

**Bachelor of Computer Applications - Course Structure under CBCS.**

(For the Candidates admitted from the Academic year 2016-2017 onwards)

**Updated on 12.07.2018**

Semester	Part	Course	Title	Instru. Hours/ Week	Credit	Exam Hours	Marks		Total
							Int	Extn.	
I	I	Language Course – I (LC) – Tamil*/Other Languages ** #		6	3	3	25	75	100
	II	English Language Course - I (ELC)		6	3	3	25	75	100
	III	Core Course – I (CC)	Programming in C	6	5	3	25	75	100
		Core Practical - I (CP)	Programming in C (P)	3	2	3	40	60	100
		First Allied Course –I (AC)		4	4	3	25	75	100
		First Allied Course – II (AC)		3	-	-	-	-	-
	IV	Value Education	Value Education	2	2	3	25	75	100
<b>Total</b>				<b>30</b>	<b>19</b>				<b>600</b>
II	I	Language Course – II (LC) -- Tamil*/Other Languages ** #		6	3	3	25	75	100
	II	English Language Course – II (ELC)		6	3	3	25	75	100
	III	Core Course – II (CC)	Programming in C++	6	6	3	25	75	100
		Core Practical - II (CP)	Programming in C++ (P)	3	2	3	40	60	100
		First Allied Course – II (AC)		3	3	3	25	75	100
		First Allied Course – III (AC)		4	2	3	25	75	100
	IV	Environmental Studies	Environmental Studies	2	2	3	25	75	100
<b>Total</b>				<b>30</b>	<b>21</b>				<b>700</b>
III	I	Language Course – III (LC) – Tamil*/Other Languages ** #		6	3	3	25	75	100
	II	English Language Course - III (ELC)		6	3	3	25	75	100
	III	Core Course – III (CC)	Programming in Java	6	5	3	25	75	100
		Core Practical - III (CP)	Programming in Java (P)	3	2	3	40	60	100
		Second Allied Course – I (AC)		4	4	3	25	75	100
		Second Allied Course – II (AC and AP) (Theory-60 marks (UE:45 IA:15) (Practical-40 marks (UE:30 IA:10)		3	-	-	-	-	-
	III	Non Major Elective I - for those who studied Tamil under Part I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree programme	Working Principles of Internet	2	2	3	25	75	100
<b>Total</b>				<b>30</b>	<b>19</b>				<b>600</b>

IV	I	Language Course –IV (LC) - Tamil*/Other Languages ** #		6	3	3	25	75	100
	II	English Language Course–IV (ELC)		6	3	3	25	75	100
	III	Core Course – IV (CC)	Database Systems	5	5	3	25	75	100
		Core Practical - IV (CP)	Database Systems (P)	3	2	3	40	60	100
	III	Second Allied Course – II (AC and AP) (Theory -60 marks (UE:45 IA:15) (Practical-40 marks (UE:30 IA:10)		3	3	(2+2) 4***	40	60	100
		Second Allied Course–III (AC)		3	2	3	25	75	100
	IV	Non Major Elective II - for those who studied Tamil under Part I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree programme	Fundamentals of Information Technology	2	2	3	25	75	100
		Skill Based Elective - I	Skill Based Elective - I	2	2	3	25	75	100
		<b>Total</b>		<b>30</b>	<b>22</b>				<b>800</b>
V	III	Core Course V [CC]	Data Structures and Algorithms	5	5	3	25	75	100
		Core Course VI [CC]	Operating Systems	5	5	3	25	75	100
		Core Course VII [CC]	Digital Computer Fundamentals	5	5	3	25	75	100
		Core Practical V [CP]	Computer Graphics and Animation (P)	4	3	3	40	60	100
		Major Based Elective - I	Computer Graphics / Software Engineering / <b>Software Testing</b>	5	5	3	25	75	100
	IV	Skill Based Elective II	Skill Based Elective - II	2	2	3	25	75	100
		Skill Based Elective III	Skill Based Elective – III	2	2	3	25	75	100
		Soft Skills Development	Soft Skills Development	2	2	3	25	75	100
		<b>Total</b>		<b>30</b>	<b>29</b>				<b>800</b>
VI	III	Core Course VIII [CC]	Computer Networks	6	6	3	25	75	100
		Core Course IX [CC]	Programming in PHP	6	6	3	25	75	100
		Core Practical VI [CP]	Programming in PHP (P)	5	4	3	40	60	100
		Major Based Elective - II	Cloud Computing / Business Process Outsourcing /Mobile Computing	6	6	3	25	75	100
		Major Based Elective - III	Mini Project ( Students to do it in their respective Colleges) / Linux Lab/ Dot Net Lab	6	6	3	40	60	100
	V	Extension Activities	Extension Activities	-	1	-	-	-	-
		Gender Studies	Gender Studies	1	1	3	25	75	100
		<b>Total</b>		<b>30</b>	<b>30</b>				<b>600</b>
		<b>Grand Total</b>		<b>180</b>	<b>140</b>	-	-	-	<b>4100</b>

### List of Allied Courses

Allied Course I  
**Mathematics**

Allied Course II  
**Accounting and OB**

Language Part – I	-	4
English Part –II	-	4
Core Paper	-	9
Core Practical	-	6
Allied Paper	-	4
Allied Practical	-	2
Non-Major Elective	-	2
Skill Based Elective	-	3
Major Based Elective	-	3
Environmental Studies	-	1
Value Education	-	1
Soft Skill Development	-	1
Gender Studies	-	1
Extension Activities -	-	1 (Credit only)

\* for those who studied Tamil upto 10<sup>th</sup> +2 (Regular Stream)

+ Syllabus for other Languages should be on par with Tamil at degree level

# those who studied Tamil upto 10<sup>th</sup> +2 but opt for other languages in degree level under Part I should study special Tamil in Part IV

\*\* Extension Activities shall be out side instruction hours

\*\*\* Examination hours : (Theory – 2 Hours and Practical – 2 Hours)

Non Major Elective I & II – for those who studied Tamil under Part I

- a) Basic Tamil I & II for other language students
- b) Special Tamil I & II for those who studied Tamil upto 10<sup>th</sup> or +2 but opt for other languages in degree programme

**Note:**

	Internal Marks	External Marks
1. Theory	25	75
2. Practical	40	60
3. Separate passing minimum is prescribed for Internal and External marks		

**FOR THEORY**

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

**FOR PRACTICAL**

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]

The passing minimum for University Examinations shall be 40% out of 60 marks [i.e. 24 marks]

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**CORE COURSE – I**  
**PROGRAMMING IN C**

**Objective:** To impart basic knowledge of Programming Skills in C language.

**Unit I**

Introduction to C – Constants, Variables, Data types – Operator and Expressions.

**Unit II**

Managing Input and Output operations – Decision Making and Branching – Decision making and Looping.

**Unit III**

Arrays – Character Arrays and Strings – User defined Functions.

**Unit IV**

Structures and unions – Pointers – File management in C.

**Unit V**

Dynamic memory allocation – Linked lists- Preprocessors – Programming Guidelines.

**Text Book:**

1. Balagurusamy E .,Programming in ANSI C , Sixth Edition, McGraw-Hill, 2012

**Reference Book:**

1. R.S.Bichkar, Programming with C, University Press, 2012

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**CORE PRACTICAL I**  
**PROGRAMMING IN C (P)**

**Objective :** To Impart Practical Training in C Programming Language

1. Write a Program to convert temperature from degree Centigrade to Fahrenheit.
2. Write a Program to find whether given number is Even or Odd.
3. Write a Program to find greatest of Three numbers.
4. Write a Program to using switch statement to display Monday to Sunday.
5. Write a Program to display first Ten Natural Numbers and their sum.
6. Write a Program to find Multiplication of Two Matrices.
7. Write a Program to find the maximum number in Array using pointer.
8. Write a Program to reverse a number using pointer.
9. Write a Program to solve Quadratic Equation using functions.
10. Write a Program to find factorial of a number using Recursion.
11. Write a Program to show Call by Value and Call by Reference.
12. Write a Program to add two numbers using pointer.
13. Write a Program to create a file containing Student Details.
14. Write a Program to update the details of student's information using various file modes.

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**CORE COURSE II**  
**PROGRAMMING IN C++**

**Objective:** To impart basic knowledge of Programming Skills in C++ language.

**Unit I**

Principles of Object- Oriented Programming – Beginning with C++ – Tokens, Expressions and Control Structures – Functions in C++

**Unit II**

Classes and Objects – Constructors and Destructors – New Operator – Operator Overloading and Type Conversions

**Unit III**

Inheritance: Extending Classes – Pointers- Virtual Functions and Polymorphism

**Unit IV**

Managing Console I/O Operations – Working with Files – Templates – Exception Handling

**Unit V**

Standard Template Library – Manipulating Strings – Object Oriented Systems Development

**Text Book**

1. Balagurusamy E, Object Oriented Programming with C++, Tata McGraw Hill Publications, Sixth Edition, 2013

**Reference Books**

1. Ashok Kamthane, Programming in C++, Pearson Education, 2013.

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**CORE PRACTICAL II**  
**PROGRAMMING IN C++ (P)**

**Objective :** To Impart Practical Training in C++ Programming Language

**1. Classes**

Write a Program using a class to represent a Bank Account with Data Members – Name of depositor, Account Number, Type of Account and Balance and Member Functions – Deposit Amount – Withdrawal Amount. Show name and balance. Check the program with own data.

**2. Constructor & Destructor**

Write a program to read an integer and find the sum of all the digits until it reduces to a single digit using constructor, destructor and default constructor.

**3. Default & Reference Argument**

Write a program using function overloading to read two matrices of different data types such as integers and floating point numbers. Find out the sum of the above matrices separately and display the total sum of these arrays individually.

**4. Operator Overloading**

- a. Addition of Two Complex Numbers.
- b. Matrix Multiplication

**5. Inheritance**

Prepare Pay Roll of an employee using Inheritance.

**6. Pointers**

- a. Write a Program to find the number of vowels in a given text
- b. Write a Program to check for Palindrome

**7. Files**

Prepare Students Mark List in a file with Student Number, Mark in four subjects and Mark Total. Write a program to arrange these records in the ascending order of Mark Total and write them in the same file overwriting the earlier records.

**8. Exception Handling**

Prepare Electricity Bill for customers generating and handling any two Exceptions.

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## **CORE COURSE III**

### **PROGRAMMING IN JAVA**

**Objective:** To understand the basic concepts of Object Oriented Programming with Java language

#### **Unit I**

Object Oriented Programming : Introduction to OOP – Objects and Classes – Characteristics of OOP – Difference between OOP and Procedure Oriented Language – Introduction to java Programming : Introduction – Features of Java – Comparing java and Other Languages – Applications and Applets – Java Development Kit – Complex Programs – Java Source File Structure – Prerequisites for Compiling and Running Java Programs

#### **Unit II**

Java Language Fundamentals : The Building Blocks of Java – Data Types – Variable Declarations – Wrapper Classes – Operations and Assignment – Control Structures – Arrays – Strings – StringBuffer Class

#### **Unit III**

Java as an OOP Language : Defining Classes – Modifiers – Packages - Interfaces

#### **Unit IV**

Exception Handling : Introduction – Basics of Exception Handling – Exception Hierarchy – Constructors and Methods in Throwable Class - Unchecked and Checked Exceptions – Handling Exceptions in Java – Exception and Inheritance – Throwing User-defined Exceptions – Redirecting and Rethrowing Exceptions – Advantages of Exception Handling Mechanism – Multithreading : Introduction – Creating Threads – Thread Life-cycle – Thread Priorities and Thread Scheduling – Thread Synchronization – Daemon Threads – Thread Groups – Communication of Threads

#### **Unit V**

Files and I/O Streams : Overview – Java I/O – File Streams – FileInputStream and FileOutputStream – File Streams – RandomAccess File – Serialization - Applets : Introduction – Java Applications versus Java Applets – Applet Life-cycle – Working with Applets – The HTML APPLET Tag – The java.Applet package

#### **Text Book :**

1. Object Oriented Programming through Java, P.Radha Krishna, University Press,2011

#### **Reference Book:**

1. Java Programming, K.Rajkumar, Pearson India, 2013

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## **CORE PRACTICAL III**

### **PROGRAMMING IN JAVA (P)**

**Objective :** To Impart Practical Training in Java Programming Language

1. Write a program to sort the given numbers using arrays.
2. Write a program to implement the FIND and REPLACE operations in the given multiple text.
3. Write a program to implement a calculator to perform basic arithmetic Operations.
4. Write a program to find the area of a rectangle using constructor
5. Write a program to find the student's percentage and grade using command line arguments.
6. Write a program to draw circle or triangle or square using polymorphism and inheritance.
7. Implement multiple inheritance concepts in java using interface, you can choose your own example of a company or education institution or a general concept which requires the use of interface to solve a particular problems.
8. Write a program to create threads and assign priorities to them
9. Write a program to develop an applet to play multiple audio clips using multithreading.
10. Write a program to create a window with three check boxes called red, green and blue. The applet should change the colors according to the selection.

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## **NON MAJOR ELECTIVE I**

### **WORKING PRINCIPLES OF INTERNET**

**Objective :** To understand the working Principles of Internet

#### **Unit I**

What is Internet ? The Internet's underlying Architecture

#### **Unit II**

Connecting to the Internet – Communicating on the Internet

#### **Unit III**

How the World Wide Web works. Common Internet tools

#### **Unit IV**

Multimedia on the Internet – Intranet and shopping on the Internet

#### **Unit V**

Safeguarding the Internet

#### **Text Book :**

1. How the Internet Works, Preston Gralla, Pearson Education, Eighth Edition, 2006

#### **Reference Book :**

1. Internet for Everyone, Alexis Leon, S. Chand (G/L) & Company Ltd; Second Edition 2012.

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## **CORE COURSE IV**

### **DATABASE SYSTEMS**

**Objective :** To provide the basic concepts of the Database Systems including Data Models, Storage Structure, Normalization and SQL

#### **Unit I**

Introduction: Database-System Applications- Purpose of Database Systems - View of Data --Database Languages - Relational Databases - Database Design -Object-Based and Semi structured Databases - Data Storage and Querying Transaction Management -Data Mining and Analysis - Database Architecture - Database Users and Administrators - History of Database Systems.

#### **Unit II**

Relational Model: Structure of Relational Databases - Fundamental Relational-Algebra Operations Additional Relational-Algebra Operations- Extended Relational-Algebra Operations - Null Values - Modification of the Database.

#### **Unit III**

SQL: Data Definition - Basic Structure of SQL Queries - Set Operations - Aggregate Functions - Null Values - Nested Subqueries - Complex Queries - Views -Modification of the Database - Joined Relations - SQL Data Types and Schemas - Integrity Constraints -Authorization - Embedded SQL

#### **Unit IV**

Relational Languages: The Tuple Relational Calculus - The Domain Relational Calculus - Query-by- Example. Database Design and the E-R Model: Overview of the Design Process - The Entity-Relationship Model - 3 Constraints - Entity-Relationship Diagrams - Entity-Relationship Design Issues - Weak Entity Sets - Database Design for Banking Enterprise

#### **Unit V**

Relational Database Design: Features of Good Relational Designs - Atomic Domains and First Normal Form - Decomposition Using Functional Dependencies - Functional-Dependency Theory - Decomposition Using Functional Dependencies - Decomposition Using Multivalued Dependencies-More Normal Forms - Database-Design Process

#### **Text Book:**

1. Database System Concepts, Sixth edition, Abraham Silberschatz , Henry F. Korth, S. Sudarshan, McGraw-Hill-2010.

#### **Reference Books:**

- 1 Database Systems: Models, Languages, Design and Application, Ramez Elmasri, Pearson Education, 2014.

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**CORE PRACTICAL IV**  
**DATABASE SYSTEMS (P)**

**Objective :** To Impart Practical Training in MySQL

1. Create a table and perform the following basic mysql operations

- a) Set the primary key
- b) Alter the structure of the table
- c) Insert values
- d) Delete values based on constraints
- e) Display values using various forms of select clause
- f) Drop the table

2. Develop mysql queries to implement the following set operations

- a) Union
- b) Union all
- c) Intersect
- d) Intersect all

3. Develop mysql queries to implement the following aggregate functions

- a) Sum
- b) Count
- c) Average
- d) Maximum
- e) Minimum
- f) Group by clause & having clause

4. Develop mysql queries to implement following join operations

- a) Natural join
- b) Inner join
- c) Outer join-left outer, right outer, full outer
- d) Using join conditions

5. Develop mysql queries to implement nested subqueries

- a) Set membership (int, not int)
- b) Set comparison (some, all)
- c) Empty relation (exists, not exists)
- d) Check for existence of Duplicate tuples(unique, not unique)

6. Develop mysql queries to create a views and expand it.

7. Develop mysql queries to implement

- a) String operations using %
- b) String operations using ‘\_’
- c) Sort the element using asc,desc  
[\*create necessary relations with requires attribute]

8. Consider the following database for a banking enterprise

BRANCH(branch-name:string, branch-city:string, assets:real)  
ACCOUNT(accno:int, branch-name:string, balance:real)  
DEPOSITOR(customer-name:string, accno:int)  
CUSTOMER(customer-name:string, customer-street:string, customer-city:string)  
LOAN(loan-number:int, branch-name:string, amount:real)  
BORROWER(customer-name:string, loan-number:int)

- i. Create the above tables by properly specifying the primary keys and the foreign keys
- ii. Enter at least five tuples for each relation
- iii. Find all the customers who have at least two accounts at the *Main* branch.
- iv. Find all the customers who have an account at *all* the branches located in a specific city.
- v. Demonstrate how you delete all account tuples at every branch located in a specific city.
- vi. Generate suitable reports.
- vii. Create suitable front end for querying and displaying the results.

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## **NON MAJOR ELECTIVE II**

### **FUNDAMENTALS OF INFORMATION TECHNOLOGY**

**Objective :** To Provide the Basic Concepts in Information Technology

#### **Unit I**

Introduction to Computers - Generation of Computers - Classification of Digital Computer - Anatomy of Digital Computer.

#### **Unit II**

CPU and Memory - Secondary Storage Devices - Input Devices - Output Devices.

#### **Unit III**

Introduction to Computer Software - Programming Language - Operating Systems - Introduction to Database Management System.

#### **Unit IV**

Computer Networks - WWW and Internet - Email - Web Design

#### **Unit V**

Computers at Home, Education, Entertainment, Science, Medicine and Engineering - Introduction to Computer Security - Computer Viruses, Bombs, Worms.

#### **Text Book:**

1. Fundamentals of Information Technology, Alexis Leon And Mathews Leon, Vikas Publishing House Pvt. Ltd, 2009

#### **Reference Book:**

1. Fundamentals of Computers and Information Technology, M.N Doja, 2005

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## **CORE COURSE V**

### **DATA STRUCTURES AND ALGORITHMS**

**Objective:** To understand the concepts of Data Structures and Algorithms.

#### **Unit I**

Arrays and sequential representations – ordered lists – Stacks and Queues – Evaluation of Expressions – Multiple Stacks and Queues – Singly Linked List – Linked Stacks and queues – Polynomial addition.

#### **Unit II**

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 and Transitive closure – Activity Networks – Topological Sort and Critical Paths.

#### **Unit III**

Algorithms – Priority Queues - Heaps – Heap Sort – Merge Sort – Quick Sort – Binary Search – Finding the Maximum and Minimum.

#### **Unit IV**

Greedy Method : The General Method – Optimal Storage on Tapes – Knapsack Problem – Job Sequencing with Deadlines – Optimal Merge Patterns.

#### **Unit V**

Back tracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring.

#### **Text Books:**

1. Fundamentals of Data Structure – Ellis Horowitz, Sartaj Sahni, Galgotia Publications, 2008
2. Computer Algorithms – Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, University Press, 2008.

#### **Reference Book:**

1. Data Structures – Seymour Lipschutz, Tata McGraw Hill, Schaum's Outline Series, 2014

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## **CORE COURSE VI**

### **OPERATING SYSTEMS**

**Objective:** To provide the Fundamental Concepts in an Operating System.

#### **Unit I      Introducing Operating Systems**

Introduction - What Is an Operating System-Operating System Software -A Brief History of Machine Hardware -Types of Operating Systems -Brief History of Operating System Development-Object-Oriented Design

#### **Unit II      Memory Management**

Early Systems: Single-User Contiguous Scheme -Fixed Partitions-Dynamic Partitions-Best-Fit versus First-Fit Allocation -Deallocation - Relocatable Dynamic Partitions. Virtual Memory: Paged Memory Allocation-Demand Paging-Page Replacement Policies and Concepts -Segmented Memory Allocation-Segmented/Demand Paged Memory Allocation - Virtual Memory-Cache Memory

#### **Unit III      Processor Management**

Overview-About Multi-Core Technologies-Job Scheduling Versus Process Scheduling-Process Scheduler-Process Scheduling Policies-Process Scheduling Algorithms -A Word About Interrupts-Deadlock-Seven Cases of Deadlock -Conditions for Deadlock-Modeling Deadlock-Strategies for Handling Deadlocks -Starvation - Concurrent Processes: What Is Parallel Processing-Evolution of Multiprocessors-Introduction to Multi-Core Processors-Typical Multiprocessing Configurations--Process Synchronization Software

#### **Unit IV      Device Management**

Types of Devices-Sequential Access Storage Media-Direct Access Storage Devices-Magnetic Disk Drive Access Times- Components of the I/O Subsystem-Communication among Devices-Management of I/O Requests

#### **Unit: V      File Management**

The File Manager -Interacting with the File Manager -File Organization - Physical Storage Allocation -Access Methods-Levels in a File Management System - Access Control Verification Module

#### **Text Book:**

1. Understanding Operating Systems, Ann McIver McHoes and Ida M. Flynn, Course Technology, Cengage Learning, 2011

#### **Reference Book:**

1. Operating Systems, Achyut Godbole and Atul Kahate, McGraw Hill Publishing, 2010.

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**CORE COURSE VII**  
**DIGITAL COMPUTER FUNDAMENTALS**

**Objective :** To understand the concepts in Digital Computer System

**Unit I**

Number Systems and Codes: Binary Number System – Binary to Decimal Conversion – Decimal to Binary Conversion – Binary Addition – Binary Subtraction – Binary Multiplication and Division – Octal Numbers – Hexadecimal Numbers – Binary Codes – Error Detecting Codes – Error Correcting Codes.

**Unit II**

Logic Gates and Circuits: Boolean Algebra and Logic Gates – AND, OR, NOT, NAND, NOR, Exclusive OR and Exclusive OR Gates – Applications of XOR Gate – The Exclusive NOR Gate – Positive and Negative Logic – Logic Characteristics – Bipolar Logic Families – Integrated Circuits – Boolean Algebra: Definitions – Fundamentals of Boolean Algebra – Boolean Functions – Minterms and Maxterms – Laws and Theorems of Boolean Algebra – DeMorgan’s Theorem – Universal Building Blocks (UBB) – NAND Gate as UBB – NOR Gate as UBB.

**Unit III**

Boolean Algebra: Simplifying Logic Circuits – Sum of Products – AND-OR Networks – Sum of Products and Product of Sums Forms – Karnaugh Maps – Product of Sums Simplification – NAND and NOR Implementation – AND-OR-INVERT Implementation – OR-AND-INVERT Implementation – Don’t Care Conditions – Overlapping Groups – Rolling the Map – Eliminating Redundant Groups.

**Unit IV**

Combinational Logic Circuits: Introduction – Adders – The Half Adder – The Full Adder – Subtractors – BCD Adder – Multiplexers – Demultiplexers – Decoders – Encoders – Floating Point Number System – Range of Stored Numbers.

**Unit V**

Sequential Logic Circuits: Flip Flops – RS Flip Flop – Clocked RS Flip Flop – D Flip Flop – JK Flip Flop – T Flip Flop – Triggering of Flip Flops – Master Slave Flip Flop – Conversion of D Flip Flop – Conversion of T Flip Flop – Transfer Circuit – Clock – Counters and Shift Registers: Counters – Asynchronous or Ripple Counter – Ring Counter – Twisted Ring Counter – State Diagrams and State Tables – Magnitude Comparator – Programmable Arrays of Logic Cells – Shift Registers.

**Text Book:**

1. Principles of Digital Electronics, Dr. K. Meena, PHI Learning Private Limited, New Delhi, 2009.

**Reference Book:**

1. Digital Logic Design, M. Morris Mano, Pearson Education, 2010

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## **CORE PRACTICAL V**

### **COMPUTER GRAPHICS AND ANIMATION (P)**

**Objective :** To Impart Practical Training in Computer Graphics and Animation related problems

#### **Photoshop :**

1. (i) Handling different file formats and interchanging them, changing the resolution, color, grayscales and size of the images  
(ii) Using brushes and creating multicolor real life images
2. Cropping, rotating, overlapping, superimposing, pasting photos on a page
3. Creation of a single image from selected portions of many
4. Developing a commercial brochure with background tints
5. Creating an image with multi-layers of images and texts.
6. Applying masks and filtering on images

#### **Flash :**

Develop an image(s) and do the following.

1. Basic Drawing and Painting
2. Working with Strokes and Fills
3. Creating Custom Colors, Gradients, and Line Styles Transforming and Grouping Objects
4. Creating and Managing Multiple Layers
5. Converting Text into Shapes
6. Animate using motion, shape, Tweening, and actions

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## **MAJOR BASED ELECTIVE I (A)**

### **COMPUTER GRAPHICS**

**Objective:** To understand the concepts on basic Graphical Techniques, Raster Graphics, Two Dimensional and Three Dimensional Graphics

#### **Unit I**

Overview of Computer Graphics System: Video Display Devices – Raster Scan Systems – Random – Scan Systems - Graphics Monitors and Workstations – Input Devices – Hardcopy Devices – Graphics Software.

#### **Unit II**

Output Primitives: Line Drawing Algorithms – Loading the Frame Buffer – Line Function – Circle – Generating Algorithms. Attributes of Output Primitives: Line Attributes – Curve Attributes – Color and Grayscale levels – Area fill Attributes – Character Attributes – Bundled Attributes – Inquiry Functions.

#### **Unit III**

2D Geometric Transformations: Basic Transformation – Matrix Representations – Composite Transformations – Window to View port Co-Ordinate Transformations. Clipping: Point Clipping – Line Clipping – Cohen-Sutherland Line Clipping – Liang Barsky Line Clipping – Polygon Clipping – Sutherland – Hodgman Polygon Clipping – Curve Clipping – Text Clipping.

#### **Unit IV**

Graphical User Interfaces and Interactive Input Methods: The User Dialogue – Input of Graphical Data – Input Functions – Interactive Picture Construction Techniques. Three Dimensional Concepts: 3D-Display Methods – #Three Dimensional Graphics Packages

#### **Unit V**

3D Geometric and Modeling Transformations: Translation – Scaling – Rotation – Other Transformations. Visible Surface Detection Methods: Classification of Visible Surface Detection Algorithm – Back face Detection – Depth-Buffer Method – A-Buffer Method – Scan-Line Method – Applications of Computer Graphics.

#### **Text Book:**

1. Donald Hearn M. Pauline Baker, Computer Graphics C Version, Second Edition, Pearson Education, 2014.

#### **Reference Book:**

1. Computer Graphics, Sunil Kumar Sharma, Manoj Singhal, Pearson Education, 2014

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## **MAJOR BASED ELECTIVE I (B)**

### **SOFTWARE ENGINEERING**

**Objective:** To provide knowledge of the various phases of Software Engineering Process

#### **Unit I**

Introduction : Introduction to Software Engineering - Software Process - Software Process Models - Software Model - Requirements Engineering Principles : Requirements Engineering - Importance of Requirements - Types of Requirements - Steps involved in Requirements Engineering

#### **Unit II**

Requirements Analysis Modeling : Analysis Modeling Approaches - Structured Analysis - Object Oriented Analysis - Design and Architectural Engineering : Design Process and Concepts - Basic Issues in Software Design - Characteristics of Good Design - Software Design and Software Engineering - Function Oriented System vs Object Oriented System - Modularity, Cohesion, Coupling, Layering - Real Time Software Design - Design Models - Design Documentation

#### **Unit III**

Object Oriented Concepts : Fundamental Parts of Object Oriented Approach - Data Hiding and Class Hierarchy Creation - Relationships - Role of UML in OO Design - Design Patterns - Frameworks - Object Oriented Analysis - Object Oriented Design - User Interface Design : Concepts of User Interface - Elements of User Interface - Designing the User Interface - User Interface Evaluation - Golden Rules of User Interface Design - User Interface Models - Usability

#### **Unit IV**

Software Coding - Introduction to Software Measurement and Metrics - Software Configuration - Project Management Introduction - Introduction to Software Testing - Software Maintenance

#### **Unit V**

Web Engineering : Introduction to Web - General Web Characteristics - Web Application Categories - Working of Web Application - Advantages and Drawbacks of Web Applications - Web Engineering - Emerging Trends in Software Engineering - Web 2.0 - Rapid Delivery - Open Source Software Development - Security Engineering - Service Oriented Software Engineering - Web Service - Software as a Service - Service Oriented Architecture - Cloud Computing - Aspect Oriented Software Development - Test Driven Development - Social Computing

#### **Textbook:**

1. Software Engineering, Chandramouli Subramanian, Saikat Dutt, Chandramouli Seetharaman, B.G. Geetha, Pearson Publications, 2015

#### **Reference Books:**

1. Software Engineering, Jibitesh Mishra, Pearson Education, 2011

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## **MAJOR BASED ELECTIVE I (C)**

### **SOFTWARE TESTING**

**Objective :** To understand the basics of Software Testing

#### **Unit I**

Software Development Life Cycle models: Phases of Software project – Quality, Quality Assurance, Quality control – Testing, Verification and Validation – Process Model to represent Different Phases - Life Cycle models. White-Box Testing: Static Testing – Structural Testing –Challenges in White-Box Testing.

#### **Unit II**

Black-Box Testing: What is Black-Box Testing? - Why Black-Box Testing? – When to do Black-Box Testing? – How to do Black-Box Testing? – Challenges in White Box Testing -Integration Testing: Integration Testing as Type of Testing – Integration Testing as a Phase Testing – Scenario Testing – Defect Bash.

#### **Unit III**

System and Acceptance Testing: system Testing Overview – Why System testing is done? – Functional versus Non-functional Testing – Functional testing - Non-functional Testing – Acceptance Testing – Summary of Testing Phases.

#### **Unit IV**

Performance Testing: Factors governing Performance Testing – Methodology of 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 V**

Test Planning, Management, Execution and Reporting: Test Planning – Test Management – Test Process – Test Reporting –Best Practices. Test Metrics and Measurements: Project Metrics – Progress Metrics – Productivity Metrics – Release Metrics.

#### **Text Book**

1. Software Testing Principles and Practices – Srinivasan Desikan & Gopalswamy Ramesh, Pearson Education, 2014

#### **Reference Book**

1. Foundations of Software Testing, Aditya P. Mathur, Pearson Education, 2013

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**CORE COURSE VIII**  
**COMPUTER NETWORKS**

**Objective:** To understand the Design and Organization of Computer Networks

**Unit I**

Overview and Physical Layer: Introduction: Data Communications - Networks - Network Types, Network Models: TCP/IP Protocol Suite- The OSI Model, Bandwidth utilization : Multiplexing- Spread Spectrum, Transmission Media: Guided Media-Unguided Media, Switching: Circuit Switched Network-Packet Switching-Structure of a switch

**Unit II**

DataLinkLayer:Error Deduction and Correction : Introduction- Cyclic codes- Forward error correction, Data link Control: Datalink layer protocols- Media Access Control: Random Access- Controlled Access, Wireless Networks: IEEE 802.11- Bluetooth-Cellular Telephone- Satellite network- Connection devices,

**Unit III**

Network Layer Services : Packet Switching- Network layer performance- IPV4 Addresses- Internet Protocol-Routing Algorithms - IPV6 Addressing

**Unit IV**

Transport Layer : Transport Layer Protocols- User Datagram Protocol - TCP:TCP Services TCP features - Windows in TCP - Flow Control - Error Control- TCP Congestion Control - TCP timers

**Unit V**

Application Layers : Client Server Programming - Word Wide Web & HTTP - FTP - Email - DNS

**Text Book:**

1. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw Hill, Fifth Edison, 2013

**Reference Book:**

1. Data Communications and Networks, Achyut Godbole and Atul Kahate, McGraw Hill Education, 2011

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**CORE COURSE IX**  
**PROGRAMMING IN PHP**

**Objective :** To understand the Concepts of PHP and Ajax.

**Unit I**

Essentials of PHP - Operators and Flow Control - Strings and Arrays.

**Unit II**

Creating Functions - Reading Data in Web Pages - PHP Browser - Handling Power.

**Unit III**

Object-Oriented Programming –Advanced Object-Oriented Programming .

**Unit IV**

File Handling –Working with Databases – Sessions, Cookies, and FTP

**Unit V**

Ajax – Advanced Ajax – Drawing Images on the Server.

**Text Book:**

1. The PHP Complete Reference, Steven Holzner, McGraw Hill Education, 2007

**Reference Books:**

1. PHP: A Beginner's Guide, Vikram Vaswani, McGraw Hill Education, 2008

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## **CORE PRACTICAL VI**

### **PROGRAMMING IN PHP (P)**

**Objective :** To Impart Practical Training in PHP Programming Language

1. Write a program to find the factorial of a number.
2. Write a program using Conditional Statements.
3. Write a program to find the maximum value in a given multi dimensional array.
4. Write a program to find the GCD of two numbers using user-defined functions.
5. Design a simple web page to generate multiplication table for a given number.
6. Design a web page that should compute one's age on a given date.
7. Write a program to download a file from the server.
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. Write a program to draw the human face.
11. Write a program to design a simple calculator.
12. Design an authentication web page in PHP with MySQL to check username and password.

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## **MAJOR BASED ELECTIVE II (A)**

### **CLOUD COMPUTING**

**Objective :** To understand the concepts in Cloud Computing and its Security

#### **Unit I**

Cloud Computing Foundation : Introduction to Cloud Computing – Move to Cloud Computing – Types of Cloud – Working of Cloud Computing

#### **Unit II**

Cloud Computing Architecture : Cloud Computing Technology – Cloud Architecture – Cloud Modeling and Design - Virtualization : Foundation – Grid,Cloud and Virtualization – Virtualization and Cloud Computing

#### **Unit III**

Data Storage and Cloud Computing : Data Storage – Cloud Storage – Cloud Storage from LANs to WANs – Cloud Computing Services : Cloud Services – Cloud Computing at Work

#### **Unit IV**

Cloud Computing and Security : Risks in Cloud Computing – Data Security in Cloud – Cloud Security Services – Cloud Computing Tools : Tools and Technologies for Cloud – Cloud Mashaps – Apache Hadoop – Cloud Tools

#### **Unit V**

Cloud Applications – Moving Applications to the Cloud – Microsoft Cloud Services – Google Cloud Applications – Amazon Cloud Services – Cloud Applications

#### **Text Book**

1. Cloud Computing – A Practical Approach for Learning and Implementation, A.Srinivasan and J.Suresh, Pearson India Publications, 2014

#### **Reference Book**

1. Cloud Computing: Principles and Paradigms, edited by Rajkumar Buyya, James Broberg, Andrzej, Wiley India Publications, 2011

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## **MAJOR BASED ELECTIVE II (B)**

### **BUSINESS PROCESS OUTSOURCING**

**Objective :** To provide the Knowledge about the working environment of Business Process Outsourcing Industry

#### **UNIT I**

Search For Competitiveness - Need For Outsourcing - BPOs: Beyond Call Centres

#### **UNIT II**

Transition Management - BPO Business Models - BPO Governance

#### **UNIT III**

Legal Issues in BPO Contracts - BPO—Regulatory Issues - Service Supplier Selection

#### **UNIT IV**

Service Level Agreement - BPO Legal Contract - BPO to KPO: Up In The Value Chain

#### **UNIT V**

HR Challenges in BPO Industry - Performance Evaluation In BPO – BPO — Prerequisites And Precautions - Service Quality Issues in BPO

#### **Text Book**

1. Business Process Outsourcing: A Supply Chain of Expertises, Vinod V. Sople, Prentice Hall of India, 2011.

#### **Reference Book:**

1. Business Process Outsourcing, Sarika Kulkarni, Jaico Publishing House, Delhi 2005

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## **MAJOR BASED ELECTIVE II (C)**

### **MOBILE COMPUTING**

**Objective :** To understand the Architectures, Synchronization Process and Operating Systems in Mobile Computing

#### **Unit I**

Mobile Communications - An Overview : Mobile Computing - Mobile Computing Architecture - Mobile Devices - Mobile System Networks - Data Dissemination - Mobility Management - Security

#### **Unit II**

Mobile Devices and Systems : Mobile Phones - Digital Music Players - Handheld Pocket Computers - Handheld Devices with Operating Systems - Smart Systems - Limitations of Mobile Devices - Automotive Systems

#### **Unit III**

GSM and Similar Architectures : GSM Services and System Architecture - Radio Interfaces - Protocols - Localization - Calling - Handover - Security - New Data Devices - General Packet Radio Service - High Speed Circuit Switched Data

#### **Unit IV**

Data Synchronization in Mobile Computing Systems : Synchronization - Synchronization Software for Mobile Devices - Synchronization Protocols - Mobile Devices Server and Management : Mobile Agent - Application Server - Gateways - Portals - Service Discovery - Device Management - Mobile File Systems - Security

#### **Unit V**

Mobile Operating Systems : Operating System - Palm OS - Windows CE - Symbian OS - Linux for Mobile Devices

#### **Text Book:**

1. Mobile Computing, Rajkamal, Oxford University Press, 2011.

#### **Reference Book :**

1. Mobile Computing, KumkumGarg, Pearson Education, 2010.

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## **MAJOR BASED ELECTIVE III (A)**

### **MINI PROJECT**

Students to do Mini Project in their respective Colleges. The **objective** of the Mini Project is to enable the students to work in convenient groups of not more than Four members on a project with a Latest Software.

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## **MAJOR BASED ELECTIVE III (B)**

### **LINUX (P)**

**Objective :** To Impart Practical Training in Linux Operating System

#### **Write Shell Programs for the following using the Linux Operating System**

1. Check whether the given number is prime or not.
2. Find the biggest of given two numbers
3. Write a program to check the given number is odd or even
4. Write a program to generate Fibonacci Series
5. Write a program to prepare electric bill for domestic consumers.

For first 100 units - Rs.0.75/ unit

For next 100 units - Rs.1.50/unit

Above 200 units - Rs.3.00/unit.

Prepare the bill for the following format:

Customer No. -----

Customer Name -----

Pre.Reading -----

Cur.Reading -----

Units Consumed -----

Charge -----

Signature

6. Write a program to display the result PASS or FAIL using the information given below:  
Student Name, Student Reg. No., Mark1, Mark2, Mark3, Mark4. The minimum pass for each subject is 50.
7. Write a program to prepare a Payroll with Basic Pay, DA, Allowances ,PF and Gross Pay.
8. Using Case Statement, write a program to check the files ending with vowels.
9. Write a single program to sort the names and numbers in alphabetical, ascending and descending order.
10. Write a menu driven program to print Bio-data for five persons.

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## **MAJOR BASED ELECTIVE III (C)**

### **DOT NET (P)**

**Objective :** To Impart Practical Training in Dot Net Programming Language

1. Design ASP.Net web form using Html Server Controls to enter job seeker's details.
  2. Create an ASP.Net web form using Web control to enter E-Mail registration form.
  3. Apply appropriate validation techniques in E-Mail registration form using validation controls.
  4. Write an ASP.Net application to retrieve form data and display it the client browser in a table format.
  5. Create a web application using ADO.Net that uses which performs basic data manipulations:
    - (i). Insertion (ii) Updating (iii) Deletion (iv) Selection
- Hint: Do operations using Ms-Access and SQL-Server

6. Create an application using Data grid control to access information's from table in SQL server.
7. Create an application using Data list control to access information's from table in SQL server and display the result in neat format.

**Case Studies (Must include basic database operations such as Insertion, Deletion, Modication, Selection and Searching)**

8. Job Search Portal.
9. College Portal.
10. Company Portal.

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