge about Microprocessor and embedded system**.**

UNIT – I: **8 Hrs**
Basic Computer Organization and Design: Instruction Codes – Registers – Instructions – Timing and Control – Instruction cycle – Memory Reference Instructions – Input Output and Interrupt – Complete Computer Description – Design of Basic Computer.

UNIT-II: **8 Hrs**
Programming the Basic Computer: Machine Language – Assembly Language – Assembler – Program Loops – Programming Arithmetic and Logic Operations – Subroutines – I/O Programming - MicroProgrammed Control: Control Memory – Address Sequencing.

UNIT-III: **8 Hrs**
Central Processing Unit: General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulations Program Control – RISC & CISC – Computer Arithmetic: Addition and Subtraction – Multiplication and Division Algorithms.

UNIT-IV: **9 Hrs**
Input Output Organization: Peripheral Devices – Input Output Interface – Asynchronous Data Transfer – Modes of Transfer – Priority Interrupt – DMA – I/O Processor – Serial Communication.

UNIT- V: **8 Hrs**
Memory Organization: Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory.

Text Book:
> 1. Morris Mano M., *"Computer System Architecture"* 3rd Edition, Pearson Education
>   Pvt. Ltd., New Delhi, 2004.
>   Unit I – Chapter 5
>   Unit II – Chapter 6 & 7
>   Unit III – Chapter 8 & 10
>   Unit IV – Chapter 11
>   Unit V – Chapter 12

Reference Book:
> 1. Nicholas P Carter, *"Comuter Architecture and Organization",* 2nd Edition, Schaum's
>   Outlines Series, McGraw Hill Education, 2016.

NMEC – II: WORKING PRINCIPLES OF INTERNET

Objectives:
1. To learn the basics of Internet.
2. To provide fundamental knowledge in web page designing using HTML.

Prerequisite: Fundamental Knowledge about Web Browsers and Web Designing.

UNIT-I: **5 hrs**
Internet: The wired world of the internet – Information travels across the internet – TCP/IP – Understanding internet addresses and domains – Anatomy of web connections – Internet file types. **Internet's Underlying Architecture:** Domain name system – Routers – The internet's client/server architecture.

UNIT-II: **5 hrs**
Connecting to the internet: Connecting your computer – Connecting to the internet from online services – ISDN – The internet/television connection – Network computers – DSL(Digital Subscriber Line). **Communicating on the internet:** E-mail – Usenet and newsgroups – Internet chat and instant messaging – Making phone calls on the internet.

UNIT-III: **5 hrs**
World Wide Web: Web pages – Web browsers – Markup Languages – Hypertext – Image maps and interactive forms – Web host servers – Websites with databases. **Common Internet Tools:** Gophers – Telnet – FTP and downloading files – Searching the internet.

UNIT-IV: **5 hrs**
Multimedia on the Internet: Audio on the internet – Video on the internet – Intranet and shopping on the internet.

UNIT-V: **5 hrs**
Safeguarding the internet: Firewalls – Viruses – Digital certificates.

Text Book:
1. Preston Gralla, *"How the Internet works"*, 10th Edition, Que publishers, 2014.

References:
1. Raj Kamal, *"Internet and Web Technologies"*, Tata Mc Graw Hill, 2002.
2. C Xavier, *"World Wide Web design with HTML"*, Tata Mc-Graw Hill, 2008.
2. www.informatics.buzdo.com/p912-internet-principles.htm

Core – V: PROGRAMMING IN ASP.NET WITH C#

Objectives:
1. To impart knowledge in designing interactive websites using ASP.Net.
2. To create web based applications using ASP.Net with C#.

Prerequisite: Fundamental knowledge about C and C++ programming Languages, SQL and HTML.

UNIT-I: **7 hrs**
Introducing .NET: The Evolution of Web Development – HTML and HTML Forms, Server-Side Programming, Client-Side Programming - The .NET Framework- C#, VB, and the .NET Languages, The Common Language Runtime, The .NET Class Library. **The C# Language:** C# Language Basics – Variables and Data Types – Variable Operations – Object-Based Manipulation - Conditional Logic – Loops – Methods.

UNIT-II: **14 hrs**
Types, Objects, and Namespaces: The Basics About Classes – Static Members, A Simple Class. Building a Basic Class – Creating an Object, Adding Properties, Automatic Properties, Adding a Method, Adding a Constructor, Adding an Event. Value Types and Reference Types – Understanding Namespaces and Assemblies – Advanced Class Programming. **Developing ASP.NET Applications:** The Promise of Visual Studio – Creating Websites – Designing a Web Page – The Anatomy of a Web Form – Writing Code – Visual Studio Debugging .

UNIT-III: **13 hrs**
Web Form Fundamentals: The Anatomy of an ASP.NET Application – Introducing Server Controls – HTML Server Controls, Converting an HTML Page to an ASP.NET Page, View State, The HTML Control Classes, Event Handling, Error Handling. The Page Class – Application Events – ASP.NET Configuration. **Web Controls:** Stepping Up to Web Controls – Web Control Classes – List Controls – Table Controls – Web Control Events and AutoPostBack – A Simple Web Page.

UNIT-IV: **13 hrs**
Error Handling: Exception Handling – Handling Exceptions. **State Management:** The Problem of State – View State – Transferring Information Between Pages – Cookies – Session State – Session State Configuration – Application State. **Validation:** Understanding Validation – The Validation Controls. **Rich Controls:** The Calendar – The AdRotator – Pages with Multiple Views.

UNIT-V: **13 hrs**
ADO.NET Fundamentals: Understanding Databases – Configuring Your Database –SQL Basics – The Data Provider – Model Direct Data Access – Disconnected Data Access.**The Data Controls:** The GridView – Formatting the GridView – Selecting a GridView Row – Editing with the GridView – Sorting and Paging the GridView – The DetailsView and FormView.

Text Book:
1. Matthew MacDonald, *"Beginning ASP.NET in C# 2010"*, Apress, 2013.

References:
1. Dr. J.G.R.Sathiaseelan and N.Sasikaladevi, *"Programming with C#.Net"*, Pearson Education Inc, 2009.
2. Matthew MacDonald, Adam Freeman, *"Pro ASP.NET 4 in C# 2010"*, Apress, 2010.
3. Stephen Walther,Kevin Hoffman and Nate Dudek, *"ASP.NET4 Unleashed"*, Pearson Education Inc, 2011.
4. Dean Alan Hume, *"Fast ASP.NET Websites"*, Manning Publications Co, 2013.
5. www.csharppoints.com
6. www.asp.net-tutorials.com

SEMESTER: V
CODE: U18CA506

HOURS : 6
CREDITS: 5

Core – VI: OPERATING SYSTEMS

Objectives:
1. To impart fundamental knowledge about operating systems.
2. To study functions of operating system.

Prerequisite: Basic Knowledge about I/O devices, Memories, Hardware and Software.

UNIT-I: **12 hrs**
Introduction to Operating System: Basic Concepts and Terminology - An Operating System as Resource Manager - I/O Programming - Interrupt Programming - Machine Structure – I/O Programming - Interrupt Structure and Processing.

UNIT-II: **12 hrs**
Memory Management: Single Contiguous Allocation - Partitioned Allocation – Re-locatable Partitioned Memory Management - Paged Memory Management - Demand Paged Memory Management - Segmented Memory Management - Segmented and Demand Paged Memory Management.

UNIT-III: **12 hrs**
Processor Management: State Model - Job Scheduling - Process Scheduling - Multiprocessor Systems - Process Synchronization.

UNIT-IV: **12 hrs**
Device Management: Techniques for Device Management - Channels and Control Units - Device Allocation Considerations - I/O Traffic Controller - I/O Scheduler - I/O Device Handlers.

UNIT-V: **12 hrs**
The Unix File System: Creating Files: touch, cat – Indulging in File Play: cp, rm, mv – Listing File and Directories: ls, cat, ln, chmod – Directory Related Commands: pwd, mkdir, rmdir, cd – Miscellaneous Commands: logname, id, uname, tty, date – Essential Unix Commands: who, passwd, cal – File Related Commands: wc, sort, cut – Viewing Files: head, tail – File Compression: compress, uncompress.

Text Books:
1. Stuart E. Madnick, John J. Donovan, *"Operating Systems"*, TATA McGraw Hill Publications, 18th reprint, 2011. (**Units I, II, III and IV**)
2. Yashavant P.Kanetkar,*"UNIX Shell Programming"*, BPB Publications, 1st edition 2010. **(Unit V)**

References:
1. Abraham SilberSchatz and Peter Baer Galvin, *"Operating Systems"*, 9th Edition, Addision Wesley Longman Inc, 2012.
2. www.tutorialspoint.com/operating_system/

SEMESTER: V   **HOURS : 6**
CODE: U18CA507   **CREDITS: 5**

Core – VII: FUNDAMENTALS OF DATA STRUCTURES AND ALGORITHMS

Objectives:
1. To impart knowledge on the various representations of Data
2. To study the different algorithms involved in sorting and finding the shortest path.

Prerequisite: Knowledge about C, C++ programming Language.

UNIT-I: **7 hrs**
Arrays and Sequential Representations: Ordered Lists – Stacks and Queues – Evaluation of Expressions – Multiple Stacks and Queues – Singly Linked Lists – Linked Stacks and Queues – Doubly Linked Lists and Dynamic Storage Management.

UNIT-II: **14 hrs**
Trees: Binary Tree Representations – Tree Traversal – Threaded Binary Trees – Binary Tree Representation of Trees – Graphs and Representations – Traversals, Connected Components and Spanning Trees – **Shortest Paths:** Single Source All Destinations – Activity Networks – Topological Sort and Critical Paths.

UNIT-III: **16 hrs**
Divide and Conquer: General Method – Binary Search – Finding the Maximum and Minimum – Merge Sort – Quick Sort – **The Greedy Method:** General Method – Knapsack Problem – Job Sequencing with Deadlock – **Minimum Cost Spanning Trees:** Kruscal's Algorithm – Optimal Storage on Tapes – Optimal Merge Patterns.

UNIT-IV: **9 hrs**
Dynamic Programming: General Method – Reliability Design – All Pairs Shortest Paths – 0/1 Knapsack Problem – The Traveling Salesperson Problem.

UNIT-V: **9 hrs**
Backtracking: The General Method – The 8-Queen's Problem – Graph Coloring – Hamiltonian Cycles – Knapsack Problem.

Text Book:
1. Ellis Horowitz, Sartaj Sahni, Rajasekaran, ***"Fundamentals of Computer Algorithms"***, Silicon Press, 2010.

References:
1. Anany Levitin, ***"Introduction to the Design and Analysis of Algorithms"***, Pearson Education, 2nd edition, 2011.
2. Ellis Horowitz and Sartaj Sahni, ***"Fundamentals of Data Structure"***, Galgotia Book House, 1978.
3. www.studytonight.com/data-structures/

Core Practical – V: PROGRAMMING IN ASP.NET WITH C# LAB

Objectives:
1. To enhance the programming skills about ASP.NET.
2. To design the dynamic and interactive websites using ASP.NET.

Prerequisite: Knowledge about ASP.NET Programming Language.

Lab Exercises:

1. Write C# windows application for currency conversion.

2. Write C# windows application for calculator with some scientific function.

3. Design website for online entrance examination registration form.

4. Create a job search portal by using web controls.

5. Design ASP.Net login page for website with Session and cookies.

6. Create the webpage to validate E-Mail registration.

7. Design a web page that makes uses of Ad Rotator Control.

8. Design a web page involving Multi View Control.

9. Create a MSSQL table and execute queries to read, add, remove and modify a record

   from that table.

10. Design website for your College, Department.

Elective – I A: SOFTWARE ENGINEERING

Objectives:

1. To impart knowledge in the life cycle of software engineering.
2. To study about the software design.

Prerequisite: Fundamental Programming Knowledge and Software.

UNIT-I: 11 hrs
Introduction: Definitions – Size factors – Quality and Productivity Factors – Managerial Issues – **Planning a Software Project:** Introduction – Defining the Problem – Developing a Solution Strategy – Planning and Development Process – Planning and Organizational Structure – Other Planning Activities.

UNIT-II: 11 hrs
Software Cost Estimation: Cost Factors – Cost Estimation Techniques – Staffing Level Estimation – Estimating Software Maintenance Costs – Software Requirement Definition – Software Requirement Specification – Formal Specification Techniques – Languages and Processors for Requirements.

UNIT-III: 11 hrs
Software Design: Fundamental Design Concepts – Modules and Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real Time and Distributed Systems – Test Plans – Milestones, Walkthroughs and Inspections – Design Guidelines.

UNIT-IV: 11 hrs
Implementation Issues: Documentation Guidelines – Data Abstraction – Exception Handling – Concurrency Mechanisms.

UNIT-V: 11 hrs
Structured Coding Techniques – Coding Style – Standards and Guidelines – **Verification and Validation Techniques:** Quality Assurance – Walkthroughs and Inspections – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing– Software Maintenance – Managerial Aspects – Configuration Management – Source Code Metrics – Other Maintenance Tools.

Text Book:
1. Richard Fairley, ***"Software Engineering Concepts"***, TMH Publication, 2012.

References:
1. Ian Sommerville, ***"Software Engineering"***, Pearson education Asia, 6th Edition, 2000.
2. www.bcanotes.com
3. www.newagepublishers.com

Elective – I B: MANAGEMENT INFORMATION SYSTEM

Objectives:
1. To understand the concepts of organizational information systems.
2. To study the concepts of information systems in organization.

Prerequisite: Knowledge about Storage and Retrieval of Data.

UNIT-I: **11hrs**
Introduction to Management Information System – An Overview of MIS – Structure of MIS.

UNIT-II: **11hrs**
Survey of Information Systems Technology – H/W, S/W and Communication Technology for Information Systems –Storage and Retrieval of Data – Transaction Processing, Office Automation and Information Processing Control Functions.

UNIT-III: **11hrs**
Conceptual Foundations – The Decision Making Process – Concepts of Information – Concepts of Planning and Control – Organizational Structure and Management Concepts.

UNIT-IV: **11hrs**
Information Based Support System – Support Systems for Planning Control and Decision Making – Information System Requirements – Developing a Long Range Information System Plan – Database Requirements And User Interface Requirements.

UNIT-V: **11hrs**
Development - Implementation and Management of Information Systems Resources – Quality Assurance and Evaluation of the Information Systems.

Text Book:
1. Gordon B. Davis, Margrethe H. Olson, *"Management Information System - Conceptual Foundations, Structure and Development"*, 2nd Edition, McGraw Hill International Edition, 2010.

References:
1. G. Mardrick, Joel E. Ross, James R. Claggett, *"Information System for Modern Management"*, 3rd Edition, Prentice Hall of India, 2009.
2. Jerome Kanterr, *"Managing with Information"*, 4th Edition, Prentice Hall of India, 2009.
3. www.tutorialspoint.com/management_information_system/

Elective - I C: INTRODUCTION TO INTERNET OF THINGS

Objectives:
1. To understand the fundamentals of Internet of Things.
2. To apply the concept of Internet of Things in the real world scenarios

Prerequisite: Basic Knowledge about Microprocessor and embedded system**.**

UNIT- I: **11 Hrs**
Smart Connectivity: Welcome to the Internet of Things: Welcome to the Future - What Is the Internet of Things? -What Kinds of Things Can Be Connected to the Internet of Things? - What Do All Those Connected Things Do?- When Will the Internet of Things Arrive? - How Important Is the Internet of Things? - Smart Connectivity and You **Smart Technology: How the Internet of Things Works:** Understanding the Internet of Things: The Big Picture- Building the Internet of Things - Understanding Smart Devices - Understanding Network Connections- Examining Wireless Technologies Understanding the Data - Understanding Intelligent Applications - Understanding Big Data

UNIT-II: **12 Hrs**
Smart Appliances: From Remote Control Ovens to Talking Understanding Smart Appliances Today -Smarter Food Storage with Smart Refrigerators - Smarter Cooking with Smart Ovens - Smarter Cleaning with Smart Washers and Dryers- Smarter Dishwashing with Smart Dishwashers - Smart Appliances and You **Smart Homes: Tomorrowland Today:** Automating the Home - A Short History of Smart Homes - Smart Steps to a Smart Home- Simple Components for a Smart Home - Smarter Living with Smart Furniture - Smarter Environment with Smart Lighting - Smarter Views with Smart Windows -Smarter Heating and Cooling with Smart Thermostats-Smarter Protection with Smart Security Systems-Smarter Sensing with Smart Monitors

UNIT-III: **13 Hrs**
Smart Clothing: Wearable Tech: Wearable Technology Today—and Tomorrow - Watching the Smartwatches - Exercising with Fitness Trackers - Understanding Fitness and Activity Trackers - Keeping Well with Wearable Healthcare Devices - Monitoring Your Family with Wearable Trackers -Recording with Wearable Cameras- Eyeing Smart Eyewear - Wearing Other Smart Clothing - Dealing with Your Personal Data. **Smart Shopping:** Eliminating the Need to Shop- Changing the Retail Environment - Smart Store Tech- Making It Easier to Pay - Deliveries by Drone - Managing Inventory Smarter - What About Your Data?

UNIT-IV: **12 Hrs**
Smart Cars: Connecting on the Road: Smart Cars Today—and Tomorrow - Cars That Drive Themselves Pros and Cons of Autonomous Autos.- Navigating the Legal Landscape - Smart Cars and You . **Smart Aircraft: Invasion of the Drones -** What Drones Are—and What They Aren't - How Drones Are Used Today- The Future of Drone Aircraft -Regulating Drone Aircraft-Fly the Scary Skies: The Problems with Drones

UNIT- V: **12 Hrs**
Smart Warfare: Rise of the Machines - The Past, Present, Future of Tech-Based Warfare- Smart Bombs - Smart Weapons - Robot Soldiers -Smart Strategy-Smart Combat and You **Smart Businesses: Better Working Through Technology:** Smart Offices - Smart Stores - Smart Inventory Management - **Smart World: The Global Internet of Everything:** Scaling the Internet of Things Globally- Connecting Cities, States, and Countries - The Rural Internet of Things- The Agricultural Internet of Things - The Environmental Internet of Things - Battling Climate Change - Impediments to the Global Internet of Things

Text Book:
1. Michael Miller, *"The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World"*, Que Publishing, 2015.

References:
1. Arshdeep Bahga and Vijay Madisetti, *"Internet of Things, A Hands on Approach"*, Universities Press, 2015.
2. www.libelium.com/top_50_iot_sensor_applications_ranking/

SBEC – II: SOFT SKILLS (ORAL AND WRITTEN COMMUNICATION)

Objectives:
1. To impart oral communication skills.
2. To import written communication skills

Prerequisite: Basic knowledge about English Grammar

Exercises:

I – Oral communication skills:

- Presentation
- Debate
- Group Discussion
- Interviews

II – Written communication skills:

- Preparing presentations for new products
- Preparing CV
- Preparing minutes of meeting
- Letters to press, officials and the like

Students will do Practice–I during class hours. Assignments will be given from II.

Evaluation:

CIA: Performance in the class   : 10
       Assignment   : 10
       Test I – Oral Communication   : 10
       Test II- Written Communication   : 10

                                          40

End Semester Examination:

Tests based on presentation / Stress Interviews / GD / Mock Interviews : 20
Testing written communication skills   : 40

                                           Total   60

Core – VIII: PROGRAMMING IN PHP

Objectives:
1. To create dynamic website using PHP.
2. To design simple web Application using MySql.

Prerequisite: Basic Knowledge about HTML and Database.

UNIT – I   12 hrs
Introduction to PHP: Incorporating PHP within HTML - The Structure of PHP (comments –
variables – operators – assignment – variable typing – constants – predefined constants –
functions – variable scope). **Expressions and Control Flow in PHP:** Expressions - Operators -
Conditionals – Looping - Implicit and Explicit Casting.

UNIT – II   12 hrs
PHP Functions and Objects: PHP Functions - Including and Requiring Files - PHP Version
Compatibility - PHP Objects. **PHP Arrays:** Basic Access -The foreach...as Loop-
Multidimensional Arrays -Using Array Functions. **Practical PHP:** Using printf - Date and Time
Functions - File Handling

UNIT - III   12 hrs
Form Handling: Building Forms - Retrieving Submitted Data - An Example Program - What's
New in HTML5? - Features Awaiting Full Implementation. **Cookies, Sessions, and
Authentication:** Using Cookies in PHP - HTTP Authentication - Using Sessions.

UNIT – IV   12 hrs
Introduction to MySQL: MySQL Basics - Summary of Database Terms Accessing MySQL via
the Command Line – Indexes - MySQL Functions - Accessing MySQL via phpMyAdmin.
Accessing MySQL Using PHP: Querying a MySQL Database with PHP - A Practical Example
- Practical MySQL - Creating a Table - Preventing Hacking Attempts.

UNIT – V   12 hrs
Exploring JavaScript : Variables - Operators - Variable Typing -Functions - Global Variables -
Local Variables- The Document Object Model. **Expressions and Control Flow in JavaScript:**
Expressions - Literals and Variables - Operators - The with Statement - Using onerror -Using
try...catch –Conditionals - Looping -Explicit Casting. **JavaScript and PHP Validation and
Error Handling:** Validating User Input with JavaScript.

Text Book:
1. Robin Nixon., *"Learning PHP, MySQL and JavaScript ",* O'reilly Publishers , 2009

References:
1. Leon Atkinson, *"Core PHP Programming"*, Pearson Education, 2004.
2. www.jkmaterials.yolasite.com/resources/labmanuals/BTech/WT-PHP-Record.pdf

Elective – II A: COMPUTER NETWORKS
Objectives:

1. To know about the physical structure of networks.
2. To know about various network communications.

Prerequisite: Knowledge about Internet and Communications.

UNIT-I: **12 hrs**
Introduction: Data Communication Networks - Protocols and Standards - Basic Concepts – Line Configuration – Topology - Transmission Mode - Categories Of Networks - The OSI Model – Functions of the Layers.

UNIT-II: **12 hrs**
Physical Layer Signals: Analog and Digital - Periodic and Aperiodic Signals - Analog Signals, Composite Signals - Digital Signals - Transmission Media – Unguided Media & Guided Media.

UNIT-III: **12 hrs**
Data Link Layer: Error Detection and Correction – Types of Errors – Error Detection - Various Redundancy Checks – Checksum - Error Correction - Data Link Control – Line Discipline - Flow Control - Error Control - Data Link Protocols – Character Oriented Protocols and Bit Oriented Protocols.

UNIT-IV: **12 hrs**
Network Layer: Switching – Circuit Switching, Packet Switching and Message Switching - Networking and Internetworking Devices – Repeaters – Bridges – Routers – Gateways - Routing Algorithm – Distance Vector Routing and Link State Routing - **Transport Layer:** Functions of Transport Layer.

UNIT-V: **12 hrs**
Session Layer: Session and Transport interaction - Synchronization points - Session Protocol Data Unit - **Presentation Layer:** Translation - Encryption and Decryption - Authentication and Data compression – **Application Layer:** Message Handling System - File transfer - Access and Management - Virtual Terminal - Directory Services - Common Management Information Protocol.

Text Book:
1. Behrouz A. Forouzan, *“Data Communication and Networking”*, TATA McGraw-Hill Publications, 2nd Edition, 2012.

References:
1. Andrew S. Tannenbaum, *“Computer Networks”*, Pearson Education, 4th Edition, 2011.
2. William Stallings, *“Data and Computer Communications”*, 8th Edition, Pearson Education, 2011.
3. www.practicallynetworked.com/networking/lan.htm

Elective – II B: DATA WAREHOUSING AND DATA MINING

Objectives:
> 1. To impart the Measures and Metrics for Data Mining
> 2. To learn various Data Mining Techniques.

Prerequisite: Knowledge about Software Engineering.

UNIT-I: **11 hrs**
Introduction: Why Data Mining? – What is Data Mining? – What Kinds of Patterns can be Mined? – Which Technologies Are Used? – Which Kinds of Applications Are Targeted? – Major issues in Data Mining.

UNIT-II: **11 hrs**
Data Preprocessing: **Data Preprocessing:** An Overview – **Data Clearing** – **Data Integration**-Entity Identification Problem - Redundancy & Correlation Analysis – Data Reduction – Data Transformation and Data Discretization.

UNIT-III: **11 hrs**
Data Warehousing and Online Analytical Processing: Data Warehouse: Basic Concepts – Data Warehouse Modeling-Data Cube and OLAP – Data Warehouse Design and Usage.

UNIT-IV: **11 hrs**
Mining Frequent Patterns, Associations, and Correlations: Basics Concepts and Methods: Basic Concepts – Frequent Item set Mining Methods. **Classification: Basic Concepts:** Basic Concepts – Decision Tree Induction – Rule Based Classification.

UNIT-V: **11 hrs**
Cluster Analysis: Basic Concepts and Methods: Cluster Analysis-Partitioning Methods – k-means – Hierarchical Methods – BIRCH – **Data Mining Trends and Research Frontiers:** Data Mining Applications.

Text Book:
> 1. Jiawei Han and Micheline Kamber, ***"Data Mining Concepts and Techniques"***, Morgan Kaufmann, Third Edition, 2012.

References:
> 1. Margaret H.Dunham, ***"Data Mining: Introductory and Advanced Topics"***, Pearson Education, 2003.
> 2. Arun K.Pujari, ***"Data Mining Techniques"***, University Press, 2001.

Elective – II C: E-COMMERCE AND ITS APPLICATIONS

Objectives:

1. To know about the physical structure of networks.
2. To know about various network communications.

Unit-1:

Welcome to Electronic Commerce: Electronic Commerce Framework-Media Convergence-Anatomy of E-Commerce Applications. **The Network Infrastructure for Electronic Commerce**: Components of the I-Way-Network Access Equipment- The Last Mile: Local Roads and Access Ramps-Global Information Distribution Networks.

Unit-2:

The Internet as a Network Infrastructure: The Internet Terminology-Chronological History of the Internet- NSFNET: Architecture and Components- National Research and Education Network- Globalization of the Academic Internet.

Unit-3:

Network Security and Firewalls: Client –Server Network Security-Emerging Client-Server Security Threats- Firewalls and Network Security-Data and Message Security-Challenge-Response Systems-Encrypted Documents and Electronic Mail.
Electronic Commerce and World Wide Web: Architectural Framework for Electronic Commerce-Technology Behind the Web -Security And The Web.

Unit-4:

Consumer Oriented Electronic Commerce: Mercantile Process Models- Mercantile Models from the Consumers Perspective- Mercantile Models from the Merchants Perspective.
Electronic Payment Systems: Types of Electronic Payment Systems-Digital Token- Based Electronic Payment Systems-Smart Cards and Electronic Payment Systems-Credit Card –Based Electronic Payment Systems-Risk and Electronic Payment Systems-Designing Electronic Payment Systems.

Unit-5:

Interorganizational Commerce and EDI: Electronic Data Interchange-EDI Applications in Business- EDI:Legal,Security and Privacy Issues-EDI and Electronic Commerce. **EDI Implementation,MIME, and Value-Added Networks:** EDI Software Implementation-EDI Envelope for Message Transport- Value-Added Networks(VANs)-Internet-Based EDI.

Text Book:
1. Dr.Ravi Kalakota & Andrew B Whinston, **"Frontiers of E-Commerce",**Pearson Education,2004.(For Unit-1:Chapters 1,2,For Unit-2:Chapters 3, For Unit-3:Chapters 5,6,For Unit-4:Chapters 7,8,For Unit-5:Chapters 9,10)

Reference Book:
1. Kamlesh K Bajaj and Debjani Nag**-"E-Commerce- The Cutting Edge of Business",**Tata McGraw Hill Publishing Company Ltd,IV Reprint 2000.

Core Practical – VI: PROGRAMMING IN PHP LAB

Objectives:
1. To create dynamic website using PHP.
2. To design simple web Application using MySql.

Prerequisite: Fundamental Knowledge about HTML, Java and Android programming
Language.

Lab Exercises

1. Write a PHP program to check a given number is Palindrome or not.

2. Write a PHP program for sorting numbers.

3. Write a PHP program for sorting names.

4. Write a PHP function to reverse an integer and a string.

5. Write a PHP program to test 10 string functions

6. Write a program to upload a file and download a file.

7. Design a web form to validate the form input.

8. Write a program to store the current date and time in a COOKIE and display the 'Last
Visited' date and time on the web page.

9. Write a program to store page views count in SESSION, to increment the count on each
refresh and to show the count on web page.

10. Design an authentication web page in PHP with MySQL to check username and password.

11. Write a program to demonstrate Insertion, Updation and Deletion of rows in MYSQL tables.

12. Write a PHP program using forms to display Employee records stored in MySQL.

Elective – III A: SOFTWARE TESTING AND QUALITY ASSURANCE

Objectives:

1. To know about the physical structure of networks.
2. To know about various network communications.

Unit-1:   **12 Hrs**

Principles of Testing: Testing in Producing Software – Dijkstra's Doctrine – Test the Tests First – Automation Syndrome. - **Software Development Life Cycle Models :** Phases of Software Project – Quality, Quality Assurance, and Quality control – Testing, Verification, and Validation – Process Model to Represent Different Phases – Life Cycle Models – Spiral or Iterative model – The V model – Modified V Model.

Unit-2:   **12 Hrs**

White Box Testing: Static Testing – Structural Testing – Challenges in White Box Testing - **Black box testing:** Why and When to Do Black Box Testing – How To Do Black Box Testing.

Unit-3:   **12 Hrs**

Integration Testing – Integration Testing as A Type Of Testing – Integration Testing As a Phase of Testing – Scenario Testing – Defect Bash. - **System and Acceptance Testing:** Overview of System Testing – Why System Testing? – Functional vs Non-Functional Testing – Functional System Testing – Non-Functional Testing – Acceptance Testing – Summary of Testing Phases.

Unit-4:   **12 Hrs**

Performance Testing : Factors Governing Performance Testing – Methodology for Performance Testing – Tools for Performance Testing – Process for Performance Testing – Challenges - **Regression Testing :** What is Regression Testing – Types of Regression Testing – When to do Regression Testing – How to Do Regression Testing – Best Practices in Regression Testing.

Unit-5:   **12 Hrs**

Internationalization Testing – Primer on Internationalization – Test Phases for Internationalization – Enabling Testing – Locale Testing – Internationalization Validation – Fake Language Testing – Language Testing – Localization Testing – Tools Used For Internationalization – Challenges and Issues - **Adhoc Testing:** Overview – Buddy Testing – Pair Testing – Exploratory Testing – Interactive Testing – Agile and Extreme Testing – Defect Seeding – Conclusion.

Text Book:

1. Srinivasan Desikan and Goplalaswamy Ramesh – **"Software Testing – Principles and Practices"** – Pearson Education, 2010.   Chapters 1 to 10

Elective – III B: MULTIMEDIA SYSTEMS DESIGN

Objectives:
1. To impart knowledge in graphical interfaces, multimedia applications
2. To design web based applications.

Prerequisite: Fundamental Knowledge in Computer Graphics.

UNIT-I: **7 hrs**
Introduction to Multimedia: CDROM and the Multimedia Highway – Use of Multimedia –Introduction to Making Multimedia – Multimedia Skills.

UNIT-II: **11 hrs**
Multimedia Hardware and Software : Macintosh and Windows Production Platforms –Connections – Memory and Storage Devices – Input Devices – Output Devices – Communication Devices – Basic Software Tools – Text Editing and Word Processing Tools – Painting and Drawing Tools – 3-D Modeling and Animation Tools – Image Editing Tools – Sound Editing Tools –Animation, Video and Digital Movie Tools – Making Instant Multimedia – Multimedia Authoring Tools.

UNIT-III: **12 hrs**
Multimedia Building Blocks – Text – Fonts and Faces – Using Text in Multimedia – Computers and Text – Font Editing and Design Tools – Hypermedia and Hypertext – Sound – Multimedia System Sounds – MIDI Versus Digital Audio – Digital Audio – Making MIDI Audio – Audio File Formats – Images – Making Still Images – Color – Image File Formats – Animation –Principle of Animation – Making Animations That Work – Video – How Video Works –Integrating Video standards – Integrating computers and Television – Shooting and Editing –Video – Video Tips – Recording Formats – Digital Video.

UNIT-IV: **12 hrs**
Multimedia and the Internet – The Internet and How it Works – Internetworking – Connections – Internet Services – The World Wide Web and HTML – Dynamic Web Pages – Multimedia on the Web – Tools for the World Wide Web – Web Services – Web Browsers – Plug-ins and Delivery Vehicles – Designing for the World Wide Web – Working on the Web – Text for the Web – Images for the Web – Sound for the Web – Animation for the Web.

UNIT-V: **13 hrs**
Assembling and Delivering a Project – Planning and Costing – Project Planning – Estimating – Designing and Producing – Content and Talent – Using Content Created by others – Using Content Created for a Project – Delivering – Testing – Preparing for Delivery – Delivering on CD – ROM – Delivering on World Wide Web.

Text Book:
1. Tay Vaughan, *"Multimedia Making It Work"*,Tata McGraw Hill Edition, 5th edition, 2010.

References:
1. James E.Shuman , *"Multimedia In Action"* , Cengage Learning Publishers, 1997.
2. John Villamil , *"Multimedia An Introduction"* , Pearson Education Ltd, 1997.
3. www.webstyleguide.com/wsg2/multimedia/applications.html

Elective – III C: ORGANIZATIONAL BEHAVIOUR

Objectives:
1. To help the students to understand ethics and social responsibility.
2. To improve the understanding of individual behaviour in organizations, including diversity, attitudes, job satisfaction, emotions, moods, personality and motivational theories.

Pre-requisite: Basic understanding about one's self and society.

UNIT-I: **11 Hrs**
Foundations of Individual Behaviour: Ability – Biographical Characteristics – Learning – Global Implications. **Attitudes and Job Satisfaction:** Attitudes – Job Satisfaction

UNIT-II: **12 Hrs**
Personality and Values: Personality – Values – Values and Ethical Behaviour in Asian Countries. **Perception and Individual Decision Making:** What is perception? – Person Perception: Making Judgments About others – The link Between Perception and Individual Decision Making – Decision Making in Organizations

UNIT-III: **13 Hrs**
Motivation Concepts: Defining Motivation – Early Theories of Motivation – Contemporary Theories of Motivation – Integrating Contemporary Theories of Motivation. **Emotions and Moods:** What are Emotions and Moods? – Emotional Labor- Affective Events Theory – Emotional Intelligence – OB Applications of Emotions and Moods

UNIT- IV: **12 Hrs**
Foundations of Group Behavior: Defining and Classifying Groups – Stages of Group Development – Group Properties: Roles, Norms, Status and Cohesiveness – Group Decision Making – Group Behavior: An Asian Perspective. **Understanding Work Teams:** Types of Teams

UNIT-V: **12 Hrs**
Communication: Functions of Communication – The Communication Process – Direction of Communication – Interpersonal Communication – Organizational Communication – Choice of Communication channel – Barriers to Effective Communication. **Basic Approaches to Leadership:** What is Leadership? Trait Theories – Behavioral Theories.

Text Book:
1. Stephen P. Robbins, Timothy A Judge, Seema Sanghi, "*Organizational Behaviour*", Pearson Education, 2011.

Reference Book:
1. K. Aswathappa, "*Organizational Behavior Text, Cases and Games*", Himalaya Publishing House, Mumbai, 2005.
2. www.scdlpune.com/organisational-behaviour-notes.html

Core Project- : PROJECT WORK

SBEC - III: PROGRAMMING IN ANDROID

Objectives:
1. To design Useful APPs using Android.
2. To create Dynamic APPs using MAPviews.

Prerequisite: Basic Knowledge about Java and .Net.

UNIT-I: **5 hrs**
Getting to know Android – Android development environment – Android development environment for real applications – start up code, M J Android applications.

UNIT-II: **5 hrs**
Debugging Android applications: The Tools-Eclipse Java Editor: Java Errors-The Debugger–Log cat-Android Debug Bridge-DDMS-TraceView - The ApiDemos Application: Application Setup up in the Manifest File-Finding the source to an Interesting example

UNIT-III: **5 hrs**
SQLite databases and connect providers: Databases-Basic structure of the MicroJobsDatabase class–Reading Data from Database-Modifying the Database. Content Providers: Introducing Notepad-Content Providers-Consuming a Content Provider.

UNIT-IV: **5 hrs**
Locating and Mapping: Location-Based Services-Mapping-The Google Maps Activity-The Map View and MapActivity-Working with MapView-Location without Maps. Building a view: Android GUI Architecture–The Model-The View-The Controller-Assembling a Graphic Interface- Wiring up the Controller: Listening to the Model-Listening for Touch Events-Listening for Key events-Alternative ways to handle events-Advanced Wiring-The Menu.

UNIT-V: **5 hrs**
Drawing 2D and 3D graphics: Rolling your own widgets-Layout-Canvas Drawing-Drawables-Bitmaps.Bling: Shadows, Gradients and Filters-Animation-OpenGL Graphics.

Text Book:
1. R. Roger, J Lombardo, Z Mednieks and B. Meike, *"Android – Applications Development"*, O'Reilly, Shroft Publishers & Distributors Pvt Ltd, New Delhi, 2010.

References:
1. Pradeep Kothari, *"Android Application Development (with Kitkat Support), Black Book"*, Dreamtech Press , 2014.
2. Wei-Meng Lee, *"Beginning Android 4 Application Development"*, Wiley, 2012.
3. www.androidexample.com/
4. www.java2s.com/Code/Android/CatalogAndroid.htm