A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI
DEPARTMENT OF COMPUTER SCIENCE
(Students admitted from the academic year 2018 – 2019 onwards)

B.Sc. COMPUTER SCIENCE

Sem.	S. Code	Courses	Title of the paper	Hours	Credits	Total Credits
I		LC I	Tamil I	6	3	20
		ELC I	English I	6	3	
		CC I – Theory	C Programming	5	5	
		CC II – Practical	Practical I – C Programming	2	2	
		AC I – Theory	Mathematics I	9	5	
		VBC	Human Value Based Course	2	2	
II		LC II	Tamil II	6	3	20
		ELC II	English II	6	3	
		CC III – Theory	C++ Programming and Data Structures	5	5	
		CC IV – Practical	Practical II – C++ Programming and Data Structures	2	2	
		AC II – Theory	Mathematics II	9	5	
		ES	Environmental Studies	2	2	
III		LC III	Tamil III	6	3	20
		ELC III	English III	6	3	
		CC V – Theory	Java Programming	5	5	
		CC VI – Practical	Practical III – Java Programming	2	2	
		AC III – Theory	Physics I	7	4	
		AC IV – Practical I	Practical I – Physics I	2	1	
		SBC I	Business Communication Tools Lab	2	2	
IV		LC IV	Tamil IV	6	3	20
		ELC IV	English IV	6	3	
		CC VII – Theory	XML and PHP Programming	6	6	
		CC VIII – Practical	Practical IV – XML and PHP Programming	2	2	
		AC V – Theory	Physics II	7	4	
		AC VI – Practical II	Practical II – Physics II	2	1	
		EA I	Gender Studies	1	1	
V		CC IX – Theory	Relational Database Management System	5	5	30
		CC X - Theory	Principles of Operating System	5	5	
		CC XI – Theory	Digital Computer Architecture	4	4	
		CC XII – Practical	Practical V – RDBMS	5	5	
		EC I	Elective I – Software Engineering	5	5	
		NMEC I	Mathematics Aptitude –I	2	2	
		SBC II	DTP Lab	2	2	
		SSD	Soft Skills Course	2	2	
VI		CC XIII – Theory	Dot Net Programming	4	4	29
		CC XIV – Theory	Computer Networks	4	4	
		CC XV – Theory	Introduction to Microprocessor	4	4	
		CC XVI – Practical	Practical VI – Dot Net Programming	6	5	
		EC II	Elective II– Multimedia and its Applications	4	4	
		EC III	Elective III – Internet of Things	4	4	
		NMEC II	Mathematics Aptitude II	2	2	
		SBC III	Graphics and Animation Lab	2	2	
		EA II	Extension Activity	-	1	1
		TOTAL				**140**

Elective: I

1. **Software Engineering**
2. System Analysis and Design
3. Object-oriented Analysis and Design

Elective: II

1. **Multimedia and Its Applications**
2. Embedded Systems
3. E-Commerce

Elective: III

1. **Internet of Things**
2. Network Security
3. Business Process Outsourcing

A.V. C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
B.Sc. COMPUTER SCIENCE – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2018-2019 onwards)

Code	Core Course – I	Hrs.	Credits	Marks (CIA+ESE)
	C Programming	5	5	25+75

Objectives:

- To acquire knowledge on programming skills using 'C' language.
- To understand the concepts of Pointers and File concepts.

Unit - I: **15 Hrs.**

Datatypes and Operators: Identifiers and keywords – Constants – C Operators – Type Conversion.

Writing a program in C: Variable declaration – Statements – Simple C programs – Simple I/O statements.

Unit - II: **15 Hrs.**

Control Statements: Conditional Expressions - Loop statements – Breaking control statements.

Functions and program structures: Introduction – Defining a function – return statement – Types of functions – Actual and formal arguments – Local and global variables – Multifunction program – The scope of variables – Recursive functions.

Unit - III: **15 Hrs.**

Arrays : Array notations, Declaration and Initialization - Processing with arrays – Arrays and functions – Multidimensional array – Character array.

Pointers : Pointer declaration and arithmetic – Pointers and functions – Pointers and arrays – Pointers and strings – Arrays of pointers.

Unit - IV: **15 Hrs.**

More on functions: Preprocessors – Macros – Header files – Standard functions.

Structures, Unions and Bitfields : Declaration and initialization of structure – Functions and structures – Arrays of structures – Arrays within a structures – structures within a structure – Pointers and structures – Unions – Bitfields – Typedef – Enumerations.

Unit - V: **15 Hrs.**

Dynamic memory allocations: Memory management functions – sizeof statement.

Data file Operations : Review of I/O functions – Opening and closing of functions – Simple file Operation – Structure and file operations – Block read/write – Random access file processing.

Text Books :

1. Programming in C by D. Ravichandran , New age international private limited publisher, 2011.

References:

1. "A Workbook on C", Vikas Verma, Cengage Learning, 2nd Edition, 2012
2. "Programming in ANSI C " – Kumar Agrawal,
3. "Computer Programming in C", V. Rajaraman.
4. "Computer Programming", Ashok N Kamthane, Pearson education, Second Impression, 2008.
5. "Programming in ANSI C", Balagurusamy E –Tata McGraw Hill, 6th edition, 2012.

A. V. C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

B,Sc. COMPUTER SCIENCE – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2018-2019 onwards)

Code	Core Course – II	Hrs.	Credits	Marks (CIA+ESE)
	Practical – I : C Programming	2	2	40 + 60

Objectives:

- To acquire knowledge on programming skills in 'C' language
- To understand the functions and file operations.

LIST OF PRACTICALS

1. Write a C program to generate Fibonacci series for a given number.
2. Quadratic equation
3. Sorting of numbers
4. String functions (user defined)
5. Recursion
6. Matrix multiplication
7. Write a C program to convert decimal number to other number systems.
8. File creation (using command line arguments and structures)
9. File copy (using command line arguments)
10. File concatenation (using command line arguments)

A. V. C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

B.Sc. COMPUTER SCIENCE – Semester - II
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Code	Core Course – III	Hrs.	Credits	Marks (CIA+ESE)
	C++ Programming and Data Structures	5	5	25+75

Objectives

- To understand the difference between the Structured and Object oriented programming.
- To learn the Object oriented programming and Data Structures concepts.
- To acquire knowledge on C++ language features using Data Structures.

Unit – I: **15 Hrs.**

Object Oriented programming paradigm - Basic concepts of Object Oriented programming -structure of C++ program.

Functions in C++ : Introduction – the main function – function prototyping – call by reference – return by reference – Inline function – Default, const arguments – recursion – function overloading – friend and virtual functions

Classes and Objects : Introduction – specifying a class- Defining member function – a C++ program with class – Making an outside function inline – Nesting of member function – Private member functions - Arrays within a class – Memory allocation for objects – Static data members – Static member functions – Arrays of objects – Objects as function arguments – Friendly functions.

Unit – II: **15 Hrs.**

Constructor and Destructor: Introduction – Constructions - Parameterized constructors - Multiple constructors in a class – Constructors with default arguments – Dynamic initialization of objects – Copy constructor – Dynamic constructors – Destructor.

Operator Overloading and Type Conversions : Defining operator overloading – Overloading unary operators – Overloading binary operators – Rules for overloading operators – Type conversions.

Unit – III: **15 Hrs.**

Inheritance: Defining derived classes – Single inheritance – Making a private member inheritance – Multilevel inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance – Virtual base classes – Abstract classes.

Pointers, Virtual Functions and Polymorphism: Pointers – Pointers to objects – this pointer – Pointers to derived classes – virtual functions – Pure virtual functions.

Unit – IV: **15 Hrs.**

Managing Console I/O Operators: C++ streams, stream classes – unformatted I/O operations – Formatted console I/O operations – Managing output with manipulators.

Working with files: Classes for file stream operations – Opening and closing a file – Detecting end of file – More about open() : file modes – File pointer and there manipulations – Sequential Input Output operations – Updating a file : random access – Error handling during file operations – Command line arguments.

Exception Handling: Basics – Exceptions handling mechanism – throwing mechanism – Catching mechanism - rethrowing an exception- specifying exceptions.

Unit - V: **15 Hrs.**

Introduction to data structures: Data structures, Operations.

Arrays : Representation of one dimensional array in memory – Multidimensional arrays – Operations on arrays.

Linked List : Introduction to lists and linked lists – Operations on linked list – Circular linked list – Doubly linked lists.

Stacks : Introduction – Representation of stack through arrays - Representation of stack through linked lists.

Queues : Introduction – Representation of queues – Circular queues - Doubly ended queues.

Text Book:

1. ” Object Oriented Programming with C++’, 6e, E.Balagurusamy, Tata McGraw Hill Publishing Company Limited, 2015.(For Unit I to IV)
2. “Data Structures through C++”, ISRD group, Tata McGraw Hill Publications, 2011. (For Unit V).

A. V. C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.
B.Sc. COMPUTER SCIENCE – Semester - II
(For candidates admitted to the course under CBCS Pattern from 2018-2019 onwards)

Code	Core Course – IV : Practical	Hrs.	Credits	Marks (CIA+ESE)
	C++ Programming and Data Structures	2	2	40 + 60

Objectives:

- To enable students to understand the Object oriented programming and Data Structures concepts
- To gain programming skills in 'C++' language

C++:

1. Write an OOP Program to Perform Complex Arithmetic Operations which passes objects from functions.
2. Write a class to represent a vector. Include member functions to perform the following tasks:
    a. To create the vector
    b. To modify the value of a given element
    c. To multiply by a scalar value
    d. To display the vector in the form (10,20,….)
3. Write an OOP Program for matrix manipulation using constructor with dynamic allocation of memory.
4. Write an OOP Program to prepare mark sheet using inheritance and manipulator functions
5. Write an OOP Program to perform Runtime Polymorphism.
6. Write an OOP Program to perform the following Conversion Operations:
    a) From Built-in type to class type
    b) From Class type to Built-in type.
    c) From one class type to another class type.
7. Write an OOP program to create a data file for storing student's data and print mark list for a particular student.
8. Write an OOP program to create and manipulate employee data file.
9. Write a OOP program to sort the data using selection sort.
10. Write an OOP program to implement Stack.
11. Write an OOP program to implement Queue.
12. Write an OOP program to implement List.

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

B.Sc., COMPUTER SCIENCE – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2018–2019 onwards)

Code	Core Course – V	Hrs.	Credits	Marks (CIA+ESE)
	Java Programming	5	5	25+75

Objectives:

- To understand Classes and Objects;
- To apply the concept of Inheritance and Polymorphism;
- To know the concept of Multithreading;
- To develop GUI based applications using Abstract Windowing Toolkit.

Unit – I: **(15 Hours)**

Java Evolution: Java History – Features – How java differs from C and C++ – Java and internet – Java and WWW – Web browsers – H/W and S/W requirements – Java support support systems – Java environment. **Overview of Java Language:** Introduction – Simple Java program – More of Java – An application with two classes – Java program structure – Java tokens – Java statements – Installing and configuring Java – implementing a Java program – Java Virtual Machine – Command Line Arguments – Programming style. **Constants, Variables and Data Types:** Introduction – Constants – Variables – Data Types – Declaration of variables – Giving values to variables – scope of variables – symbolic constants – type casting – getting values of variables – standard default values.

Unit – II: **(15 Hours)**

Operators and Expressions: Introduction – arithmetic operators – relational operators – logical operators – assignment operators – increment and decrement operators – conditional operators – bitwise operators – special operators. Arithmetic expressions – evaluation of expressions – precedence of Arithmetic operators – Type conversions in expressions – operator precedence and associativity –Mathematical Functions. **Decision Making and Branching:** Introduction – Decision making with If Statement – Simple If Statement – the *If...Else* Statement – Nesting of *If...Else* Statement – The *Else...If* Ladder – the Switch Statement – the?: Operator. **Decision Making and Looping:** Introduction– while statement – do statement – for statement – Jumps in Loops – Labeled Loops.

Unit – III: **(15 Hours)**

Classes, Objects, and Methods: Introduction– Defining a Class– fields Declaration – Methods Declaration– Creating Objects– Accessing Class Members– Constructors– Method overloading– Static Members– Nesting of Methods– Inheritance: Extending a Class– Overriding Methods– Final Variables and Methods– Final Classes – Finalizer Methods– Abstract Methods and Classes– Methods with varargs– Visibility Control. **Arrays, Strings and Vectors:** Introduction– One–dimension Arrays– Creating an Array– Two–dimensional Arrays– Strings– Vectors– Wrapper Classes – enumerated Types– Annotations. **Interfaces: Multiple Inheritance:** Introduction– Defining Interfaces– Extending Interfaces– Implementing Interfaces– Accessing Interface Variables

Unit – IV: **(15 Hours)**

Packages: Putting Classes together: Introduction– Java API Packages– Using System Packages– Naming conventions– Creating packages– Accessing a package– Using a Package– Adding a Class to a package– Hiding Classes– Static Import. **Multithreaded Programming:** Introduction– Creating Threads– Extending the Thread Class– Stopping and Blocking a Thread– Life Cycle of a Thread– Using Thread Methods– Thread Exceptions– Thread Priority– Synchronization– Implementing the 'Runnable' Interface– Inter–thread communication. **Managing Errors and Exceptions:** Introduction– Types of Errors– Exceptions– Syntax of Exception handling code– Multiple Catch Statements– Using finally Statement– Throwing our Own Exceptions– Using Exceptions for Debugging.

Unit – V: **(15 Hours)**

Applet Programming: Introduction– How Applets differ from Applications– Preparing to Write Applets– Building Applet code– Applet Life cycle– Creating an executable Applet– Designing a Web page– Applet tag– Adding Applet to HTML file– Running the applet– More about Applet tag– passing Parameters to Applets– aligning the Display– More about HTML Tags– displaying Numerical Values– Event Handing. **Graphics programming:** Introduction– The Graphical Class– Lines and Rectangles– Circles and ellipses– Drawing Arcs– Drawing Polygons.

Managing Input/output files in Java: Introduction– concept of Streams– Stream classes– Byte stream classes– Character stream classes– Using streams– Other useful I/O Classes– Using the File class– Input/output Exceptions– Creation of Files– Reading/writing Characters– reading/writing Bytes– Handing Primitive Data types– Random Access Files.

Text Book:

1.Balagurusamy.E, "*Programming with Java A Primer"*, Tata McGraw Hill, 5th edition,2015.

Reference Books:

1. Herbert Schildt, "*Java – The Complete Reference*", Tata McGraw Hill, 11th edition.
2. K. Rajkumar, "*Java Programming*", Pearson India, 1st edition, 2013.
3. P. Radha Krishna, "*Object Oriented Programming through Java*", University Press,2011.
4. C.Muthu, "*Programming with JAVA*", Vijay Nicole Imprints, Chennai, 2014.
5. Hari Mohan Pandey, "*JAVA Programming*", 1st edition, Pearson Education, 2012.

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B.Sc., COMPUTER SCIENCE – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2018–2019 onwards)

Code	Core Course – VI	Hrs.	Credits	Marks (CIA+ESE)
	Practical: III – Java Programming	2	2	40 + 60

Objectives:

- To understand Classes and Objects;
- To apply the concept of Inheritance and Polymorphism;
- To create knowledge on Multithreading;
- To develop GUI based applications using Abstract Windowing Toolkit;

LIST OF PRACTICALS

1. Write a Java program to compute the nCr value.
2. Write a Java program to generate Fibonacci series for the given number.
3. Write a Java program to handle various Mathematical functions.
4. Write a Java program to demonstrate the usage of classes and objects.
5. Write a Java program to demonstrate the usage of Constructor inside the class.
6. Write a Java program to handle various string functions.
7. Write a Java program to demonstrate the usage of vector class.
8. Write a Java program to create and import the package.
9. Write a Java Program to implement the concept of multiple inheritance using Interfaces.
10. Write a Java program to handle multithreading processes.
11. Write a Java program to demonstrate the uses of exception handling process.
12. Write a Java program to create and use your own exception.
13. Write an applet program to display your personal details.
14. Write an applet program to draw the various geometric figures.
15. Write a Java Program which open an existing file and append text to that file.

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

B.Sc., COMPUTER SCIENCE – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2018–2019 onwards)

Code	Skill Based Course – SBC I	Hrs.	Credits	Marks (CIA+ESE)
	Business Communication Tools	2	2	40 + 60

Objectives:

- To learn the important facilities, commands and menu options available in Word Processing, Spreadsheets, Presentation and Database.

Word Processing:

1. Create a Word document in which perform the following operations:
    a. Create bookmarks
    b. Adding End notes and comments
    c. Find and Replace the text
    d. Entering the text with Autocorrect and Autotext
    e. Use Dropcaps to emphasize your text.

2. Create a Word document and perform the following operations on the text:
    a. Edit the document using cut, copy and paste
    b. Format the text with Bullets and Numbers
    c. Check for Spelling and Grammar
    d. Modifying Font, Line Spacing
    e. Protecting document by setting password.

3. Create a Word document and perform the following operations on it:
    a. Inserting and Deleting Manual Page Break
    b. Format the document using page setup
    c. Adding lines, borders, shading, background and watermarks, dates and page numbers to your document
    d. Creation and Deletion of Headers and Footers to your document
    e. Opening, Closing and Printing of a document.

4. Create a Table in the document and perform the following operations on it:
    a. Convert text to a table
    b. Convert a table to text
    c. Merging and Splitting cells, tables
    d. Applying Table formats
    e. Change case of typed text
5. Create a document which uses Advanced Mail-Merge techniques.
6. Prepare a resume using word document.

Spreadsheet:

7. Create a worksheet and perform various operations on it.
   (Apply different types of Formulas and Built-in functions)
8. Create a worksheet and prepare a Graph using :
    a. Possible types of charts with Gridlines, Datalables, Legends, and Titles.
    b. Adding Background Colour and Pictures.
9. Create a Data-Entry form just like an Invoice of an organization and maintain the information in a database.
10. Modify the worksheet layout by,
    a. Changing column width and row height
    b. Inserting and deleting columns, rows and cell
    c. Moving and Copying cell contents.
11. Create a worksheet to do the following:
    a. Generate the series using File Series command
    b. Transferring data between worksheets.

Presentation:

12. Create a presentation using Autocontent Wizard.
13. Create a Slide show which should use graphics, multimedia, transition, animation and Special effects.
14. Create presentation slides using Design Templates.
15. Method of using the different views of slides to create presentation: Normal, Outline, Slide, Slide sorter views.

Database:

16. Create a Student database using design view and generate a student report using Wizard.
17. Create an employee database and design a Form to maintain the database.

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

B.Sc., COMPUTER SCIENCE – Semester – IV
(For candidates admitted to the course under CBCS Pattern from 2018–2019 onwards)

Code	Core Course – VII	Hrs.	Credits	Marks (CIA+ESE)
	XML and PHP Programming	6	6	25+75

Objectives:

- To acquire the knowledge HTML.
- To understand the importance of PHP, its fundamentals and Programming techniques.
- To gain knowledge on the use of XML, its fundamentals and Programming techniques.

Unit – I: **(18 Hours)**

HTML: Introducing HTML Document Structure – Changing Headings on a Web page – Working with Links – Creating a Paragraph – Working with Images – Working with Tables – Working with Frames – Introduction to Forms and HTML Controls – Introducing Cascading Style Sheets – Introducing DHTML.

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Unit – II: **(18 Hours)**

PHP: Introduction– Features – Introduction to XHTML – Advantages of PHP over other Scripting languages – Creating, running and handling errors in PHP Script – Escape characters. **Working with Variables and Constants:** Using Variables – Constants – Data types in PHP – Operators in PHP. **Controlling Program flow:** Conditional statements – Looping statements – Break, Continue and Exit statements.

Unit – III: **(18 Hours)**

PHP: Working with Functions, Arrays, Files and Directories: User–defined functions in PHP – Built–in functions in PHP: String, Date, Time, Mathematical functions – Recursive, Variable and Callback functions – Introducing Arrays– Creating, accessing Arrays – Types of Arrays: Numeric, Associative, Multidimensional Arrays – Traversing Arrays using Loops and Array Iterators – Built–in Array functions – Working with Files – Working with Directories.

Unit – IV: **(18 Hours)**

PHP: Working with Forms and Database: Introducing Web Forms – Working with the <form> Tag and Form Elements – Processing a Web Form – Validating a Form – Introducing Databases – Using PHP and MySql. **Exploring Cookies, Sessions:** Working with Cookies – Working with Sessions – Differentiating Cookies and Sessions.

Unit – V: **(18 Hours)**

XML: Working with XML: Introduction to XML – XML Basics: Syntax, Declaration, Elements, Attributes, Valid XML documents, Parameter Entities and Conditional Sections – Advanced XML: Namespaces, **DTD**, CDATA, Encoding, XML on the Server, Application, HttpRequest Object – XML Technologies – XHTML – DOM – Simple API for XML – XSLT: Stylesheet, Functions – Transforming an XML Document using using XSLT – XPath: Functionality, Functions – XML Linking mechanism – Working with XLink – Working with XPointer.

Text Book:

"Web Technologies – HTML, JavaScript, PHP, Java, JSP, ASP.NET, XML and AJAX" – Black Book (New), DT Editorial Services, Dreamtech Press, New Delhi, 2017 **(Relevant portions only).**

Reference Books:

1. "Developing Web Applications", R.Moseley and M.T. Savaliya, Wiley publication, 2013.
2. "Web programming: building internet applications, Chris Bates, Wiley India, 2007.
3. "XML and PHP", Vikram Vaswani, Newriders publishers, 2002.
4. "Schaum Series– Outline of XML", Ed Tittel, 2002.
5. "PHP: A Beginner's Guide, Vikram Vaswani, McGraw Hill Education, 2008.

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B.Sc., COMPUTER SCIENCE – Semester – IV
(For candidates admitted to the course under CBCS Pattern from 2018–2019 onwards)

Code	Core Course – VIII	Hrs.	Credits	Marks (CIA+ESE)
	Practical: IV **XML and PHP Programming**	2	2	40 + 60

Objectives:

- To acquire knowledge on HTML Programming.
- To understand the Programming techniques of PHP.
- To gain knowledge on XML fundamentals and Programming techniques.

LIST OF PRACTICALS

HTML:

1. Write a HTML Program to demonstrate the Tables.
2. Write a HTML Program to demonstrate the Frames.
3. Write a HTML Program for creating Lists, Hyperlinks and loading Images on web page.

PHP:

4. Write PHP script to demonstrate String functions.
5. Write PHP script to demonstrate Array functions.
6. Write a PHP program to store current date–time in a COOKIE and display the 'Last visited on date–time on the web page upon reopening of the same page.
7. Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.
8. Write a PHP script for User authentication using PHP–MYSQL. Use session for storing username.
9. Write a program in PHP to add, update, delete using Student database and generate Result.
10. Write PHP Script to create Website Registration Form using Text box, Check box, Radio button, Select, Submit buttons. Store it in a Database and display the details on a new page.

XML:

11. Create an XML Document to store information about Books and create the DTD files.
12. Create an XML document, which contains 10 users information and display the user details in table from the XML document.

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III – B.Sc., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – IX: Theory
Title of the Paper: Relational Database Management System
Subject Code:

No. of Hours: 5
No. of Credits: 5

Learning Objectives:

- To enable students to learn the database concepts, DBMS, relational databases and Normal forms.
- To understand the usage of SQL commands.

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To acquire the detailed Knowledge about the database system.

CO2: To understand the basic features of Relations and the Relational Algebra.

CO3: To explore knowledge in SQL queries and Triggers in PL/SQL.

CO4: To understand the basic features of Integrity and Views.

CO5: To develop applications by using the concept of Normalization.

Unit – I: **(15 Hours)**

An overview of Database Management: Database System – Database – Its importance – Data Independence. **Database System Architecture:** Introduction – Three Levels of Architecture – The External Level – Conceptual Level – The Internal Level – Mappings – The

Database Administrator – The Database Management System – Client server architecture – Distributed processing.

Unit – II: **(15 Hours)**

An Introduction to SQL: Introduction – overview - The catalog – Views –Transactions Embedded SQL – Dynamic SQL and SQL/CLI. **Relations:** Introduction – Tuples – Relation types – Relation values - Relation variables. **Relational Algebra:** Introduction – Relational Operators - Examples.

Unit – III: **(15 Hours)**

SQL: Interactive SQL : Table Fundamentals – Viewing data in the Tables – Eliminating duplicate rows when using a select statement – Sorting data in a table – Creating a table from a table –Inserting data into a table from another table – Delete operations – Updating the contents of a table – Modifying the structure of tables – Renaming tables – Truncating tables – Destroying tables- Creating synonyms . I/O constraints: primary key constraint, Foreign key constraint, Unique key constraint – Null value concepts – NOT NULL constraint defined at the column level – The check constraint. ORACLE FUNCTIONS - Aggregate functions – Numeric functions – String functions – Conversion functions- Manipulating dates in SQL using the Date(). Grouping data from tables in SQL – Sub queries – Joins.

Interactive Pl-SQL: Cursor – Trigger - Before Trigger - After Trigger - Types of Triggers – Row Trigger-Database Trigger-Deleting a Trigger-Program using Triggers-Exception Handling.

Unit – IV: **(15 Hours)**

Integrity: Introduction –Internal vs External predicates – Correctness vs consistency – Integrity and views – Constraints classifications scheme – keys. **Views:** Introduction – Views – View Retrieval – View Updates.

Unit – V: **(15 Hours)**

Normalization : Introduction, **Functional Dependencies** – Non loss decomposition and functional dependencies – First, Second and Third Normal forms – Dependency preservation – Boyce/Codd Normal form.**Further Normalization : Higher Normal Form:** Introduction – Multi valued Dependencies and fourth normal form – Join dependencies and fifth normal form – A note on Denormalizations – Normalization procedure summarized.

Text Books:

(1) Date, C.J., Kannan, A. and Swamynathan, S. 2012. *An Introduction to Database Systems*, Eighth edition, Pearson Publication.

(2) Ivan Bay Ross, 2013, *SQL, PL/SQL The Programming Language of Oracle*, Fourth revised edition, BPB Publications,

Reference Books:

(1) Silberchartz korth, and Sudarashan, 2002, *Database system concepts,* Fourth edition, Tata McGraw Hill.

(2) Shah, 2002, *Database system using Oracle a simplified guide to SQL & PL/SQL*, Second edition, PHI Learning Pvt. Ltd.

(3) Sharad Maheswari, Ruchin Jain, 2007, *Introduction to SQL & PL/SQL* , Second edition, Laximi publication Pvt. Ltd.

(4) Das Gupta, 2009, *Database management system, Oracle, SQL & PL/SQL*, PHI Learning Pvt.Ltd.

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III – B.Sc., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – X: Theory
Title of the Paper: Principles of Operating System **Subject Code:**

No. of Hours: 5
No. of Credits: 5

Learning Objectives:

- To understand the history, concepts and structure of Operating Systems.
- To gain knowledge on scheduling, deadlocks, storage and I/O management.
- To know the concept of file systems and process management.

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To understand the services provided by an operating system and system calls.

CO2: To understand what a process is and how processes are synchronized.

CO3: To provide a detailed description of various process scheduling techniques and deadlock management.

CO4: To describe various memory management techniques.

CO5: To explore the physical structure of secondary storage devices, file system implementation and the design principles of LINUX operating system.

Unit – I: **(15 Hours)**

Introduction: Operating System – Computer system organization – computer system architecture – operating systems structure – operating system operations – process management –

memory management – storage management – protection and security – kernel data structures – computing environments – open source operating systems.

Operating System structures: Operating System Services – user and operating system interface – System calls – types of system calls – System Programs – operating system design and Implementation – operating system structure – operating system debugging – operating system generation – system boot.

Unit – II: **(15 Hours)**

Processes: Process concept - process scheduling – operation on processes – Interprocess communication.

Threads: Overview – multicore programming- multithreading models.

Process Synchronization: The critical section problem – Peterson's solution – Synchronization hardware – Mutex locks – Semaphores.

Unit –III: **(15 Hours)**

CPU Scheduling: Basic concepts - scheduling criteria - scheduling algorithms –thread scheduling - multiple- processor scheduling – Algorithm Evaluation.

Deadlocks: System model – Deadlock characterization – Methods of handling deadlocks – deadlock prevention – deadlock avoidance – deadlock detection – recovery from deadlock.

Unit – IV: **(15 Hours)**

Main Memory: Background – swapping – Continuous memory allocation – Segmentation Paging – structure of page table – segmentation.

Virtual Memory: Background – Demand Paging – Copy on write – page replacement – allocation of frames – Thrashing – Memory mapped files – allocating kernel memory – other considerations.

Unit –V: **(15 Hours)**

Mass Storage Structure: Overview of mass storage structure - Disk structure – Disk attachment – Disk scheduling – Disk management – Swap Space management.

File System Interface: file concept – access methods – directory and disk structure.

Case study.

The Linux System: History – Design principles – Kernel Modules – Process management – scheduling-memory management – file systems.

Text Book:

Abraham Silberschatz, Peter BaerGalvin and Greg Gagne, 2016, *Operating System concepts*, Ninth India edition, Wiley Publication.

Reference Books:

(1) Tenenbaum and Woodhull, 2006, *Operating System: Design and Implementation*, PHI Learning Pvt.Ltd.

(2) Gill, P.S. 2006, *Operating system concepts*, First edition, Laxmi Publications Pvt. Ltd.

(3) Stuart E. Madnick and John J. Donovan, 2008, *Operating Systems*, Third edtion, Tata McGraw Hill Publishing Company Ltd.

(4) Achyut S. Godbole and AtulKahate, 2011, *Operating systems*, Tata McGraw Hill Publishing.

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III – B.Sc., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – XI: Theory
Title of the Paper: Digital Computer Architecture **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To learn functions of digital logic circuits
- To understand basic computer organization and design
- To gain knowledge on CPU, Memory and I/O organization, and Multiprocessors

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To understand the structure, components of a computer, their functions and their Interconnection Structures.

CO2: To gain knowledge on Cache, Internal, External Memory working principles and its design principles.

CO3: To Learn I/O devices, module, I/O methods, DMA, Number systems and addressing modes, formats in Instruction set.

CO4: To acquire knowledge on Processor, Register organization, Instruction cycle, Pipelining, RISC.

CO5: To understand the Multiprocessor organization, Parallel processing, Cloud computing, and Control unit operations.

Unit – I: **(15 Hours)**

Basic Concepts and Computer Evolution: Organization and Architecture - Structure and Function - The Evolution of the Intel x86 Architecture - Embedded Systems - Arm Architecture - Cloud Computing.

A Top-Level View Of Computer Function and Interconnection: Computer Components - Computer Function - Interconnection Structures - Bus Interconnection - Point-to-Point Interconnect.

Unit – II: **(15 Hours)**

Cache Memory: Computer Memory System Overview - Cache Memory Principles - Elements Of Cache Design.

Internal Memory: Semiconductor Main Memory - Error Correction - DDR DRAM - Flash Memory.

External Memory: Magnetic Disk - RAID - Optical Memory.

Unit – III: **(15 Hours)**

Input/ Output: External Devices - I/O Module - Programmed I/O - Interrupt- Driven I/O - Direct Memory Access - Direct Cache Access - I/O Channels and Processors.

Number Systems: The Decimal System - Positional Number Systems - The Binary System - Converting Between Binary and Decimal - Hexadecimal Notation.

Instruction Set: Addressing Modes and Formats : Addressing Modes - Instruction Formats - Assembly Language.

Unit – IV: **(15 Hours)**

Processor Structure and Function: Processor Organization - Register Organization - Instruction Cycle - Instruction Pipelining.

Reduced Instruction Set Computers: Instruction Execution Characteristics - The Use of Large Register File - Compiler- Based Register Optimization - Reduced Instruction Set Architecture - RISC Pipelining.

Unit – V: **(15 Hours)**

Parallel Processing: Multiple Processor Organizations - Symmetric Multiprocessor - Cache Coherence and The MESI Protocol - Multithreading and Chip Multiprocessor - Clusters - Non-Uniform Memory Access - Cloud Computing.

Control Unit Operation: Micro Operation - Control of the Processor - Hardwired Implementation.

Text Book:

William Stallings, 2016, *Computer Organization and Architecture Designing for performance*, Tenth Edition, Pearson Education Publication.

Reference Books :

(1) Usha, M. Srikanth, T.S. 2012, *Computer System Architecture and Organization*, First Edition, Wiley Publications.

(2) John L. Hennessy , David A. Patterson, 2014, *Computer Architecture*, Fifth Edition: A Quantitative Approach, Fifth Edition, Morgan Kaufmann Publishers.

(3) Linda Null, Julia Lobur, 2015, *The Essentials of Computer Organization and Architecture*, Fourth Edition, Viva Publishers.

(4) Ikvinderpal Singh, Baljinder Singh, 2015, *Computer Organization and Architecture*, First Edition, Khanna Publishers.

(5) Morris Mano, , M. 2016, *Computer System Architecture,* Third Edition, Fourteenth reprint, Pearson Education.

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III – B.Sc., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – XII: Practical – V
Title of the Paper: RDBMS **Subject Code:**

No. of Hours: 5
No. of Credits: 5

Learning Objectives:

- To acquire knowledge on DDL, DML and DCL commands
- To understand the usage of SQL queries
- To learn the features on PL/SQL programming and Oracle forms

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To become familiar in creating tables and doing all the manipulations in it.

CO2: To gain knowledge in Arithmetic functions and string functions.

CO3: To explore vast knowledge in SQL queries, sub queries etc.

CO4: To establish skills in Triggers and Cursors in PL/SQL.

CO5: To acquire practical skills in forms and reports.

SQL:

1.Table creation with various data types and constraints.

2.DDL statements (CREATE, ALTER, DROP)

3.DML statements (Retrieval, Update, Delete, Insertion)

4.Arithmetic, Character and String Functions.

5.Group functions

6.Conversion functions Date functions

7.JOINS (Self, Equi and Outer, Inner)

8.Sub queries and correlated sub queries.

PL/SQL:

9.Bank transactions using a table.

10. Exception handling.

11. Explicit and Implicit cursors.

12. Program using Triggers.

FORMS:

13. Design a Form in oracle for student detail using default form.

14. Design a Report in oracle for Employee detail using controls**.**

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III – B.Sc., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Elective Course – I:

Title of the Paper: 1.Software Engineering **Subject Code:**

No. of Hours: 5
No. of Credits: 5

Learning Objectives:

- To understand the basic concepts of software engineering
- To learn the methods of planning a software project, software cost estimation, requirements definition, software design implementation, testing and maintenance

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To understand the basic concepts of Software Engineering and to learn the methods of planning a Software Planning.

CO2: To gain the knowledge of Software Cost Estimation and Software Requirement Definition.

CO3: To illustrate the usage of Software Design.

CO4: To acquire the knowledge about Implementation issues.

CO5: To learn the techniques of Verification, Validation and Maintenance.

Unit – I: **(15 Hours)**

Introduction to Software Engineering: Definitions – Size factors: Total Effort Devoted to Software, Distribution of Effort, Project Size Categories, Programmers Spend their Time – Quality and Productivity factors.

Planning a Software Project: Defining the problem – Developing a solution strategy – Planning the development Process: The Phased Life Cycle Model, Milestones, Documents, and Reviews, The Cost Model, The Prototype Life-Cycle Model, Successive Versions – Planning an organizational structure: Project Structure, Programming Team Structure,Management by Objectives – Other Planning activities.

Unit – II: **(15 Hours)**

Software Cost Estimation: Software cost factors: Programmer Ability, Product Complexity, Product Size, Available Time, Required Level of Reliability, Level of Technology – Software cost estimation techniques: Expert Judgment, Delphi Cost Estimation, Work Breakdown Structures, Algorithmic Cost Models-Staffing-level Estimation-Estimating Software Maintenance Costs.

Software Requirement Definition: Software requirement specification – Formal specification techniques: Relational Notations and State-Oriented Notations**.**

Unit – III: **(15 Hours)**

Software Design: Fundamental design concepts: Abstraction, Information Hiding, Structure, Modularity, Concurrency, Verification, Aesthetics – Modules and modularization criteria:Coupling and cohesion, other modularization criteria -Design notations: Flow Diagrams, Structure Charts, HIPO Diagrams, Procedure Templates, Pseudo code, Structured Flowcharts, Structured English, Decision Tables – Design techniques: Stepwise Refinement, Level of Abstraction, Structured Design, Integrated Top-Down Development, Jackson Structured Programming.

Unit – IV: **(15 Hours)**

Detailed Design Considerations-Real Time and Distributed System Design-Test Plans-Milestones, Walkthroughs and Inspections-Design Guidelines.

Implementation Issues: Structured coding techniques: Single Entry, Single Exit Constructs, Efficiency Considerations, Violations of Single Entry, Single Exit, Data Encapsulation, The Goto Statement, Recursion– Coding style – Standards and Guidelines –

Documentation Guidelines: Supporting Documents, Program Unit Notebooks, Internal Documentation.

Unit – V: **(15 Hours)**

Verification and Validation Techniques: Quality assurance – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing: Integration Testing, Acceptance Testing**.**

Software Maintenance: Enhancing Maintainability during development – Managerial Aspects of Software Maintenance-Configuration Management-Software Code Metrics-Other Maintenance Tools and Techniques.

Text Book:

Richard Fairly, 2012, , *Software Engineering Concepts*, Thirty seventh reprint, Tata McGraw Hill Publishing Company Limited (Relevant portions only).

Reference Books:

(1) James E.Tomayko, Orit Hazzan, 2005, *Human aspects of Software Engineering*, Laximi publication Pvt. Ltd.

(2) Kelkhar, 2007, *Software Engineering: A Concise study*, PHI Learning Pvt. Ltd.

(3) Bharat, Bhushan, Agarwal, Sumit and Prakash Tayal, 2007, *Software Engineering*, First edition, Laximi publication Pvt. Ltd.

(4) Rogan S Pressman, 2010, *Software Engineering Applications approach*, Twelfth edition, Tata McGraw Hill.

(5) James, 2011, *Software Engineering*, PHI Learning Pvt. Ltd.

A.V.C. College (Autonomous)
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III – B.Sc., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Elective Course – I:

Title of the Paper: 2.System Analysis and Design **Subject Code:**

No. of Hours: 5
No. of Credits: 5

Learning Objectives:

- To understand the concepts of Systems and Information systems
- To learn the role of Systems analyst, processes involved in system analysis, tools available, cost-benefit analysis, file organization and database design

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To understand the basic concepts of system and SDLC.

CO2: To learn the role of system analyst and the way of getting user requirements.

CO3: To gain knowledge on system analysis process and its tools.

CO4: To acquire the knowledge on cost benefits analysis and system design process.

CO5: To learn about the file, database organization and system implementations.

Unit – I: **(15 Hours)**

Systems concepts and the Information Systems Environment: Introduction – The Systems concept: Definition – Characteristics of a system: Organization – Interaction – Interdependence – Integration – central objective – Elements of a system: Outputs and inputs – processor – control – feedback – environment – boundaries and interfaces – types of systems: physical or abstract

systems – open or closed systems – man-made information systems. The system development life cycle: introduction – the system development life cycle – recognition of need – what is problem? – Feasibility study – analysis – design – implementation – post implementation and maintenance – considerations for candidate systems: political considerations – planning and control for system success – prototyping.

Unit – II: (15 Hours)

The Role of the Systems Analyst: Introduction – definition – Historical perspective: the early years – the war effort – what does it take to do systems analysis? – academic and personal qualifications – the multifaceted role of the analyst: change agent – investigator and monitor – architect – psychologist – salesperson – motivator – politician – the analyst/user interface: behavioral issues – conflict resolution – the place of the analyst in the MIS organization - the MIS organization – rising positions in system development paraprofessional – the technical writer. System analysis: System planning and the initial investigation: introduction – base for planning in systems analysis: dimensions of planning – initial investigation: needs identification – determining the user's information requirements – case scenario – problem definition and project initiation – background analysis – fact-finding – fact analysis – determination of feasibility.

Unit – III: (15 Hours)

System analysis: Information Gathering: introduction – what kinds of information do we need? – Information about the firm. – Information about user staff – Information about work flow – where does information originate? – Information-gathering tools: review of literature, procedures and forms – on-site observation – interviews and questionnaires – type of interviews and questionnaires. The tools of structured analysis: introduction – what is structured analysis? – the tools of structured analysis: the data flow diagram (DFD) – data dictionary – decision tree and structured English – decision tables – pros and cons of each tool. Feasibility study: introduction – system – performance definition: statement of constraints – identification of specific system objectives – description of outputs – feasibility study: feasibility consideration – steps in feasibility analysis – feasibility report – oral presentation.

Unit – IV: **(15 Hours)**

Cost/benefit analysis: introduction – data analysis – cost/benefit analysis: cost and benefit categories – procedure for cost / benefit determination – the system proposal.

Systems design: the process and stages of systems design: introduction – the process of design: logical and physical design – design methodologies: structured design – form-driven methodology – the IPO charts – structured walkthrough. – Major development activities: personnel allocation – audit considerations: processing controls and data validation – audit trail and documentation control. Input /Output and forms design: introduction – input design: input data – input media and devices: output design – forms design: what is a form? – Classification of forms – requirements of forms design – carbon paper as a form copier – types of forms – layout considerations – forms control.

Unit – V: **(15 Hours)**

File organization and data base design: introduction – file structure – file organization: sequential organization – indexed-sequential organization – inverted list organization – direct-access organization – data base design: objectives of data base- key terms – logical and physical views of data. Data structure – normalization – the role of the data base administrator.

System implementation: System testing and quality assurance: introduction – why system testing? – What do we test for? – The nature of test data.- the test plan: activity network for system testing. – System testing – quality assurance: quality assurance goals in the systems life cycle. – Levels of quality assurance – trends in testing – role of the data processing auditor: the audit trail. Implementation and software maintenance: introduction – conversion: activity network for conversion – combating resistance to change – post-implementation review: request for review – a review plan – software maintenance: maintenance or enhancement? – Primary activities of a maintenance procedure – reducing maintenance costs.

Text Book:

Elias M. Awad, 2000, *System Analysis and Design*, Second edition, Galgotia Publications Pvt. Ltd.

Reference Books:

(1) Lee, 2002, *Introducing system analysis and design*, Vol. I & II, Galgotia Publication.

(2) Chaing. et al(Eds), 2005, *System analysis and design: Techniques, Methodologies, Approaches and Architectures,* PHI Learning Pvt. Ltd.

(3) Kendall and Kendall, 2007, *System analysis and design*, Seventh edition, PHI Learning Pvt. Ltd.

(4) Rajaraman, 2007, *Analysis and design of Information Systems*, Second edition, PHI Learning Pvt. Ltd.

(5) Dixit, J.B. and Raj Kumar, 2010, *Structured system analysis and design*, Laxmi publication Pvt. Ltd.

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III – B.Sc., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Elective Course – I:

Title of the Paper: 3.Object-Oriented Analysis and Design

Subject Code:

No. of Hours: 5
No. of Credits: 5

Learning Objectives:

- To learn the basics of object, object-oriented systems development methodologies
- To understand the usage of UML and the process involved in object-oriented analysis
- To enable students to learn the procedure of ensuring software quality assurance

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To understand the basic concepts of object and object oriented SDLC.

CO2: To learn various object oriented methodologies and UML.

CO3: To gain knowledge on object oriented analysis process.

CO4: To acquire the knowledge on object-oriented design process and design axioms.

CO5: To understand about software quality assurance, usability and user satisfaction.

Unit – I: **(12 Hours)**

Object Basics: Introduction – An Object-Oriented Philosophy – Objects – Object are grouped in classes – Attributes: Object state and properties – Object Behavior and methods – Object respond to message – Encapsulation and Information hiding – class hierarchy – polymorphism – Object relationship and associations – Aggregations and object containment.

Object-Oriented systems development life cycle: Introduction – The software development process – Building high-quality software – Object-Oriented system development: A use-case driven approach- Reusability.

Unit – II: (12 Hours)

Object-Oriented Methodologies: Introduction – Survey of some of the object-oriented methodologies – Rumbaugh et al.'s object modeling technique – the Booch methodology – the Jacobson et al. methodologies – Patterns – Frameworks – The Unified Approach.

Unified Modeling Language: Introduction – static and dynamic models – why modeling? – Introduction to the Unified modeling language – UML Diagrams – UML Class Diagram – Use-case Diagram – UML Dynamic modeling – Model Management: packages and model Organization – UML Extensibility – UML Meta-model.

Unit – III: (12 Hours)

Object-Oriented analysis process: Identifying use cases – Introduction – why analysis is a difficult activity – business object analysis: understanding the business layer – use-case driven object-oriented analysis: the unified approach – business process modeling – use-case model – Developing effective documentation.

Object analysis: Classification – Introduction – classification theory – Approaches for identifying classes – Noun Phrase Approach – common class patterns approach – Use-case driven approach: Identifying classes and their behavior through sequence / collaboration modeling – Classes, Responsibilities, and Collaborations- Naming classes.

Unit – IV: (12 Hours)

Identifying object relationships, attributes, and methods: Introduction – Associations – Super-sub class relationships – A-part-of relationships-Aggregation- Class Responsibility: Identifying attributes and methods – Class Responsibility: Defining attributes by analyzing use case and other UML Diagrams – Defining attributes for ViaNet Bank objects – Object Responsibility: methods and messages – Defining methods for vianet bank objects.

The object-oriented design process and design axioms: Introduction – the object-oriented design process – object-oriented design axioms – corollaries – design patterns.

Unit – V: **(12 Hours)**

Software quality assurance: Introduction – Quality assurance tests – testing strategies – impact of object orientation on testing – test cases – test plan – continuous testing – Myers's debugging principles.

System usability and measuring user satisfaction: Introduction – usability testing – user satisfaction test – A tool for a analyzing user satisfaction: the user satisfaction test template.

Text Book:

Ali Bahrami, 2001, *Object Oriented Systems Development*, International edition, Tata McGraw Hill.

Reference Books:

(1) Gredy Booch, 1994, Object Oriented Analysis and Design with applications, Second edtion, Addision Wesley.

(2) Matha, 2002, Object Oriented Analysis and Design using UML: Introduction Unified Process and design pattern, PHI Learning Pvt. Ltd.

(3) Andrew Haigh,, 2002, Object Oriented Analysis and Design, Tata McGraw Hill.

(4) Lee & Tepfenhart, 2003, UML & C++: A practical guide to object-oriented development, Second edition, PHI Learning Pvt. Ltd.

(5) Kelkar, 2002, Structured systems analysis and design: A Concise Study, PHI Learning Pvt. Ltd.

A.V.C. College (Autonomous)
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III – B.Sc., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Skill Based Course - II
Title of the Paper: DTP Lab **Subject Code:**

No. of Hours: 2
No. of Credits: 2

Learning Objectives:

- To acquire the knowledge on Desktop publishing
- To learn the method of preparation of document and manipulation of pictures

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To gain knowledge about picture attributes.

CO2: To understand the setting background and stroke effect for the image.

CO3: To learn the working principles of built-in tools

CO4: To understand the manipulation of text.

CO5: To update the knowledge of drawing tools

List of Exercises:

1. Change the color modes, resize and rotate the picture.
2. Define the background pattern for a canvas
3. Apply stroking effects to the picture.
4. Merge a picture and a text into the single layer
5. Create a shadow of the image without using the in-built tool.

6. Create and manipulate text using text wrap, anti-aliasing, formatting text and paragraph.
7. Create and modify the particular area of that picture using selection tools.
8. To draw an arbitrary and regular paths using Freehand and Bezier tool.
9. To draw a straight lines and curves using basic tools.
10. To create an object, edit and apply the stroke and fill.
11. To create shadows, blurs and other useful filters.

A.V.C. College (Autonomous)
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III – B.Sc., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – XIII: Theory
Title of the Paper: Dot Net Programming **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To enable students to learn ASP.NET framework.
- To understand the Control structures, Procedures and Arrays and validation.
- To gain skills on Graphical User Interface Controls and Databases.

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To outline the concept of Web Programming

CO2: To understand the Validation and Rich controls in ASP.NET

CO3: To acquire the Knowledge of Database Access

CO4: To gain the knowledge of Display data using grid, simple controls

CO5: To understand the data access using controls, usage of cookies and session variables

Unit – I: **(12 Hours)**

Building ASP.NET pages: ASP.NET and the .NET framework: Understanding the framework class library, Understanding the Common Language Runtime – Understanding

ASP.NET Controls : Overview of ASP.NET Controls, Understanding HTML Controls, Understanding and Handling Control Events, Understanding View State .

Using the Standard Controls: Displaying Information: Using the Label Control , Using the Literal Control – Accepting User Input : Using the Text box Control, Using the Check box Control, Using the Radio Button Control – Using the Button Control.

Unit – II: **(12 Hours)**

Using validation controls: Using the RequiredFieldvalidator Control, Using the RangeValidator Control, Using the CompareValidator Control, Using the RegularExpressionValidator Control.

Using Rich Controls: Accepting File Uploads : Saving Files to the File System, Saving Files to a Database – Displaying a Calendar : Creating a Pop-Up date picker – Displaying Advertisements : Storing Advertisement in an XML File, Storing Advertisement in a database Table – Displaying different page views: Display a Tabbed Page View, Displaying a Multipart Form.

Unit – III: **(12 Hours)**

Performing Data Access: Using DataBound controls: Working with List Controls, Working with Tabular DataBound Controls, Working with Hierarchical DataBound Controls – using DataSource controls : Using ASP.NET Parameters with Data Source Controls – Using Programmatic DataBinding.

Using the SqlDataSource control: Creating database connections : Connecting to Microsoft SQL Server , Connecting to other Databases – Executing database commands : Executing Inline SQL Statements, Executing Stored Procedures, Filtering Database Rows, Changing the Data Source Mode , Handling SQL Command Execution Errors, Cancelling Command Execution - Programmatically Executing SqlDataSource commands: Adding ADO.NET Parameters, Executing Insert, Update and Delete Commands , Executing Select Commands – Catching database data with the SqlDataSource control.

Unit – IV: **(12 Hours)**

Using the GridView Control: GridView Control Fundamentals : Displaying Data ,Seleting Data, Using data Keys, Sorting Data, Paging through Data , Editing Data, Displaying Empty Data, Formatting the Gridview Control, Using Viewstate and Gridview Control – using

fields with the GridView control : Using BoundFields , Using CheckBoxFields, Using Command Fields, Using Button Fields – working with GridView control Events : Highlighting GridViewRows , Displaying Column Summaries , Displaying Nested Master/Details Forms.

Unit – V: (12 Hours)

Using Repeater and DataList controls: Using the Repeater Control : Displaying Data with the Repeater Control, Using Templates with the Repeater Control, Handling Repeater Control Events – using the DataList Control: Displaying data with the DataList Control, Displaying data in Multiple Columns, Using Templates with the DataList Control, Selecting Data with the Data List Control, Editing Data with the Data List Control, Formatting the DataList Control.

Maintaining Application State: Using browser cookies : Cookie Security Restriction, Creating Cookies, Reading Cookies – using session state : Storing Database data in Session State.

Text Book:

Stephen Walther, 2016, *ASP.NET 4.0 unleashed*, Pearson Education.

Reference Books:

(1) Donny Mack, Doug Seven, 2002, *Programming Data-driven Web Applications with ASP.NET*, SAMS publishing.

(2) Marco Bellinaso, 2006, *Asp .Net 2.0 Website Programming*.

(3) Doug Seven, 2002, *Programming Data-driven Web Applications with ASP.NET*.

(4) Carl Rippon, 2019, *ASP.NET Core 3 and React: Hands-On full stack web*.

(5) Lisa Lopuck, 2012, *Web Design for Dummies*.

A.V.C. College (Autonomous)
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Mannampandal-609 305, Mayiladuthurai.
III – B.Sc., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – XIV: Theory
Title of the Paper: Computer Networks **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To learn the concepts of Data communications and networks and Transmission Errors, Topologies and Routing Algorithms.
- To understand the Classification of Networks and Internetworking Concepts
- To acquire knowledge on TCP/IP, DNS, FTP and UDP

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To understand the fundamental concepts of Data Communication and networks, Signals and Modes of data transmission.

CO2: To gain the knowledge of Network Topologies, Protocols, routing algorithms.

CO3: To illustrate the usage of ISDN, X.25.

CO4: To acquire the knowledge about IEEE standards, Wireless Communications and internetworking.

CO5: To learn the techniques of TCP/IP.

Unit – I: **(12 Hours)**

Introduction to data communications and networks: Fundamental concepts, Data communications, Protocols, Standards, Standards organizations, Signal propagation,

Analog and Digital signals, Bandwidth of a signal and a medium – Fourier analysis and the concept of Bandwidth of a signal, Data Transmission Rate and Bandwidth- **Analog and digital transmission methods:** Analog signal, analog transmission, Digital signal and Digital transmission, Digital signal and analog transmission, Baud rate and bits per second, Analog signal and digital transmission, Nyquist Theorem **- Modes of data transmission and multiplexing:** Introduction, parallel and serial communications, asynchronous, synchronous and isochronous communication, simplex, half duplex and full duplex communication - multiplexing and demultiplexing - types of multiplexing.

Unit – II: (12 Hours)

Transmission media - Guided media - Unguided media. **Transmission errors: Deduction and correction:** Error Classification, Types of Errors, Error Detection **- Network topologies, switching and routing algorithm:** Mesh Topology, star Topology, Tree Topology, Ring Topology, Bus Topology, Hybrid Topology, Basics of switching, Router and routing, Routing algorithms **- networking protocols and OSI model:** Protocols in computer communications, The OSI Model, OSI layer functions.

Unit – III: (12 Hours)

LAN, MAN, WAN Networks- **Medium Access sublayer and ISDN:** Static and dynamic channel allocation, Medium Access Control sublayer, ISDN and Its background, ISDN Architecture, ISDN Interfaces, Functional grouping, Reference points, ISDN protocol Architecture, Narrowband-ISDN and Broadband ISDN – **X.25 protocol:** Understanding X.25 works, Characteristics of X.25, Packet Format, X.25 Operation, CCITT X.21 **- Frame relay and congestion control:** The need for frame relay, Frame relay frame format, congestion control, congestion control algorithms, traffic control.

Unit – IV: (12 Hours)

Wireless Communications - IEEE Standards - Infrared communication - Bluetooth- 802.11 Wireless LAN. **Internetworking Concepts, Devices, Internet basics, History and Architecture:** Repeaters, bridges, routers, gateways.

Unit – V: **(12 Hours)**

TCP/IP Part 1: TCP/IP basics , IP addresses, ARP, RARP, ICMP. **TCP/IP – Part 2: TCP and UDP:** TCP Basics, Feature of TCP – Relationship between TCP and IP –Ports And sockets – TCP Connections –TCP Packet Format - UDP Packet -Differences between UDP and TCP. **TCP/IP –Part 3:** DNS – Email – FTP – TFTP. **TCP/IP –Part 4:** Web Browser Architecture-Telnet.

Text Book:

Achyut and Godbole, 2011, *Data communications and networks*, Second edition, Tata McGraw Hill Publishing Company limited. (Relevant portions only).

Reference Books:

(1) Behrouz A.Forouzan, 2013, *Data communications and Networking*, Fifth edition, Tata McGraw Hill Publication company limited.

(2) Gupta, 2014, *Data Communication and Computer Networks*, PHI Learning Pvt. Ltd.

(3) Singh, 2014, *Data Communication and Computer Networks*, Fourth edition, PHI Learning Pvt. Ltd.

(4) Black, 2005, *Data Communication and Distributed Networks*, Third edition, PHI Learning Pvt. Ltd.

(5) Amutha, S.A. and Jeevakumari, 2008, *Elements of Data Communications Networks*, First edition, Laxmi Publications.

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III – B.Sc., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – XV: Theory
Title of the Paper: Introduction to Microprocessor **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To enable students to learn Microprocessor Architecture, Assembly language programming.
- To understand the 8085 instructions, Counters, Time delays, Interrupts and I/O communication.
- To acquire knowledge on Pentium processors.

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To acquire the basic Knowledge of Microprocessor.

CO2: To explore the programming knowledge using 8085.

CO3: To gain the complete knowledge of 8086 Microprocessor.

CO4: To understand the concept of Microprocessor Applications.

CO5: To become familiar with Pentium Processor and other processors

Unit – I: **(15 Hours)**

Evaluation of Microprocessors – Single Chip Microcomputer Microprocessor Applications – Embedded Microprocessor - types of Microprocessor - Programming Digital

Computers – Memory – Buses – Memory addressing capacity and CPU – Microcomputers – Processor Architecture – Intel 8085 – Instruction Cycle.

Unit – II: **(15 Hours)**

Instruction set of Intel 8085 – Instruction and Data Formats – Addressing Modes – Status flags – Intel 8085 Instructions- Stacks and Subroutines – MACRO – Microprogramming- Assembly language Programming – Simple examples. Addition and Subtraction of Binary and Decimal Numbers – Complements – Shift – Masking – Finding the largest and smallest numbers in an Array- Multiplication – Division – Multibyte Addition and Subtraction.

Unit – III: **(15 Hours)**

Intel 8086 Microprocessor- classification of Intel 8086 instructions- Description of Intel 8086 instrucions-examples of intel 8086 assembly language programs- binary address of Intel 8086 registers- assembler directives- assembler directives for Intel 8086 Microprocessor in alphabetical order.

Unit – IV: **(15 Hours)**

Microprocessor Applications – Delay Subroutines – Interfacing of 7 Segment Displays – Frequency measurement – Temperature measurement and Control – Water Level Indicator – Microprocessor based Traffic Control.

Unit – V: **(15 Hours)**

Intel 80186- Intel 80286- Intel 8088- Intel 80386- Intel Pentium processor-An introduction to the Pentium Microprocessor: Introduction-real mode and protected mode operation-the s/w model of the Pentium-A functional description of the Pentium- Pentium register- Pentium data organization - instruction types- addressing modes- interrupts-pentium instructions.

Text Books:

(1) Badri Ram, 1993, *Fundamentals of Microprocessors and Microcomputers*, Fourth Revised and Enlarged Edition, Dhanpat Rai and Sons.

(2) James L. Antonakos, 1997, *The Pentium Microprocessor*, Pearson Education.

Reference Books:

(1) Romesh S.Gaonkar , 1990, Microprocessor Architecture, Programming and Applications with the 8085 / 8080A, Wiley Eastern.

(2) Douglas V. Hall, 1999, Microprocessors and Interfacing, Tata Mcgraw Hill.

(3) Barry B. Brey, 1998, The Intel Microprocessors – 8086/8088,80186,286,386,486, Pentium Pro Processor, Prentice Hall of India Pvt. Ltd.

(4) Mathur Adithya, P. 2006, Introduction to Microprocessor, Third Edition, Tata Mcgraw Hill.

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III – B.Sc., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – XVI: Practical - VI
Title of the Paper: Dot Net Programming **Subject Code:**

No. of Hours: 6
No. of Credits: 5

Learning Objectives:

- To enable the student to learn application designing and handling events.
- To acquire knowledge on developing database programs.
- To enable students to learn the database concepts and DBMS.

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To illustrate the usage of validation Controls, Ad Rotator Control

CO2: Display required output using controls

CO3: Illustration of file uploading methods

CO4: Interpret interactive design using web forms

CO5: To develop real time applications using database

Program List:

1. Design a web page using Required Field validator and Compare validator controls.
2. Design a web page to display the advertisements using Ad Rotator Control.
3. Demonstrate the usage of grid control.
4. Demonstrate the usage of calendar control.

5. Demonstrate the file upload control usage.
6. Prepare shopping cart using database.
7. Prepare employee pay slip using SQL connection.
8. Design a banking application for doing deposit, withdrawal and balance enquiry.
9. Prepare a database application for library management.

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III – B.Sc., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Elective Course – II
Title of the Paper: 1.Multimedia and its Applications **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To enable students to learn the introduction of multimedia, Setting up a Multimedia Studio and Multimedia Elements
- To acquire knowledge on Multimedia Text, Audio, Animation and Multimedia Projects

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To acquire the basic knowledge of Multimedia concepts.

CO2: To explore the knowledge about image processing.

CO3: To gain complete knowledge about graphics and audio.

CO4: To understand the concepts of animation and video.

CO5: To become familiar with compression technique and multimedia application development.

Unit – I: **(12 Hours)**

Multimedia-An overview: Introduction – Multimedia Presentation and Production – Characteristics of multimedia presentation – Hardware and Software requirements – Uses of Multimedia – Analog and Digital Representations – Digitization.

Text: Introduction – Types of Text – Unicode standard – Font – Insertion of Text – Text File Formats.

Unit – II: **(12 Hours)**

Image: Introduction - Image Data Representation – Image Acquisition – Image Processing: Binary Image processing – Gray Scale Image Processing: Edge detection -

Intensity transformation – Histogram processing- Color Image Processing :Color models and spaces – CIE XYZ and CIE LAB ,RGB,CMYK models.

Unit – III: **(12 Hours)**

Graphics: Introduction – Advantages of Graphics – Uses of Graphics – Components of a Graphics System – 2D co-ordinate systems – 2D Transformations – Line Drawing Algorithms – Circle Drawing Algorithms.

Audio: Introduction – Acoustics – Sound waves – Types and Properties of Sounds – Psycho-Acoustics – Components of an Audio Systems – Digital Audio – Synthesizers – Musical Instrument Digital Interface – Digital Audio Processing – Speech – Sound Card.

Unit – IV: **(12 Hours)**

Video: Introduction – Motion Video – Analog Video Camera – Analog Video Signal Representation – Television Systems – Digital Video – Digital Video Processing – Video Recording and Storage Formats.

Animation: Introduction – Historical Background – Uses of Animation – Traditional Animation – Principles of Animation – Computer Based Animation – Animation on the Web – 3D Animation .

Unit – V: **(12 Hours)**

Compression: Introduction – Basic Concepts – Lossless compression Techniques – Lossy compression Techniques.

Multimedia Application Development: Introduction - Software Life Cycle Overview – ADDIE Model – Multimedia Production Steps – Case Study – Authoring Software.

Text Book:

Ranjan Parekh, 2013, Principles *of Multimedia*, Second edition, TMH publication, (Relevant portions only)

Reference Books:

(1) Steinmetz and Nahrstedt, 2003, Multimedia fundamentals: Vol – 1: Media coding and content processing, PHI Learning Pvt. Ltd.

(2) Andreas and Holzinger, 2004, Multimedia basis – Technologies (Vol-1), Andreas, Laximi Publication Pvt. Ltd.

(3) Rao, Bojkovic and Milovanovic, 2007, Multimedia communication systems – Techniques, Standards and Networks, First edition, PHI Learning Pvt. Ltd.

(4) Sharadha, 2009, Multimedia information networking, PHI Learning Pvt. Ltd.

(5) Tay Vaughan, 2011, *Multimedia making it work*, Eighth edition, Tata McGraw Hill.

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III – B.Sc., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Elective Course – II
Title of the Paper: 2.Embedded Systems **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To understand the basic concepts of Embedded systems
- To learn the concepts of Interrupts and Real-Time Operating Systems (RTOS)
- To know the design of RTOS and debugging techniques

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To understand the basic concepts of embedded systems.

CO2: To learn about interrupts and different software architecture.

CO3: To acquire knowledge on real time operating systems.

CO4: To know the procedure in design using RTOS.

CO5: To learn about debugging techniques and lab tools.

Unit – I: **(12 Hours)**

A First Look at Embedded Systems: Examples of Embedded Systems-Typical Hardware-Hardware Fundamentals for the Software Engineer: Terminology-Gates- A Few Other Basic–Considerations-Timing Diagrams- Memory-Advanced Hardware Fundamentals:

Microprocessors-Buses-Direct Memory Access-Interrupts-Other-Common Parts-Built-Ins on the Microprocessor-Conventions Used on Schematics.

Unit – II: **(12 Hours)**

Interrupts: Microprocessor Architecture-Interrupt Basics-The Shared-data Problem Interrupt Latency-Survey of Software Architectures-Round-Robin-Round-Robin with Interrupts-Function- Queue Scheduling Architecture- Real –Time Operating system Architecture-Selecting an Architecture.

Unit – III: **(12 Hours)**

Introduction to Real –Time Operating Systems: Task and Task States-Tasks And data-Semaphores and Shared data-More Operating System Services- Message Queues, Mailboxes and Pipes-Timer Functions-Events-Memory Management-Interrupt routines in an RTOS Environment.

Unit – IV: **(12 Hours)**

Basic Design Using a Real-Time Operating System: Overview-Principles-An Example-Encapsulating Semaphores and Queues-Hard Real-Time Scheduling Considerations-Saving Memory Space-Saving Power-Embedded Software Development

Tools-Host and Target Machines-Linker/Locator for Embedded Software-Getting Embedded Software into the Target System.

Unit – V: **(12 Hours)**

Debugging Techniques: Testing on Your Host Machine-Instruction Set Simulators-The assert Macro-Using-Laboratory Tools an Example System: What the Program Does-Environment in which the program Operates – A Guide to the Source Code-Source Code

Text Book:

David E. Simon, 2004, *An Embedded Software Primer,* PEARSON Education.

Reference Books:

(1) Rajkamal, 2003, *Embedded Systems Architecture, Programming and Design*, Tata McGraw Hill.

(2) Tim Jones, M. 2004, *TCP/IP application layer protocol for Embedded systems*, Laxmi publication Pvt. Ltd.

(3) Ashfaq A. Khan, 2004, *Practical Linux programming: Device Drivers, Embedded Systems and the internet*, Laxmi publication Pvt. Ltd.

(4) Lewis, 2003, *Fundamentals of Embedded software: Where C and Assembly Meet*, PHI Learning Pvt. Ltd.

(5) Kanta Rao, 2002, *Embedded Systems*, PHI Learning Pvt. Ltd.

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III – B.Sc., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Elective Course – II
Title of the Paper: 3.E - Commerce **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To understand the fundamentals of E-Commerce, Software agents and Internet technologies essential for E-commerce.
- To learn the Network security and Firewalls, E-payment systems – E-marketing and E-business portals.

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To understand the E-Commerce and its Business models.

CO2: To gain the knowledge of E-Marketing strategies and its security.

CO3: To learn digital payments, customer managements and e-logistics.

CO4: To update the knowledge management for mobile commerce.

CO5: To understand the e-business, legal and ethical issues.

Unit – I: **(12 Hours)**

History of E-Commerce: Electronic commerce –Emergence of the internet – Emergence of the World Wide Web – Advantages and Disadvantages of E-commerce – E-transaction challenges for Indian Corporates. **Business models for E-Commerce:** Business model – E-

Business models based on the Relationship of Transaction Parties – E-Business models based on the Relationship of Transaction Types. **Enabling technologies of the World Wide Web:** Akshaya project – Internet Client Server Applications – Networks and Internet.

Unit – II: (12 Hours)

E-Markeing: Google – Traditional marketing – Identifying web presence goals – The Browsing Behavior Model – Online Marketing – E-Advertising – E-branding – Marketing Strategies**. E-Security**: Security Breach – Information system security – Security on the internet – E-business risk management issues – Information security environment in India.

Unit – III: (12 Hours)

E-Payment Systems: Digital Payment Requirements – Digital token-based e-Payment systems – Transition to Digital payments in India – Digital Signature. **E-customer relationship management**: Customer Relationship Management – Typical business touch-points – CRM and Workflow Automation. **e-Supply chain management**: *Supply Chain:* The new way – e-logistics of UPS – seven ways to reduce inventory – benefits – e-supply chain components – Architecture.

Unit – IV: (12 Hours)

E-Strategy and Knowledge Management: Definitions of Knowledge and Management – Importance of Knowledge Management – Stages in developing knowledge management systems – Seven Dimension of e-Commerce strategy – Value chain and e-Strategy – Planning the e-commerce project. **Information systems for mobile commerce**: History of Smartphones – Impacts of smartphones on human life – Mobile Commerce – Cellular networks – Different generation in Wireless communication – Security issues pertaining to cellular technology.

Unit – V: (12 Hours)

Portals for E-Business: Portals – Requirements of intelligent websites – setting website goals and objectives – Portals for mass collaboration – Portals for Enterprise Resource Planning – ERP – SAP AG as a successful ERP system – Intranet portals: HRIS – Human Resource Management – various HRIS modules. **Legal and ethical issues:** Ethical issues in a digital economy – Cyberstalking – Cybersquatting – Phishing – Application fraud – Skimming – Copyright violations – Internet Gambling – Threats to children – Loss of privacy – Cookies and privacy.

Text Book:

P.T. Joseph S.J. 2019, *E-Commerce: An Indian Perspective*, Sixth edition, PHI Learning Pvt. Ltd. (Relevant chapters only).

Reference Books:

(1) Kalakota Whinston, 2012, *Frontiers of Electronic Commerce,* Sixth impression, Pearson Education.

(2) Award, 2012, *E-Commerce – From Vision to Fulfillment*, Third edition, PHI Learning Pvt. Ltd.

(3) Parag Diwan and Sunil Shavana, 2012, *E-Commerce - a Management Guide.*

(4) Edi, 2013, *Cyber laws intellectual property & E-commerce security,* Dominant publishers and distributors.

(5) Rajaraman, 2013, *Essentials of E-Commerce Technology*, PHI Learning Pvt. Ltd.

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
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III – B.Sc., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Elective Course – III
Title of the Paper: 1.Internet of Things **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To learn the basics and technology of IOT.
- To understand the fundamentals of Internet of Things.
- To apply the concept of Internet of Things in the real world scenarios.

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To outline the concept of Internet of Things.

CO2: To understand the Smart Appliance and Smart Homes.

CO3: To acquire the Knowledge of Smart Clothing and Smart Shopping.

CO4: To gain the knowledge of Smart Cars and Smart Aircrafts and Smart Welfare.

CO5: To Understand the Smart Medicine and Smart Cities and Smart World.

Unit – I: **(12 Hours)**

Smart Connectivity: Welcome to the Internet of Things: Welcome to the Future - Internet of Things - Kinds of Things that can be connected to the Internet of Things - All Those Connected Things do - Internet of Things Arrive - Importance of Internet of Things - Smart

Connectivity and You **Smart Technology: 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 **Smart TVs: Viewing in a Connected World :** Smart TV – Consideration Smart TV Operating System – Examining a Typical Smart TV – Exploring Smart TV Set Top Devices.

Unit – II: (12 Hours)

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: (12 Hours)

Smart Clothing: Wearable Tech: Wearable Technology Today - and Tomorrow - Watching the Smart watches - 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 - Your Data – Smart Shopping and You.

Unit – IV: (12 Hours)

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 -** Drones - They Aren‘t - Drones Are Used Today for - The Future of Drone Aircraft -Regulating Drone Aircraft-Fly the Scary

Skies: The Problems with Drones – Other Smart Aircraft Technologies – Smart Aircraft and You **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.

Unit – V: (12 Hours)

Smart Medicine: We have the Technology: Welcome to the internet of Medical Things – Smart Medical Devices and Monitoring – Smart Meds – Smart Hospital – Smart Medical Records. **Smart Businesses: Better Working Through Technology:** Smart Offices - Smart Stores - Smart Inventory Management – **Smart Cities: Everyone's Connected:** Understanding the Smart City – Smart Infrastructure – Smart Roads and Traffic 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:

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

Reference Books:

(1) Arshdeep Bahga and Vijay Madisetti, 2015, *Internet of Things, A Hands on Approach*, Universities Press.

(2) www.libelium.com/top_50_iot_sensor_applications_ranking/

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III – B.Sc., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Elective Course – III
Title of the Paper: 2.Network Security **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To enable students to learn Information security, policies and process
- To understand the security technologies
- To acquire knowledge on Internet Security

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To understand the basic of network security.

CO2: To learn the information security services and policies.

CO3: To gain knowledge on information security process and the way of managing risk.

CO4: To acquire the knowledge on best practices and technologies in network and information security.

CO5: To learn the technologies of Monitoring and Encryption.

Unit – I: **(12 Hours)**

Information security basics: Information Security : Define Security as a process, Not point products - **Types of Attacks - Hacker Techniques:** A hacker's motivation – Hacking Techniques – Methods of untargeted Hacker. **Information Security Service.**

Unit – II: **(12 Hours)**

Information Security Services : The confidentiality service – The integrity service – The availability service – The accountability service. **Policy:** Why policy is important – The various policies used by organizations – Create appropriate policy – Deploy Policy.

Unit – III: **(12 Hours)**

Managing Risk: Define Risk – Measuring risk. **Information security process**: Conducting an assessment – Developing Policy – Implementing security – Awareness training.

Unit – IV: **(12 Hours)**

Information security best practices: Administrative security practices– Technical security practices. **Network Security technology: Perimeter Technology:** Perimeters and Perimeter Policy basics – Perimeter control – Creating a architecture.

Unit – V: **(12 Hours)**

Monitoring Technology: The purposes of monitoring – Monitoring technologies – Creating a monitoring architecture –correlating events – separation of duties. **Encryption Technologies:** Basic encryption concepts – Encryption terms – Symmetric key encryption – Public key encryption – Digital signatures – Key management.

Text Book:

Eric Maiwald, 2013, *Network security - A Beginners Guide*, Third edition, Tata McGraw Hill.

Reference Books:

(1) William Stallings, 1998, *Cryptography and Network Security*, First edition, Pearson Education.

(2) Ankit Fadia,1998, *Network Security*, First edition, McMillan Publications.

(3) Singh, 2011, *Network security & Management*, Second edition, PHI Learning Pvt. Ltd.

(4) Kaufman, Perlman and Speciner, 2002, *Networks Security: Private Communication in a public world*, Second edition, PHI Learning Pvt. Ltd.

(5) Balvir Singh, 2009, *Networking*, Second edition, Laxmi Publications Pvt. Ltd.

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III – B.Sc., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Elective Course – III
Title of the Paper: 3.Business Process Outsourcing **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To learn the concepts of Business Process Outsourcing
- To understand the planning stage, process strategy
- To acquire knowledge on contract, measuring performance and human resources

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To understand the scope of BPO, categories and various planning stages.

CO2: To know the procedure in selecting the vendor.

CO3: To learn the method of measuring performance.

CO4: To gain the knowledge on international policies and considerations.

CO5: To learn the procedure of post negotiations activities, renegotiations and terminations.

Unit – I: **(12 Hours)**

Overview: The Emerging Market – BPO – BPO categories – Reasons for outsourcing Business Process – Integration: Making BPO Fit – BPO Vendors.

Planning Stage: Outsourcing as an Option - Defining the Scope of the Transaction - Selecting a Group of Potential Vendors - Request for Proposal.

Unit – II: **(12 Hours)**

Selecting the Vendor: Evaluating the Proposals - Notifying the Preferred Vendor. **Negotiations Strategy and Process:** Forging the Legal Relationship - Negotiating Process - Exposure Analysis - People Negotiate, Not Companies - Negotiating Strategy. BPO outsourcing contract: Overview - Use of Attorneys - Key Contract Issues - Regaining Strategic Control - Pricing Considerations.

Unit – III: **(12 Hours)**

Measuring Performance: Overview – Service levels – Benchmarking**. Human Resources**: Transitioning employees to the vendor – Due Diligence – Terms and conditions of employment – Transitioning employees from customer to vendor – Human resources representatives – contract-related issues. **Transformational outsourcing:** Project definition – maintaining multiple environments – using subcontractors.

Unit – IV: **(12 Hours)**

International considerations: international transactions – contract and legal issues. Information privacy and security issues: introduction – selected information privacy laws – selected information security laws – company privacy policies – Global issues – Offshore outsourcing. Exhibits and ancillary agreements: A critical part of the BPO contract – Exhibits listings – Checklist for the exhibits.

Unit – V: **(12 Hours)**

Post negotiation activities: Contract signing – Autopsy – Risk analysis – Contract administration – Implementation the transition plan - Notifying third parties. **Renegotiation and Termination:** overview – Renegotiation/Termination process – Contract say – Additional issues to consider – Termination plan.

Text Book:

John K. Halvey and Barbara M. Melby, 2005, *Business Process Outsourcing Process, Strategies and Contracts,* Second edition, John Wiley & Son's, Inc.

Reference Book:

(1) Nakkiran, S. and John Franklin, D. 2008, *Business Process Outsourcing: Concept, Current Trends, Management, Future Challenges.*

(2) Saxena, K.B. and Sangeeta Shah Bharadwaj, 2007, *Business Process Outsourcing: for strategic advantage,* First edition, Anurag Jain for Excel books.

(3) James Wanyama, 2016, *Business process outsourcing (BPO) strategy, A conceptual approach,* GRIN Publishing.

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III – B.Sc., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

SBC – III

Title of the Paper: Graphics and Animation Lab **Subject Code:**

No. of Hours: 2
No. of Credits: 2

Learning Objectives:

- To understand the concepts of animation.
- To enable students to creating animations.

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To become familiar with animation features.

CO2: To get an exposure to additional effects.

CO3: To perform manipulations using buttons.

CO4: To explore vast knowledge in morphing.

CO5: To learn various motion of the objects.

Using Flash:

1. Move an animated Object in path using GUIDE layer
2. Perform Dynamic Masking in the Text.
3. Retrieve the Drive information in the system Using URL.

4. Apply the animation on an image.

5. Design Drag masking application Using Movie Clip.

6. Design the Arithmetic Calculator. Use BUTTON and get the user input through Mouse.

7. Create a changing shape motion: Change the shape of drawn image or text to another shape of image or text.

8. Create an animation for cloud effect.

Using Photoshop:

9. Create Image morphing.

10. Create Animated Buttons which is used for Web design.

11. Create animated GIF for use as Banners, Titles and Buttons.

12. Create a mirror image effect.

A.V.C. COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI

ALLIED COURSES

[Offered by Department of Computer Science]
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

ALLIED PAPER

1. II B.Sc., Electronic Science:

III – SEMESTER:

ALLIED PAPERS

1. ALLIED THEORY : 'C' Programming

   -- 7 Hrs. - 4 Credits.

2. ALLIED Practical – I : C Programming Lab **- 2 Hrs. - 1 Credit.**

IV – SEMESTER:

ALLIED PAPERS

1. ALLIED THEORY : C++ Programming

   - 7 Hrs. - 4 Credits.

2. ALLIED Practical – I : C++ Programming Lab **--- 2 Hrs. - 1 Credit.**

A.V.C. COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI

B.Sc., Electronic Science: Semester – III
[Offered by Department of Computer Science]
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Code	Allied Computer Science Paper – I	Hrs	Credits	Marks (CIA+ESE)
	'C' Programming	7	4	25 + 75

Objectives:

- To acquire knowledge on programming skills using 'C' language
- To understand the file management capabilities

Unit – I: 21 Hrs

Overview of C: History of C – Importance of C – Sample programs-Printing a message, Adding two numbers, Interest Calculation, Use of Subroutines and Use of Math Functions – Basic Structure of C programs – Programming Style – Executing a C program.

Constants, Variables and Data types: Character set - C tokens - Keywords and identifiers - Constants - Variables - Data types – Declaration of Variable and Storage Class – Assigning Values to Variables - Symbolic constants – Declaring Variable as Constant and Volatile – Overflow and Underflow of Data.

Operators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment and decrement, Conditional, Bitwise, Special Operators - Arithmetic, Expressions – Precedence of Arithmetic Operators - Type conversions in Expression – Operator Precedence and Associatively - Mathematical Functions.

Managing I/O operations: Reading and Writing a Character - Formatted Input and Output.

Unit – II: 21 Hrs

Decision Making and Branching: Decision Making with ' if ' Statements – Simple IF – IF…ELSE – Nesting of IF…ELSE – ELSE IF ladder statement - 'switch' Statements - ? : Operator and 'goto' Statement.

Decision Making and Looping: 'while' Statement - 'do' Statement - 'for' Statement – Jumps in Loops.

Arrays: One-dimensional, Two-dimensional, Multi-dimensional and Dynamic Arrays.

Unit – III: 21 Hrs

Character Arrays and Strings: Declaring and Initializing String Variables – Reading and Writing Strings – Arithmetic Operations on Characters – Putting Strings Together – Comparison of Two Strings – String-handling Strings – Table of Strings – Other features.

User-defined Functions: Need for User-defined Functions, A Multi-function Program – Elements of User-defined Functions – Definition - Return Values and their Types , Function Calls and Declaration – Categories of Functions – Functions that return Multiple Values – Nesting of Functions – Recursion – Passing Arrays and Strings to Functions – Scope, Visibility and Lifetime of Variables – Multi-file programs.

Unit – IV: 21 Hrs

Structures and Union: Defining a Structure – Declaring Structure Variables – Accessing Structure Members – Structure Initialization – Copying and Comparing Structure Variables – Operations on Individual Members – Arrays of Structures – Arrays within Structures – Structures and Functions – Unions – Size of Structures – Bit fields.

Pointers: Understanding Pointers – Accessing the Address of a Variable – Declaring and Initializing Pointer Variables – Accessing a Variable through its Pointer - Chain of Pointers – Pointer Expressions – Pointer Increments and Scale Factor – Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments – Functions Returning Pointers – Pointers to Functions – Pointer and Structures.

Unit – V: **21 Hrs**

File Management in C: Defining, Opening and Closing a file – I/O Operations on Files – Error Handling During I/O Operations – Random Access to files – Command line Arguments.

Dynamic Memory Allocation: Dynamic memory allocation – Allocating a Block of Memory: MALLOC – Allocating Multiple Blocks of Memory: CALLOC – Releasing the Used Space Free– Altering the Size of a Block: REALLOC.

Text Book:

"Programming in ANSI C", E. Balagurusamy, Tata McGraw Hill Publishing Company Limited, 4th Edition, 2008.

Reference Book:

1. "Programming in C", D.Ravichandran, New Age International (P) Ltd., Publishers, 2008.
2. "The C Programming Language", W. Kergnighan & Dennis Ritchie, 2nd Edition 1990, PHI Ltd.
3. "C:How to program", Deitel & Deitel, PHI, 7th Edition, 2012.
4. " C Programming", Salim Y. Amdani, Laxmi publications, 1st Edition, 2009.
5. "Trouble free C", Hari Mohan Pandey, Laxmi publications, 1st Edition, 2009.

A.V.C. COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI

B.Sc., Electronic Science: Semester – III
[Offered by Department of Computer Science]
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Code	Allied Computer Science Practical – I	Hrs	Credits	Marks (CIA+ESE)
	'C' Programming Lab	2	1	40 + 60

Objectives:

- To enable students to gain programming skills in 'C' language
- To understand the usage of C programming in various applications.

C' Programming:

1. Write a C Program to find the Roots of a Quadratic Equation.
2. Write a C Program to generate Fibonacci Series and find the Sum.
3. Write a C Program to check whether the given number is Prime or Not.
4. Write a C Program to find the Reverse of a number and Sum of Digits.
5. Write a C Program to find the NCR value using Recursion.
6. Write a C Program to print the given Amount in Words.
7. Write a C Program to Sort the Numbers in Ascending and Descending order.
8. Write a C Program to performing Matrix Manipulations.
9. Write a C Program to performing String Manipulations.
10. Write a C Program to demonstrate the use of Functions and pointers.
11. Write a C Program to perform Stack Operations.
12. Write a C Program for File creation (using command line arguments and structures)

A.V.C. COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI

B.Sc., Electronic Science: Semester – IV
[Offered by Department of Computer Science]
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Code	Allied Computer Science Paper – II	Hrs	Credits	Marks (CIA+ESE)
	C++ Programming	7	4	25 + 75

Objectives:

- To understand the difference between the Structured and Object oriented programming
- To learn the Object oriented programming concepts
- To acquire knowledge on C++ language features.

Unit – I: **21 Hrs**

Object oriented programming: Software Evolution – OOP paradigm – Concepts, benefits, Object Oriented Languages and Applications. Beginning with C++ – **Tokens, Expression and control structures:** Tokens, Keywords, Identifiers and constants.

Unit – II: **21 Hrs**

Basic data types – user defined data types- Derived data types – Declaring, initializing and referencing variables - manipulators – Expressions and their types - control structures – Functions: main functions – functions prototyping – Call by Reference – Function overloading – friend and virtual functions.

Unit – III: **21 Hrs**

Classes and object – Constructors and Destructors – Operator overloading and Type conversions.

Unit – IV: **21 Hrs**

Inheritance – Single Inheritance – Multiple Inheritance – Hierarchical, Hybrid Inheritance – pointers – pointers to objects – this pointer – virtual functions – console I/O operations: C++ streams – C++ stream classes –Unformatted I/O operations – Formatted Console I/O Operations.

Unit – V: **21 Hrs**

Files – Classes for file stream Operations – opening, closing files – Detecting End of file – File pointers and their Manipulations – Updating a file: Random Access – Error Handling during file Operations – Command line Arguments – Templates – Exception Handling.

Text Book :

"Object Oriented Programming With C++ - E.Balagurusamy, Tata McGraw Hill Publishers Ltd., New Delhi, 4th Edition 2009.

Reference Books:

1. "Object oriented Programming in C++" – Robert Lafore, Galgotia, 5th Edition 2014.
2. "C++ - The Complete Reference: - Herbert Schilt, 5th Edition, Tata McGraw Hill, Pvt. Ltd., 2005.
3. "C++ and Objecte Oriented Programming Paradigm " Jana, 2nd Edition, PHI Learning pvt. Ltd, 2005.
4. "C++ How to program " , Deitel & Deitel , 7th Edition, PHI Learning pvt. Ltd, 2012.
5. "Object Oriented C++ Programming ", Hirday Narayan Yadav, 1st Edition, Laximi publication pvt. Ltd., 2008.

A.V.C. COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI

B.Sc., Electronic Science: Semester – IV
[Offered by Department of Computer Science]
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Code	Allied Computer Science Practical – II	Hrs	Credits	Marks (CIA+ESE)
	'C++' Programming Lab	2	1	40 + 60

Objectives:

- To enable students to understand the Object oriented programming concepts
- To gain programming skills in 'C++' language

C++ Programming:

1. Write an OOP program to calculate Simple Interest.
2. Write an OOP Program to Perform Complex Arithmetic Operations which passes objects from functions.
3. Write an OOP program to create vector.
4. Write an OOP Program for Matrix Manipulation using constructor with dynamic allocation of memory.
5. Write an OOP Program to overload any 3 operation using Unary Operator Overloading.
6. Write an OOP Program to perform overloading for the Binary Operators.
7. Write an OOP Program to prepare mark sheet using Inheritance and Manipulator Functions
8. Write an OOP Program to perform the Built-in type to class type Conversion Operation.
9. Write an OOP program to create a Data File for storing student's data and Print mark list for a particular student.
10. Write an OOP program to Create and Manipulate Employee Data File.

A.V.C. COLLEGE (AUTONOMOUS)
MANNAMPANDAL, MAYILADUTHURAI.

NMEC COURSES

[Offered by Department of Computer Science]
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

UG – NMEC PAPERS – for B.Sc., Mathematics / B.Sc., Electronic Science / B.Sc., Visual Communication.

V – SEMESTER

NMEC– I: Web Design **-- 2 Hrs. - 2 Credits.**

VI – SEMESTER

NMEC – II: Principles of Multimedia **-- 2 Hrs. - 2 Credits.**

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III B.Sc., Mathematics / Electronic Science / Visual Communication
[Offered by Department of Computer Science]
Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

NMEC – I:

Title of the Paper: Web Design **Subject Code:**

No. of Hours: 2
No. of Credits: 2

Learning Objectives:

- To learn the method of creating web pages
- To understand the features of HTML and DHTML
- To understand tools and techniques used in the Internet.

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To acquire the Knowledge of HTML

CO2: To understand the basic features of HTML

CO3: To work with Table, Frames in HTML

CO4: To understand the basic features of PHP

CO5: To develop applications with functions and forms

Unit – I: **(6 Hours)**

Introduction to HTML: Designing a Home page-History of HTML-HTML generations-HTML documents-Anchor tag-Hyper Links-Sample HTML Documents. **Head and Body Sections**: Header Section-Title-prologue-links-colorful web page-comment lines-Some sample html documents.

Unit – II: **(6 Hours)**

Designing the body section: Heading printing-Aligning the Headings-Horizontal rule-paragraph-tab settings-images and pictures.

Ordered and Unordered lists: lists-Unordered lists-headings in a list-ordered lists-nested lists.

Unit – III: **(6 Hours)**

Table handling: Tables-table creation in html-width of the table and cells-cells spanning multiple rows/columns.

DHTML and style sheets: Defining styles-Elements of styles-Linking a style sheet to an html document-In line styles-External style sheets-Internal style sheets-**.**

Frames: frameset definition-frame definition.

Unit – IV: **(6 Hours)**

PHP and HTML: Getting started – Writing PHP – Naming Files – Comments – Delivering Text as output.

The basics of PHP: Data types – Variables –Constants – HERE Documents – Operators: Unary operators, Binary operators, Ternary operators, Operator precedence – Arrays.

Unit – V: **(6 Hours)**

Conditional Statements: If statement, the switch Statement – Iterations: Looping: for, while, do..while, for each.

Functions: Built-In functions – Working with string functions: Finding a string within a string – Retuning the first occurrence of a string – Replacing parts of a string – Trimming white space.

Working with forms: Form elements: Text box, Text Area, Password, Radio Button, Check Box, The Combo box or Drop down list box, Submit and Reset button.

Text Books:

(1) Xavier, C. 2010, *World Wide Web design with HTML*, Tata McGraw Hill.

(2) Ivan Bayross, 2015, *Web Enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP,* Fourth revised edition, BPB publications.

Reference Books:

(1) Deitel, H.M. 2008, *Internet & World wide web - How to program*, Fourth edition, PHI Learning Pvt. Ltd.

(2) Wempen, 2012, *HTML & XHTML – Step-by-Step*, PHI Learning Pvt. Ltd.

(3) Sunil Jalota, 2006, *Design your web world*, Laximi publication Pvt. Ltd.

(4) Ramesh Bangia, 2008, *Web Technology*, First edition, Laximi publication Pvt. Ltd.

(5) Thomas A. Powell, 2003, *The Complete Reference HTML & XHTML*, Fourth edition, Tata McGraw Hill.

A.V.C. College (Autonomous)
PG & Research Department / Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III B.Sc., Mathematics / Electronic Science / Visual Communication
[Offered by Department of Computer Science]
Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

NMEC – II:

Title of the Paper: Principles of Multimedia **Subject Code:**

No. of Hours: 2
No. of Credits: 2

Learning Objectives:

- To enable students to learn the introduction of multimedia, Basic Tools and Multimedia Elements
- To acquire knowledge on Multimedia Text, Audio, Animation and Multimedia Projects

Programme Specific Outcomes:

PSO1: To understand the basic concepts involved in computing.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To gain confidence to appear for various competitive examinations.

Course Outcomes:

CO1: To learn the applications of multimedia and designing the text.

CO2: To gain knowledge in images and in sound.

CO3: To understand the features of animation and video.

CO4: To acquire the knowledge in memory and to become skilled with tools.

CO5: To establish skills on Multimedia Projects.

Unit – I: **(6 Hours)**

What is Multimedia?: Definitions : Where to use Multimedia – Multimedia In Business- Multimedia in Schools- Multimedia at Home – Multimedia in Public Places – Virtual Reality – Delivering Multimedia-CD-ROM,DVD, Flash Drives-The Broadband Internet.

Text: About Fonts and Faces- Using Text in Multimedia: Designing with text- Computers and Text: The Font Wars Are Over, Character sets and Alphabets, Mapping texts across Platforms, Languages in the world of Computers- Font Editing and Design Tools: Fontographer, Making pretty text- Hypermedia and Hypertext: The Power of Hypertext, Using Hypertext, Searching for words, Hypermedia structures, Hypertext tools.

Unit – II: **(6 Hours)**

Images: Before you start to create: Plan your approach, Organize your tools, Configure your Computer Workspace- Making Still Images: Bitmaps, Vector Drawing, Vector- Drawn Objects vs. Bitmaps- 3-D Drawing and Rendering- Color: Understanding Natural Light and Color, Computerized Color, Color Palettes- Image File Format: Image File Compression.

Sound: Digital Audio: Making Digital Audio Files, Editing Digital Recordings- MIDI Audio- MIDI vs. Digital Audio- Multimedia System Sounds.

Unit – III: **(6 Hours)**

Animation: The Power of Motion – Principles of Animation – Animation by Computer: Animation Techniques, Animation File Formats, Motion with SVG in HTML5- Making Animation That Work: A Rolling Ball, A Bouncing Ball, Creating an Animated Scene.

Video: Using Video- How Video Works and Is displayed: Analog Video, Digital Video, Displays- Digital Video Containers: Codecs, Video Format Converters- Obtaining Video Clips- Shooting and Editing Video: Camcorders, Smartphones and Tablets, Storyboarding, Lighting, Chroma keys, Composition, Titles and Text, Non Linear editing (NLE).

Unit – IV: **(6 Hours)**

Making Multimedia: The Stages of a Multimedia Projects- What you need: The Intangibles: Creativity, Organization, Communication- What you need: Multimedia Skills: The Team, The sum of Parts- What you need: Hardware: Windows vs. Macintosh, Connections, Memory and Storage Devices, Input Devices, Output Devices- What You Need: Software: Text Editing and Word Processing Tools, OCR Software, Painting and Drawing Tools, 3-D Modeling and Animation tools, Image-Editing tools, Sound-Editing tools, Animation, Video and Digital Movie Tools- What you need: Authoring Systems: Helpful

ways to Get started, Making Instant Multimedia , Types of Authoring tools, Objects, Choosing an Authoring Tool.

Planning and Costing: The Process of Making Multimedia: Idea analysis, Pretesting, Task planning, Prototype Development, Alpha Development, Beta Development, Delivery.

Unit – V: (6 Hours)

Designing and Producing: Designing: Designing the structure, Designing the User Interface- Producing: Starting up, Working with Clients, Tracking, Copyrights, Hazards and Annoyances.

Delivering: Testing: Alpha Testing, Beta Testing, Polishing to Gold- Preparing for Delivery: File archives- Delivering on CD ROM: Compact Disc Technology, Compact Disc Standards- Delivering on DVD: DVD Standards- Wrapping it up- Delivering on the World Wide Web- Delivering through an App Store.

Text Book:

(1) Tay Vaughan, 2016, *Multimedia: Making it work,* Nineth edition, Tata McGraw Hill.

Reference Books:

(1) Gokul, S. 2006, *Multimedia Magic*, Second edition (revised and update), BPB Publications.

(2) Rao, Bojkovic and Milovanovic, 2002, *Multimedia communication systems – Techniques*, Standards and Networks, PHI Learning Pvt. Ltd.

(3) Steinmetz and Nahrstedt, 2003, *Multimedia fundamentals: Vol – 1: Media coding and content processing*, PHI Learning Pvt. Ltd.

(4) Andreas and Holzinger, 2004, *Multimedia basis – Technologies (Vol-1),* Laximi publication Pvt. Ltd.

A.V.C. COLLEGE (Autonomous), Mannampandal, Mayiladuthurai.

Department Of Computer Science

M.Sc., COMPUTER SCIENCE

(Student admitted from the academic year 2018 – 2019 onwards)

Sem.	Sub. Code	Courses	Title of the paper	Hours	Credits	Total Credits
I		CC I	Web Technologies	6	4	23
		CC II	Python Programming	6	4	
		CC III	Design and Analysis of Algorithm	5	4	
		CC IV	**Practical I** – Web Technologies	4	4	
		CC V	**Practical II**– Python Programming	4	3	
		EC I	**Elective – I**	5	4	
II		CC VI	Digital Image Processing	5	4	25
		CC VII	Java Server Programming	4	4	
		CC VIII	Distributed Operating System	5	4	
		CC IX	**Practical III-** Digital Image Processing	4	3	
		CC X	**Practical IV**– Java Server Programming	4	4	
		EDC I	**EDC – I**	4	2	
		EC II	**Elective II**	4	4	
III		CC XI	Programming Smart Devices	5	4	25
		CC XII	Big Data Analytics	5	4	
		CC XIII	Compiler Design	4	4	
		CC XIV	**Practical V:** Programming Smart Devices	4	4	
		CC XV	**Practical VI :** Big Data Analytics	4	3	
		EDC II	**EDC – II**	4	2	
		EC III	**Elective III**	4	4	
IV			**Project & Viva-voce**		17	17
	TOTAL					90

Elective – I:

1. **Software Project Management**
2. Advanced Software Engineering
3. Neural Networks and Fuzzy Logic

Elective – II:

1. **Data Mining and Data warehousing**
2. Cryptography and Network Security
3. Semantic Web

Elective – III:

1. **Mobile and Cloud computing**
2. Internet of Things
3. Parallel processing

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M.Sc., Computer Science – Semester – I

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CCI	Hrs.	Credits	Marks (CIA+ESE)
	Web Technologies	6	4	25 + 75

Objectives:

To gain knowledge on various web technologies such as HTML, JavaScript, Java Network programming, XML, CGI and PHP

Unit – I: **18 Hrs.**

Introduction: What is internet? – History of internet – Internet services and accessibility – uses of internet – protocols – web concepts – internet standards.

Internet protocols: Introduction – internet protocols – host names – internet applications and application protocol.

HTML: Introduction – SGML – outline of an HTML document – head section – body section- HTML forms.

Unit – II: **18 Hrs.**

Java Network Programming: Introduction- UDP/IP and TCP/IP communications – I/O streams – sockets – multicast sockets – RMI – protocol handler – content handler.

JavaScript:Introduction – Language Elements – Objects of JavaScript – other Objects.

Unit – III: **18 Hrs.**

Dynamic HTML: Introduction – CSS – DHTML DOM and Collections – Event Handling – Filter and Transitions –Data Binding.

XML: Introduction – HTML vs XML – Syntax of the XML document – XML Attributes – XML validation – XML DTD – Building blocks of XML Documents – DTD elements – DTD attributes – DTD Entities – DTD validation – XSL – XSL transformation- XML namespace - XML schema.

Unit – IV: **18 Hrs.**

CGI : Introduction- server browser interaction – CGI script structure – the CGI.pm module – Perl variables – CGI environment variables – processing forms – sending mails –

validating the form data – handling check boxes – server side includes – CGI server side and client side applets – CGI security issues.

PHP: Introduction to PHP – using variables & output statements – PHP building blocks – data sending ways in PHP – Introduction to MYSQL/Maria DB – Sending data to MariaDB – Retrieving data from Maria DB.

Unit – V: **18 Hrs.**

Error handling in PHP – working with images – cookies/session in PHP – sending mail in PHP – Mariadb/MySQL advanced learning – PHP /Ajax Technologies.

Text book:

1. N.P. Gopalan and J. Akilandeswari, "Web Technology A developer's perspective", Second Edition, PHI Learing Pvt. Ltd. 2014. (Relevant chapters only)
2. Hirdesh Bhardwaj, "PHP Mysql For Advanced Learning", Educreation Publishing, Second Edition, 2016. (Relevant chapters only)

Reference books:

1. Jeffrey C.Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.
2. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.
3. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.
4. Bates, "Developing Web Applications", Wiley, 2006.

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M.Sc., Computer Science – Semester – I

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CCII	Hrs.	Credits	Marks (CIA+ESE)
	Python Programming	6	4	25 + 75

Objective:

To provide fundamental concepts of python programming

Unit – I: **18 Hrs.**

Welcome to Python - What is Python – History of Python – Features of Python – Installing Python – Running Python - Comments - Operators - Variables and Assignment - Python Objects – Standard Types - Other Built-in Types - Internal Types - Standard Type Operators - Standard Type Built-in Functions - Categorizing the Standard Types - Unsupported Types.

Unit – II: **18 Hrs.**

Introduction to Numbers – Integers - Floating Point Real Numbers - Complex Numbers – Operators - Built-in Functions -Sequences – Strings - Strings and Operators - String-only Operators - Built-in Functions - String Built-in Methods - Special Features of Strings.

Unit – III: **18 Hrs.**

Lists – Operators - Built-in Functions - List Type Built-in Methods - Special Features of Lists - Tuples - Tuple Operators and Built-in Functions - Special Features of Tuples - Conditionals and Loops – if statement - else statement - else if statement - while statement - for statement - break statement - continue statement - pass statement - else statement.

Unit – IV: **18 Hrs.**

Regular Expressions – Introduction – Special symbols and characters for Regular Expressions – Regular Expressions and Python – Network Programming – Introduction – Network programming in Python – Sockets : Communication end points

Unit – V: **18 Hrs.**

GUI Programming with TKinter – Introduction TKinter and Python Programming – Tkinter examples – Related modules and other GUIs – Web programming – Web surfing with Python – Advanced web clients.

Text Book:

Chun, J Wesley, CORE Python Programming, 2nd Edition, Pearson, 2010. (Relevant chapters only)

Reference Books:

1. Dave Kuhlman, A Python Book: Beginning Python, Advanced Python and Python exercises, 1st Edition
2. John V Guttag, ―Introduction to Computation and Programming Using Python‘‘, Revised and expanded Edition, MIT Press , 2013.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, ―Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
4. Timothy A. Budd, ―Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd., 2015.

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M.Sc., Computer Science – Semester – I

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CCIII	Hrs.	Credits	Marks (CIA+ESE)
	Design and Analysis of Algorithms	5	4	25 + 75

Objectives :

To study the concepts of algorithms and analysis of algorithms using divide and conquer, greedy method, dynamic programming, backtracking, and branch and bound techniques

Unit – I: **15 Hrs.**

Introduction: What is an algorithm – Algorithm Specification – Performance Analysis. Elementary Data Structures: Stacks and Queues – Trees –Dictionaries – Priority Queues — Graphs.

Unit – II: **15 Hrs.**

Divide and Conquer: The General Method – Binary Search – Finding The Maximum And Minimum – Merge Sort – Quick Sort – Selection - Strassen's Matrix Multiplication.

Unit – III: **15 Hrs.**

The Greedy Method: General Method - Knapsack Problem - Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths.

Unit – IV: **15Hrs.**

Dynamic Programming: The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.

Unit – V: **15 Hrs.**

Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem. Branch and Bound : The method – Traveling Salesperson.

Text Book:

"Fundamentals of Computer Algorithms" Second Edition, Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, University Press Reprinted 2008.

References Book:

1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcropft, Ullman , LPE
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI.

M.Sc., Computer Science – Semester – I

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CCIV Practical I	Hrs.	Credits	Marks (CIA+ESE)
	Web Technologies	4	4	40 + 60

Objectives:

- To design simple web site using HTML tags
- To create style sheets
- To create dynamic web pages using JavaScript and PHP

Web Technologies Lab

1. Design a home page which will display your information, i.e. Bio data, using Image Link and File Link to upload images and necessary documents.
2. Create a HTML web page with the following: i) To embed an image map in a web page ii) To fix the hot spots iii) Show all the related information when the hot spots are clicked.
3. Develop a digital clock using JavaScript.
4. Write a JavaScript program to count and display the items of a dropdown list in an alert window.
5. Write a program to demonstrate Event Handling :
    (i) Validation of registration form
    (ii) Open a Window from the current window
    (iii) Change color of background at each click of button or refresh of a page
    (iv) Display calendar for the month and year selected from combo box OnMouseover event.
6. Design a CSS to create menu
7. Design a webpage i.e. Bio data using CSS.
8. Design a simple online test web application in PHP. (Use MYSQL).
9. Create a web application for file uploading.
10. Create a simple XML document to display the address book.
11. Create a XML program for DTD (Document Type Definition) creation.

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M.Sc., Computer Science – Semester – I

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CCV Practical II	Hrs.	Credits	Marks (CIA+ESE)
	Python Programming	4	4	40 + 60

Objectives:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Read and write data from/to files in Python.
- To write, test, and debug simple GUI using Python.

Python Programming Lab

1. Program to demonstrate arithmetic operations.
2. Program using numbers and operators.
3. Program to demonstrate string manipulation.
4. Program using user defined functions.
5. Program using lists.
6. Program using tuples.
7. Program using conditional statement.
8. Program using looping statement.
9. Program using continue, pass and else statement.
10. Program to demonstrate the use of regular expressions.
11. Program to demonstrate exception handling.
12. Program to demonstrate network programming.
13. Program to demonstrate GUI programming with Tkinter.
14. Program using web programming.
15. Program using advanced web clients

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M.Sc., Computer Science – Semester – I

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Elective - I	Hrs.	Credits	Marks (CIA+ESE)
	1. Software Project Management	5	4	25 + 75

Objectives:

On completion of the course, the learner will

1. Have knowledge on the basics of Software Project management
2. Know responsibilities of Software Project Manager, Risk Management roles.

Unit – I: **15 Hrs.**

Introduction to Software Project Management: Introduction -Software projects Vs Other projects – Activities covered by Software project Management – Plans, methods and methodologies – Stakeholders-Management control.

Project Evaluation and Programme Management: Evaluation of individual projects - cost benefit evaluation techniques- risk evaluation-strategic programme management – creating a programme-benefits management.

An overview of Project planning: Introduction to stepwise project-select project – Identify project Scope and objectives-Identify project infrastructure-Analyze project characteristics allocate resources.

Unit – II: **15 Hrs.**

Selection of an appropriate project approach: Choosing methodologies and Technologies– choice of process models - Structured versus speed of delivery- The water fall Model – The Spiral Models – software Prototyping-Managing iterative processes .

Software effort estimation: The basis for software estimating-Software effort estimation techniques-Bottom up estimating- Expert judgment– Albrecht Function point analysis –COSMIC Full Function point– COCOMO II model.

Unit – III: **15 Hrs.**

Activity planning: Objectives of activity planning–project schedules –project and activities – Network planning model- Forward and Backward Pass –Identify the Critical path – Activity on arrow networks.

Risk management: Risk-Categories of risk-Risk Identification –Risk Assesment–Risk planning-Risk Management- Evaluating risks to the schedule. Resource allocation: Nature of resources – Identify resource requirements – Scheduling resources – creating critical paths – Cost schedules.

Unit – IV: **15 Hrs.**

Monitoring and control: Creating the framework – Collecting the data- visualizing progress – Cost monitoring – Earned Value analysis - Prioritizing monitoring –Getting the project back to targets.

Managing contracts : Types of contract – Stages in contract placement-contract management – Acceptance.

Unit – V: **15 Hrs.**

Managing People in software environments: Introduction- Understanding and organization Behaviour – Selecting right person- Best Methods – Motivation – The Oldham-hackman job characteristics model– Stress- Health and safety-Some ethical and professional concerns.

Software Quality: Place of software quality in project planning – The importance of software quality - Defining software quality— ISO 9126- Product Vs Process quality management – Quality management systems-process capability models-Techniques to help enhance software quality-Testing-Quality plans.

Text Book:

"Software Project Management", Bob Hughes ,Mike Cotterell & Rajib Mall, Tata McGraw Hill Publishing company, New Delhi, Fifth edition, 2011

Reference Books:

1. "Managing Global software Projects", Gopalaswamy Ramesh, Tata McGraw Hill Publishing company, 2002
2. "Software Engineering", Bharat Bhushan Agarwal, Sumit Prakash Tayal, Laxmi Publications Pvt. Ltd,First Edn., 2007.
3. "Software Project Management : A Concise study", Kelkar,Second Edn., PHI.
4. "Software Engineering", Sajan Mathew, S.Chand Publishers, First Edn., 2007.
5. "Software Engineering", Pressman, TMH,Seventh Edition, 2012.

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M.Sc., Computer Science – Semester – I

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Elective - I	Hrs	Credits	Marks (CIA+ESE)
	2. Advanced Software Engineering	5	4	25 + 75

Objectives:

- To understand the basic concepts of software engineering
- To learn the methods of planning a software project, software cost estimation, requirements definition, software design implementation, testing and maintenance

Unit – I: **15 Hrs.**

Introductions: Software Engineering-Software Process-Generic Process Model-Process Models- Agile development – Agile Process – Extreme Programming – Other Agile Process Model: Adaptive process models, Scrum, Dynamic Systems development method and Crystal

Unit – II: **15 Hrs.**

Understanding Requirements: Principle that guide practice – Understanding Requirements – Requirement modeling: Scenarios, Information and Analysis classes – Requirement analysis – Requirement modeling Strategies

Unit – III: **15 Hrs.**

Design: The Design Process – Design concepts – The design model – Architectural design – Software Architecture – Component level design – User interface design – Pattern oriented design – Web Application design

Unit – IV: **15 Hrs.**

Software Implementation and Testing : Modern Programming language features – Implementation Issues and Solutions – Structured coding techniques – Coding styles – Standard and Guidelines – Documentation guidelines – Software Testing strategies on conventional software, Object oriented software and web Applications – Validation Testing – System Testing – Art of Debugging

Unit – V: **15 Hrs.**

Software Maintenance and Emerging Trends in Software Engineering: Software Maintenance and reengineering – Latest Trends: Technology Evolution – Identifying Soft Trends – Technology Directions – Tools Related Trends.

Text book:

1. Roger.S.Pressman ”Software Engineering – A Practitioner’s Approach ”, (7th edition) Tata McGraw Hill Education, 2014.
2. Ian Somerville “Software Engineering”,(9^{th} Edition) Pearson Education,2010.

Reference book:

1. Hans Van Vilet “Software Engineering: Principles and Practices”, Wiley 2008.
2. Richard Fairley “Software Engineering Concepts” Tata Mcgraw Hill Education, 2008.

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M.Sc., Computer Science – Semester – I

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Elective - I	Hrs	Credits	Marks (CIA+ESE)
	3. Neural Networks and Fuzzy Logic	5	4	25 + 75

Objectives:

- To gain knowledge on fuzzy set theory, optimization, neural networks and neurofuzzy modeling
- To understand neural networks and fuzzy logic

Unit – I: **15 Hrs.**

FUZZY SET THEORY: Introduction to Neuro-Fuzzy and SoftComputing-Fuzzy Sets-Basic Definition and Terminology-Set-theoretic Operations-Member Function Formulation and Parameterization -Fuzzy Rules and Fuzzy Reasoning –Extension Principle and Fuzzy Relations-Fuzzy if then Rules-Fuzzy Reasoning_Fuzzy Inference Systems-Tsukamoto Fuzzy Models-Input Space Partitioning and Fuzzy Modelung.

Unit – II: **15 Hrs.**

OPTIMIZATION: Derivative-based Optimization-Descent Methods-The Method of Steepest Descent –Classical Newton's Method-Step Size Determination – Derivative-free Optimization-Genetic Algorithms-Simulafted Annealing – Random Search-Downhill Simplex Search.

Unit – III: **15 Hrs.**

NEURAL NETWORKS : Supervised Learning Neural Networks- Perceptrons – Adaline – Backpropagation Multilayer Perceptrons – Radial Basis Function Networks-Unsupervised Learning Neural Networks-Competitive Learning Networks-Kohonen Self-Organizing Networks-Learning Vector Quantization – Hebbian Learning.

Unit – IV: **15 Hrs.**

NEURO FUZZY MODELING : Adaptive Neuro - Fuzzy Inference Systems – Architecture – Hybride Learning Algorithm-Learning Methods that Cross-fertilize ANFIS and RBFN-Coactive Neuro Fuzzy Modeling-Framework Neuron Fuctions for Adaptive Networks- Neuro Fuzzy Spectrum.

Unit – V: **15 Hrs.**

APPLICATION OF COMPUTATIONAL INTELLIGENCE : Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

Text Book :

"Neuro-Fuzzy and Soft Computing", J.S.R.Jang, C.T.Sun And E.Mizutani, Pearson Education, 2014.

Reference Books:

1. "Fuzzy Logic with Engineering Applications", Timothy J.Ross, Tata McGraw Hill, 1997.
2. "Neural Networks, Fuzzy Logic and Genetic Algorithms", S. Rajasekaran and G.A.V.Pai, PHI , 2003.
3. "Neural Networks, Fuzzy Logic and Genetic Algorithms", S.Rajasekaran and G.A.V.Pai, PHI, 2003
4."Neural networks and Fuzzy systems: A Dynamical System Approach to machine Intelligence", Kosko ,PHI.
5."Fuzzy Logic with Engineering Applications", Timothy j.Ross, McGraw-Hill. 1997.

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M.Sc., Computer Science – Semester – II

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CCVI	Hrs	Credits	Marks (CIA+ESE)
	Digital Image Processing	5	4	25 + 75

Objectives:

- To understand the basic concepts of image processing
- To acquire knowledge about Image enhancement and Compression techniques

Unit – I: **15 Hrs.**

Introduction and origin of digital image processing – Examples – Fundamental steps in digital image processing – components of image processing system.

Digital Image Fundamentals – Elements of visual perception – Light and Electromagnetic spectrum – Image sensing and acquisition – Image sampling and quantization – Some basic relationship between pixels.

Unit – II: **15 Hrs.**

Intensity Transformations and spatial filtering – background – Some basic intensity transformation functions – Histogram processing – fundamentals of spatial filtering – smoothing spatial filters – sharpening spatial filters.

Unit – III: **15 Hrs.**

Filtering in the frequency domain – background – preliminary concepts – Sampling and Fourier transform of sampled functions – The Discrete Fourier Transform(DFT) of one variable – Extension to functions of two variables – The basics of filtering in the frequency domain - image smoothing using frequency domain filters – Image sharpening using frequency domain filters – Selective filtering .

Unit – IV: **15 Hrs.**

Image restoration and reconstruction – A model of the image degradation/ restoration process – noise models – restoration in the presence of noise only-spatial filtering - Periodic noise reduction by frequency domain filtering – Inverse filtering – Image reconstruction from projections. Color Image Processing – Color fundamentals – color models – Pseduocolor image processing – Color transformation – Smoothing and sharpening -

Unit – V: **15 Hrs.**

Image compression – Fundamentals – Some basic compression methods – Image segmentation – Fundamentals –Point, Line and Edge detection – Region based segmentation.

Text Book:

"Digital Image processing", R.C. Gonzalez, R.E.Woods, Third Edition, Pearson Education, 2014.

Reference Books:

1. "Digital Image Processing", Abhishek Yadav, Poonam Yadav,,Laxmi Publications Pvt. Ltd, First Edn., 2009.
2. "Digital Image processing and Pattern Recognition", Malay K. Pakhira ,PHI, Second Edn.,
3. "Fundamentals of Digital image Processing", Anil K. Jain, 2nd Edition, Prentice Hall of India, New Delhi,1994.
4. "Digital Image Processing", Pratt. W.K., 3rd Edition, John Wiley & Sons.

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M.Sc., Computer Science – Semester – II

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CCVII	Hrs	Credits	Marks (CIA+ESE)
	Java Server Programming	4	4	25 + 75

Objectives:

- To gain knowledge on J2EE programming, web applications, JDBC, servlet, RMI and EJB
- To understand JSP, JNDI, LDAP, API and JMS architecture

Unit – I: **12 Hrs.**

Introducing J2EE: Need for Enterprise Programming – J2EE Advantage – Enterprise Architecture Types – Architecture of J2EE – Introducing J2EE Components – Introducing J2EE Containers – Types of J2EE Technologies.

Understanding EJB: EJB Fundamentals – EJB Architecture – EJB Interfaces – EJB Roles –Enterprise Beans – Session Bean – Features of Session Beans – Developing Session Beans – Entity Beans – Message-Driven Beans – Container-Managed Persistence – Bean Class – Home Interface – Remote Interface – Callback Methods – Comparing CMP and BMP Entity Beans – Caching – Finder Methods.

Unit – II: **12 Hrs.**

Understanding Directory Service and JNDI: Introducing Naming and Directory Services – Introducing LDAP and JNDI – Understanding LDAP – LDAP operation – Working with LDAP Server.

Introducing RMI: Understanding RMI Architecture – Working with RMI – Application Development with RMI – Creating Distributed Applications Using RMI – Building a Generic Compute Engine – RMO over IIOP – Interoperability with CORBA – RMI-IIOP Design Policy.

Unit – III: **12 Hrs.**

JDBC and Database Programming: Introduction to JDBC – JDBC Drivers – java.sql Package – Using DataSource Object – JDBC Processes with java.sql – ResultSet – JDBC Processes with javax.sql – Connection Pooling.

Introducing Web Containers: Understanding the HTTP Protocol – Introducing Web Applications and Web Containers – Web Application Life-Cycle – Creating a Web Application – EJB-Centric Applications.

Unit – IV: **12 Hrs.**

Understanding Servlet Programming: Servlet Life-Cycle – Security Features – HTML-Aware Servlets – HHTP-Specific Servlets – Performance Features – 3-Tier Architecture – Web Publishing System – Package javax.Servlet Description – Servlet Configuration – Servlet Life-Cycle – Understanding Response and Request – Reading From Data from Servlet.

Understanding Servlet Sessions: Session – Introducing Session Tracking – Session Tracking and Java Servlet API – On-Line Store Using Session Tracking – Introducing ServletContext and Collaboration – Servlet Collaboration.

Unit – V: **12 Hrs.**

Understanding of JSP and JSTL: Introducing JSP Technology – Understanding the Page Life-Cycle – JSP Documents – JSP Elements – JSP 2 Expression Language – JSP Tag Extensions – Tag Libraries – Validation – Tag Extension API – JSP Classic Tag Handlers – SimpleTag Handlers - JSP Fragments – Translation-time Class – JSTL – JSTL Functional Overview.

Text Book:

"Java Server Programming J2EE 1.6 Edition Black Book" – 2011 Print - DreamTech Software Team – DreamTech Press. (**Related Topics only in syllabus**)

Reference Books:

1. "J2EE unleased ", first edition by Jospeh J. Bambara, Paul R. Allen, Mark Ashnault, Zujad Dean, Thomas Garben, Shery Smith, Sams Tech Media
2. "Developing Java Enterprise Applications", second edition by Stephen Asbury, Scott R. Weiner, Wiley dreamtech India Pvt. Ltd.
3. "Java server pages", Hans Bergsten, Third edition, O'Rielly
4. "Mastering Enterprise Java Beans",Ed Roman,Scott Ambler, Tyler Jewell, Second edition, wiley publication

"Professional Java Server Programming – J2EE ", Subramanyam Allamraju and Cedric Buest ,1.3 Edition – APress.

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M.Sc., Computer Science – Semester – II

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CCVIII	Hrs	Credits	Marks (CIA+ESE)
	Distributed Operating System	5	4	25 + 75

Objectives:

- To understand the concepts of remote processing calls, synchronization
- To gain knowledge about resource management and distributed file system

Unit - I: **15 Hrs.**

Fundamentals: Evolution - System model - Distributed operating system - Issuses - Distributed Computing Environment. Message Passing: Features- Issuses Synchronization - Buffering – Multi datagram Messages - Encoding and Decoding - Process addressing - Failure Handling.

Unit - II: **15 Hrs.**

Remote Processing Calls: RPC Model - Transparency - Implementation - Stub generation - Messages - Server management - Parameter passing semantics - Call semantics - Communication Protocols - Complicated RPC's - Client-Server Binding. Distributed shared memory: Architecture of DSM - Issuses - Granularity - Structure - Consistency models - Replacement strategy - Thrashing.

Unit - III: **15 Hrs.**

Synchronization: Clock synchronization - Event ordering - Mutual Exclusion - Deadlock - Election algorithms.

Unit - IV: **15 Hrs.**

Resource management: Features - Task assignment approach - Load-balancing approach - Load-sharing approach. Process management: Process migration - Threads.

Unit - V: **15 Hrs.**

Distributed File System: Features - File models - Accessing models - Sharing semantics - Caching Schemes - File replication - Fault tolerance - Atomic transactions - Design principles. Naming: Features – Fundamental terminologies and concepts.

Text book :

1. "Distributed Operating Systems – Concepts and Design", Pradeep K. Sinha,PHI Learning Private Limited, Delhi, 2014.

Reference books :

1. “Distributed Operating Systems”, Andrew S. Tanenbaum, Pearson Education, New Delhi, 2002.
2. “Distributed Systems: Principles and Paradigms”, Andrew S. Tanenbaum, Maarten van Steen, Second Edition, CreateSpace Independent Publishing Platform, 2016.
3. “An Introduction to distributed and parallel processing”, John A. Sharp, Black Well scientific publications.
4. Distributed Operating Systems And Algorithm Analysis, Randy chow, Theodore Johnson,Pearson Education India, 2009
5. “Data communications and distributed network”, Uyless D. Black.

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M.Sc., Computer Science – Semester – II

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CC IX Practical III	Hrs	Credits	Marks (CIA+ESE)
	Digital Image Processing	4	3	40 + 60

Objectives:

- To acquire skills to implement median filter on a gray scale image
- To enable the students to segment the various regions in an Image using Threshold

Digital Image Processing

1. Consider a color Image and draw a histogram.
2. Implement low pass and high pass filters using weighted mean.
3. Implement median filter on a gray scale Image.
4. Convert the given gray scale Image to a negative Image.
5. Increase the contrast of an Image using contrast stretching method.
6. Implement fast Fourier transform on a gray scale Image.
7. Segment the various regions in an Image using threshold.
8. Compress a gray scale Image using predictive coding techniques.
9. Implement the cosine transform to compress an Image.
10 Implement (a) Edge detection (b) Line detection
11. Implement Smoothing and Sharpening of an eight bit color image
12. Perform blurring and de-blurring on an image.

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M.Sc., Computer Science – Semester – II

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CC X Practical IV	Hrs	Credits	Marks (CIA+ESE)
	Java Server Programming	4	4	40 + 60

Objectives:

- To understand RMI, servlet, JSP and web services programs
- To acquire skills on database connectivity program to display EB bill list

J2EE:

1. Write a RMI program where a client invokes a method on the server, which performs any numerical calculations.
2. Write a JSP program to demonstrate the usage of exception handling process.
3. Write a Java program that illustrates the use of JNDI service.
4. Write a Java program that uses JMS technology to send a message.
5. Write a Servlet program to illustrate the life cycle of the Servlet.
6. Write a Servlet program to get the information about the Server.
7. Write a Servlet program that describes the mechanism of session tracking.
8. Write a Stateless Session Bean to check whether given number is even or not.
9. Write a Container Managed Persistent Bean Customer. The functionality of the bean is to get the username and password of the customer. The bean validates the user based on the password.
10. Write a JSP program to create a web page about yourself.
11. Develop JSP Database connectivity program to display EB bill list.
12. Develop an application to send and receive email.
13. Develop a shopping cart application using J2EE technologies.

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M.Sc., Computer Science – Semester – II

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	EDC - I	Hrs	Credits	Marks (CIA+ESE)
	Web Design	4	2	25 + 75

Objectives:

- To learn the method of creating web pages
- To understand the features of the HTML and PHP
- To acquire the knowledge on writing scripts

Unit – I: **12 Hrs.**

Introduction to HTML – Web server – Web Client/Browser – HTML – Commonly used HTML commands – Titles and footers – text formatting – emphasizing material in a web page – text styles – other text effects. Lists: types of lists – Adding graphics to HTML documents : Using the border attribute – using the width and height attribute – using the align attribute – using the ALT attribute.

Unit – II: **12 Hrs.**

Tables: Introduction – using the width and border attribute – using the cellpadding attribute - using the cellspacing attribute – using the background – color property – using the colspan and rowspan atributes. Linking Documents : Links – images as hyperlinks. Frames: Introduction to frames - <Frameset>, <Frame> tags.

Unit – III: **12 Hrs.**

PHP & HTML : PHP & HTML - Getting started – writing PHP – running the PHP script. The Basics of PHP : data types - variables – constants – HERE documents - operators – arrays – conditional statements – iterations.

Unit – IV: **12 Hrs.**

Functions : User Defined Functions – Built-in functions – PHP server variables – working with date and time – performing mathematical operations – working with string functions.

Unit – V: **12 Hrs**

Working with forms: Introducing HTML form tags and elements – the main <FORM> tag – FORM elements – adding elements to a form - uploading files to the web server using PHP. Debugging and errors: Error handling in PHP: displaying errors – types of errors- error levels in PHP – acting on errors/exceptions.

Text Book:

"Web Enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP", 4th Revised Edition, **Ivan Bayross**, BPB publications, 2010.

Reference Books:

1. "World Wide Web design with HTML", C. XAVIER, Tata McGraw Hill, 2008.
2. "HTML – A Beginners Guide", Wendy Willard, Tat McGraw Hill, Fifth Edition.
3. "PHP – A Beginners Guide", Vikram Vaswani, Tata McGraw Hill, 2009.
4. "The Complete Reference PHP", Steven Holzner, Tata McGraw-Hill Edition 2008
5. Programming PHP, Rasmus Lerdorf, Kevin Tatroe and Peter MacIntyre, O'Reilly, 3rd Edition.

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M.Sc., Computer Science – Semester – II

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Elective - II	Hrs	Credits	Marks (CIA+ESE)
	1. Data Mining and Data Warehousing	4	4	25 + 75

Objectives:

- To enable the students to learn data mining techniques
- To understand the concept of data warehousing

Unit – I: **12 Hrs.**

Introduction: Basic data mining tasks: Classification- Regression-Time Series Analysis-prediction-clustering-summarization-data mining versus knowledge discovery in databases-Development of data mining-data mining issues-data mining metrics-social implications of data mining- data mining from a database perspective –database/OLTP systems – information retrieval-decision support systems-Dimensional modeling-OLAP.

Unit – II: **12 Hrs.**

Data mining Techniques: Introduction-a statistical perspective on data mining-similarity measures-decision trees-neural networks-generic algorithms. Classification: Issues-statistical based algorithms-distance based algorithms-decision tree based algorithms-neural network based algorithms-rule-based algorithms-combining techniques.

Unit – III: **12 Hrs.**

Clustering: similarity and distance measures-outliers-Hierarchical algorithms: Agglomerative algorithm-Divisive clustering-partition algorithms: Minimum spanning tree-squared Error clustering algorithm- K-Means clustering- Nearest neighbour algorithm- PAM Algorithm- Association Rules: Introduction-Large Item sets-Basic Algorithms: Apriori Algorithm – Sampling Algorithm –Partitioning – Parallel and Distributed Algorithms : Data Parallelism-Task Parallelism –Comparing Approaches.

Unit – IV: **12 Hrs.**

Data Warehousing: Introduction-Background - Delivery process- data warehouse delivery method-System process-overview –Typical process flow within a data warehouse-Extract and load process-Clean and transform data-Backup and archive process-Query

management process-process Architecture-Load manager-warehouse manager-Query manager-detailed information-Summary information-Metadata-data marting- Database schema-Starflake schemas-Identifying facts and dimensions-Designing fact table-Designing dimension tables-Designing the starflake schema-Query redirection-Multidimensional schemas.

Unit – V: **12 Hrs.**

Partitioning Strategy-Horizontal partitioning-Vertical partitioning-Hardware partitioning - Sizing the partition-Aggregation- Designing summary tables-Which summaries to create-Data marting-When is a data mart appropriate?-Designing data marts-Costs of data marting-Metadata-Data transformation and load-data management-Query generation-Metadata and tools-System and data warehouse process managers-Why you need to manage a data warehouse-System managers- Data warehouse process managers-Load manager-Ware house manager-Query manager.

Text Books :

1. "Data Mining Introductory and advanced topics. Margaret H. Dunham, Pearson Education, Sixth Edition, 2013.
2. "Data Warehousing In The Real World", Sam Anahory, Dennis Murray, Pearson Education, Fourth impression 2009.

Reference Books :

1. "Data mining concepts and techniques", Han Jiawia,Elsevier, New Delhi,2006.
2. "Data warehousing",Sinha, Anitesh.k,Thomson Asia Pvt. Ltd,2002.
3. "Data warehousing-concepts, techniques, products and applications", Prabhu, PHI, Third Edition, 2010.
4. "Data mining :Techniques and Trends", Gopalan and Sivaselvan, PHI.,2009.
5. "Principles and Implementation of Data warehousing",Rajeev A. Parida, , Laxmi Publishers Pvt Ltd.,2006.

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M.Sc., Computer Science – Semester – II

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Elective - II	Hrs	Credits	Marks (CIA+ESE)
	2.Cryptography and Network Security	4	4	25 + 75

Objectives:

On completion of the course, the students will

- Know various techniques in Cryptography
- Able to understand the issues in security.

Unit - I: **12 Hrs.**

Introduction: The Need for security – Security Approaches – Principles of Security – Types of Attacks – Theoretical Concepts.Cryptographic Techniques: Introduction – Plain Text and cipher Text – Substitution techniques –Transposition techniques – Encryption and - Decryption – Symmetric and Asymmetric key cryptography – Steganography – Key range and Key size.

Unit - II: **12 Hrs.**

Computer – Based Symmetric Key Cryptography Algrothms:Introduction – Algorithms types and modes – Overview of symmetric key cryptography – Data Encryption standard (DES) – IDEA – RC5 – BLOWFISH – Adv. Encryption std (AES).

Computer Based Asymmetric Key Cryptography Algorithm.:Introduction – History of Asymmetric Key Cryptography - The RSA Algorithm – Digital Signatures.

Unit - III: **12 Hrs.**

Public Key Infrastructure - Introduction – Digital certificate – Private key Mgt – The PKIX Model – Public key cryptography Standards (PKCS) – XML, PKI and security.

Unit - IV: **12 Hrs.**

Internet Security Protocol: Basic concepts – SECURE SOCKETS LAYER (SSL) – Secure Hyper Text Transfer protocol (SHTTP) – Secure Electronic Transaction (SET) – SSL Vs SET – 3-D secure protocol – Electronic Money – email security – WAP security – Security in GSM.

Unit - V: **12 Hrs.**

User Authentication Mechanisms: Introduction – Authentication Basics – Password – Authentication Tokens – Certificate Based Authentication – Biometric Authentication – Kerberos – Single sign–on Approaches.

Practical Implementation Of Cryptography - Cryptography solution using JAVA – Cryptography Tool kits.

Text Book:

Atul Kahate, "Cryptography and Network Security", 3rd edition, Tata McGraw Hill Publication, 2013.

Reference Book:

William Stallings, "Cryptography and Network Security: Principles and Practices", Pearson Publications, 7th edition, 2016

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M.Sc., Computer Science – Semester – II

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Elective - II	Hrs	Credits	Marks (CIA+ESE)
	3. Semantic Web	4	4	25 + 75

Objective :

On completion of the course, the students will

- Have knowledge on Semantic Web
- Know the application of Semantic Web

Unit - I: **12 Hrs.**

The Semantic web Vision: Today Web – From Today's Web the Semantic Web – Examples – Semantic web Technologies – A Layered Approach – Structured Web Documents in XML: Introduction the XML Language – Structuring - Name Spaces.

Unit - II: **12 Hrs.**

Addressing and Quieting XML Documents – Processing – Describing Web Resources in RDF: Introduction – RDF: Basic Ideas – RDF XML – Based Syntax – RDF Schema Basic Ideas – RDF Schema: The Language – RDF and RDF Schema in RDF Schema.

Unit - III: **12 Hrs.**

An Axiomatic Semantic for RDF and RDF Schema – A Direct Inference System for RDF and RDFS – Querying in RQL – Web Ontology Language: Introduction – The OWL Language – Examples – OWL in OWL.

Unit - IV: **12 Hrs.**

Future Extensions Logic and Inference: Example of Monotonic Rules: Family Relationship – Monotonic Rules: Syntax – Semantics – Non – Monotonic Rules: Motivation and Syntax – Example of Non – Monotonic Rules: Brokered Trade – Rule Markup in XML: Monotonic Rules – Non monotonic Rules.

Unit - V: **12 Hrs.**

Applications: Introduction – Horizontal Information Products at Elsevier – Data Integration at Audi – Skill Finding at Swiss Life – Think Tank Portal at Enersearch – e – Learning – Web ServicesOntology Engineering: Introduction – Constructing ontologies – Manually – Resuing Existing ontologies – Using semiautomatic methods - On – to – knowledge Semantic web Architecture.

Text Book:

Grigoris Antoniou and Frank Van Harmelen, "Semantic Web Primer", The MIT Press Cambridge, Massa Chusetts London, England, 3rd editon, 2012.

Reference Books:

1. Christopher Walton, "Agency and the Semantic Web", Oxford University Press, 2007
2. AF Salam and Jason R Stevens, "Semantic Web Technologies and e-Business", Idea Group Publications, 2007

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M.Sc., Computer Science – Semester – III

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CC XI	Hrs.	Credits	Marks (CIA+ESE)
	Programming Smart Devices	5	4	25 + 75

Objectives:

- To enable the students to develop and deploy Android Applications

Unit – I: **(15 Hours)**

Getting started with Android programming: What is Android? – obtaining required tools – launching your first android application.

Using Android studio for android development: Exploring the IDE – Code compilation – debugging – publishing your application.

Activities, Fragments and Intents: Understanding Activities- linking Activities using intents – fragments - Displaying Notifications.

Unit – II: **(15 Hours)**

Android User Interface: Understanding the components of a screen - adapting to display orientation - managing changes to screen orientation - Utilizing the Action Bar - Creating the user Interface programmatically - Listening for UI Notifications.

Designing user interface with views: Using Basic Views - Using Picker views - Using List views to display long lists- Understanding specialized fragments.

Unit – III: **(15 Hours)**

Displaying pictures and menus with views: Using Image Views to display pictures - using menus with views – using WebView.

Data Persistence : Saving and loading user preferences - persisting Data Files - Creating and using Databases.

Content Providers: Sharing Data in Android - using content provider - creating your own content providers - using content providers.

Unit – IV: **(15 Hours)**

Messaging: SMS Messaging- Sending E-mail.

Location based services : Displaying Maps - Getting Location Data - Monitoring a Location - Building a Location Tracker.

Networking : Consuming Web Services using HTTP - consuming JSON Services – socket programming.

Unit – V: **(15 Hours)**

Developing Android Services : Creating your own services - Establishing Communications between a service and an activity - binding activities to services - understanding Threading.

Publishing android applications: Preparing for Publishing, Deploying APK Files. Using Eclipse for android development – using the Android Emulator.

Text book:

1. Wei-Meng Lee, Beginning android 4 application Development, John Wiley & sons, Inc, 2012.

Reference books:

1. Beginning Android Programming with Android Studio , J.F. DiMarzio Fourth Edition, John Wiley & sons, Inc, 2016.
2. Professional Android Application Development, Reto Meier, Wiley Publishing Inc, 2009.
3. Paul Deitel-Harvey Deitel-Abbey Deitel-Michael Morgano, Android for Programmers An App-Driven Approach,Pearson Education Inc., 2012.
4. Jerome (J.F) DiMarzio, Android- A programmer's Guide, TataMcgraw Hill,2010, ISBN: 9780071070591.

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M.Sc., Computer Science – Semester – III

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CC XII	Hrs.	Credits	Marks (CIA+ESE)
	Big Data Analytics	5	4	25 + 75

Objectives:

- To understand basics of Big data
- To know analytics for Enterprise class Hadoop with java.

Unit – I: **(15 Hours)**

Big Data: From the Business Perspective: What is Big Data? – Characteristics of Big Data - Data in Warehouse and Data in Hadoop. Why is Big Data Important? – When to consider a Big Data Solution- Big Data Use Cases: Patterns for Big Data Deployment.

Unit – II: **(15 Hours)**

Big Data: From the Technology Perspective: The History of Hadoop - Components of Hadoop – Application Development in Hadoop- Getting Your Data into Hadoop- Other Hadoop Components.

Unit – III: **(15 Hours)**

Storing Data in Hadoop: HDFS –HBase- combining HDFS and HBase for effective data storage using Apache Avro - Managing metadata with HCatalog.

Unit – IV: **(15 Hours)**

Processing your data with Map Reduce: Getting to know Map Reduce - Your first MapReduce Application - Designing Map Reduce Implementations. Building Reliable MapReduce Application: Local Application Testing with Eclipse – Using logging for Hadoop Testing – Reporting Metrics with job counters – Defensive programming in Map Reduce.

Unit – V: **(15 Hours)**

Customizing MapReduce execution – Controlling MapReduce Execution with Input format - Reading Data your way with custom Record Reader- Organizing Output data with Custom Output Format – Writing Data your way with custom Record Writer- Optimizing Your MapReduce Execution with Combiner- Controlling Reduce Execution with Partitioner – Using Non-Java code with Hadoop.

Text Books:

1. Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch,George Lapis , "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data",McGraw-Hill, 2012.(Units I & II)
2. Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Jhon Wiley & Sons, 2013(Units: III,IV & V).

Reference Book:

1. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics For Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012.

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M.Sc., Computer Science – Semester – III

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – CC XIII	Hrs.	Credits	Marks (CIA+ESE)
	Compiler Design	4	4	25 + 75

Objectives:

- To Gain Knowledge on Compiler Design.
- To Enable The Students To Learn The Phases Of Compiler, Lexical Analyzer, Parser, Syntax Analysis, Type Checking, Intermediate Code Generator And Code Optimization.

Unit – I: **(12 Hours)**

Introduction: The Structure of a Compiler – Applications of Compiler Technology. **A Simple Syntax – Directed Translator**: Syntax Definition- Syntax Directed Translation- Parsing- A Translator for Simple Expressions- Lexical Analysis – Symbol Tables- Intermediate Code Generation

Unit – II: **(12 Hours)**

Lexical Analysis: Role of the Lexical Analyzer- Input Buffering- Recognition of Tokens- Finite Automata-From Regular Expressions to Automata. **Syntax Analysis:** Context Free Grammar-Writing a Grammar- Top down Parsing-Bottom Up Parsing- Introduction to LR Parsing: simple LR.

Unit – III: **(12 Hours)**

Syntax Directed Translation: Syntax Directed Definition- Application of Syntax directed Translation**. Intermediate Code Generation**: Variants Of Syntax Trees- Three Address Code- Types And Declarations – Type Checking- Control Flow- Back patching – Switch Statements.

Unit – IV: **(12 Hours)**

Runtime Environments: Storage Organization-Stack Allocation of Space - Heap Management. **Code Generation:** Issues in the Design of a Code Generator - Basic Blocks and Flow Graphs – Optimization of Basic Blocks – Peephole Optimization – Register Allocation and Assignment.

Unit – V: **(12 Hours)**

Machine Independent Optimizations: The Principles Sources of optimization-Introduction To Data-Flow Analysis- Loops In Flow Graphs – **Instruction Level Parallelism:** Processor Architectures – Basic block scheduling - Global Code Scheduling.

Text Book:

"Compilers Principles, Techniques and Tools", Alfred V.Aho, Monica S.Lam, Ravi Sethi, Jeffrey D. Ullman, Second Edition-2011, Pearson Education.

Reference Books:

1. "Theory Of Computations", Dr.O.G.Kakde, Laxmi Publication Pvt. Ltd, First Edn., 2007.
2. "Compiler Design", Dr.O.G.Kakde, Laxmi Publication Pvt. Ltd,Fourth Edn., 2006.
3. "Compiler Design", Chattopadhyay,PHI-2005.

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M.Sc., Computer Science – Semester – III

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – XIV	Hrs.	Credits	Marks (CIA+ESE)
	Practical –V: Programming Smart Devices	4	4	40+60

Objectives:

- To develop simple applications using Android
- To create the Mobile Applications using different controls in Android.

LIST OF PRACTICALS

1. Write an Android Program to Demonstrate Alert Dialog Box
2. Write an application that draws basic graphical primitives on the screen.
3. Develop an application that uses GUI component to create login page and home page
4. Develop an application that uses GUI components, font and colors.
5. Create an Android Program to Demonstrate Activity Life Cycle
6. Simulate an Android Program to Perform all Operations using Calculators
7. Develop an android application that uses GPS location information.
8. Implement an application that writes data to the SD card.
9. Implement an application that creates an alert upon receiving a message.
10. Write a mobile application for alarm clock.
11. Build an Android program that uses audio functions.
12. Design an Android program to set the wallpaper of your device using Bitmap class.
13. Develop an android program to demonstrate menus.
14. Display the phone numbers from the phone book using your own application.
15. Create a simple SMS application.
16. Create an Application which deals with the Android Content Providers
17. Develop an application that makes use of database.

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M.Sc., Computer Science – Semester – III

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Core Course – XV	Hrs.	Credits	Marks (CIA+ESE)
	Practical –VI: Big Data Analytics	4	3	40+60

Objectives

On completion of the course, the students will be able

- To work in Eclipse IDE Big Data, the Data Analytics lifecycle, Machine Learning (ML)
- To develop the map reduce for Hadoop

LIST OF PRACTICALS

1. Write a Word count Mapper program.
2. Design a Word count Reducer program using Java.
3. Develop a Word count Main program using Java.
4. Construct a program to Configure a Job using Mapper.
5. Prepare a program to Run a job using MapReduce.
6. Write a program for Running a Java map/reduce program on the cluster
7. Design a program for Reporting Metrics with job counters.
8. Develop a program for Reading Data your way with custom Record Reader.
9. Construct a program for Organizing Output data with Custom Output Format.
10. Prepare a program for Writing Data your way with custom Record Writer.
11. Write a program for Optimizing Your MapReduce Execution with Combiner.
12. Develop a program to Control Reduce Execution with Partitioner.

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M.Sc., Computer Science – Semester – III

(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	Elective Course – EC III	Hrs.	Credits	Marks (CIA+ESE)
	Mobile and Cloud Computing	4	4	25 + 75

Objectives:

- To impart knowledge on the working of mobile communication systems and expertise in application development for Mobile Computing systems.
- To understand the principle of cloud computing

Unit – I: **(12 Hours)**

Basics of Communication Technologies : Types of Telecommunication Networks – Components of a Wireless Communication System –Architecture of Mobile Telecommunication Systems –Wireless Networking Standards –WLAN –Bluetooth Technology –Introduction to Mobile Computing and Wireless Networking :Mobile Computing –Mobile Computing Vs. Wireless Networking –Characteristics of Mobile Computing -Structure of Mobile Computing Applications – Cellular Mobile Communication –GSM –GPRS -UMTS –MAC Protocols :Properties –Issues –Taxonomy –Assignment Schemes –MAC Protocols for Ad Hoc Networks.

Unit – II: **(12 Hours)**

Mobile Internet Protocol :–Mobile IP –Packet Delivery –Overview –Desirable Features –Key Mechanism –Route Optimization –DHCP -Mobile Transport Layer :Overview of TCP/IP –Terminologies –Architecture –Operations –Application Layer Protocols of TCP – Adaptation of CP Window –Improvement in TCP Performance –Mobile Databases : Introduction –Issues of Transaction Processing –Transaction Processing Environment –Data Dissemination –Transaction Processing in Mobile Environment -Data Replication –Mobile Commerce :-Applications of M-Commerce –B2B Applications –Structure of M-Commerce – Pros and Cons of -Commerce –Mobile Payment Systems.

Unit – III: **(12 Hours)**

Mobile Ad Hoc Networks (MANETs):– Basic concepts –Characteristics – Applications–Design Issues –Routing –Traditional Routing Protocols –Basic concepts of outing –Popular MANET Routing Protocols–Vehicular Ad Hoc Networks (VANETs) – MANETs Vs. VANETs –Security Issues –Security Attacks on Ad Hoc Networks –Wireless Sensor Networks WSNs) :Introduction –WSN versus MANET –Applications –Architecture of the Sensor Node –Challenges in the Design of an effective DSN –Characteristics of Sensor Networks –WSN Routing Protocols –Target Coverage -Operating Systems for Mobile Computing :Mobile OS Responsibilities –Basic concepts –Special Constraints and Requirements –Commercial Mobile OSs –Comparative study of Mobile OSs –OS for Sensor Networks –Mobile Application Development Protocols : -Mobile Devices as Web Clients – WAP –J2ME –Android SDK.

Unit – IV: **(12 Hours)**

Introduction to Cloud Computing – History of Cloud Computing – Working principle of Cloud Computing - Cloud Computing today - Computing in the cloud : pros and cons of Cloud Computing – benefits from Cloud Computing – Barriers : Internet impaired –off line workers – security conscious - any one married to existing applications – Developing Cloud Services.

Unit – V: **(12 Hours)**

Cloud computing for everyone : Cloud computing for the family- Cloud computing for the community : Communicating across the community-Collaborating on schedules-Collaborating on group projects and events. Cloud computing for the corporation.

Text Book :

1. “Fundamentals of Mobile Computing”, Prasant Kumar Pattnaik, Rajib Mall, PHI Learning
2. “Cloud Computing: Web-Based Applications that change the way you work and collaborate online”, Michael Miller ,Que-PEARSON Publication, 2009.

Reference Book:

1. “Mobile Computing 2E Technology, Applications and service creation Second Edition” , Asoke K.Talukdar Tata McGraw Hill Education Pvt. Ltd. 2010.
2.”Mobile computing: Theory and Practice” KumkumGarg, Pearson 2010.
3.”Cloud Computing Practical Approach learning and implementation “, A Srinivasan, J Suresh, Pearson 2014.
4.”Cloud computing ,Principles, Systems and Applications”, Nick Antonopoulos Lee Silliam Editors.Second edition, Springer 2010.

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M.Sc., Computer Science – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2018 – 2019 onwards)

Code	EDC – II	Hrs.	Credits	Marks (CIA+ESE)
	Android Programming	4	2	25 + 75

Objectives:

- To understand the basics of Android.
- Impart knowledge on basic building blocks of Android programming activities, user interface.
- Understanding persistence Data storage in Android

Unit – I: INTRODUCTION **(12 Hours)**

Introduction to Android: Versions – Features – Architecture of Android – Android devices in the market – Android market – Android Development Community **- Obtaining the Required tools** – Android SDK – Installing the Android SDK Tools – Configuring the Android SDK Manager – Eclipse – Android Development Tools(ADT) – Creating Android Virtual Devices(AVDs) – **Creating First Android Application – Anatomy of an Android Application**.

Unit – II: ACTIVITIES, FRAGMENTS, AND INTENTS **(12 Hours)**

Understanding Activities – Applying styles and themes to an activity – Hiding the activity title – Displaying a Dialog window – Displaying a progress dialog – Displaying a more sophisticated progress dialog – **Linking activities using intents** – Resolving intent filter collision – Returning results from an Intent – Passing data using an intent object – **Fragments -** Adding Fragments dynamically – Life Cycle – Interactions – **Calling Built-in applications using intents** – Understanding the Intent object – Using Intent Filters – Adding Categories – **Displaying Notifications**.

Unit – III: DESIGNING USER INTERFACE **(12 Hours)**

Using basic views – TextView – Buttons, EditText, RadioGroup Views, ProgressBar View – AutoCompleteTextView View – **Using Picker Views** – TimePicker View – DatePicker View. Using List Views to display Long lists – ListView – Spinner View. **Using Image views to display pictures** – Gallery and Imageview – ImageSwitcher – Gridview – **Using Menus with Views** – Creating the Helper methods – Options menu – Context menu – **Additional views** – AnalogClock and DigitalClock Views – WebView.

Unit – IV: DATA PERSISTENCE **(12 Hours)**

Saving and Loading User preferences – Accessing using an activity – Changing the default name **– Persisting Data to Files** – Saving to Internal Storage – Saving to External Storage(SD Card) – Choosing the best storage option – Using static resources – **Creating and using Databases** – Creating and using DBAdapter Helper Class.

Unit – V: PUBLISHING ANDROID APPLICATIONS **(12 Hours)**

Preparing for Publishing – Versioning application – Digitally signing android applications – **Deploying APK Files** –Using the adb.exe tool – Using a Web Server – Publishing on the Android market.

Text Book :

Wei-Meng Lee, "Beginning Android 4 Application Development", John Wiley & Sons Publications, 2012.

Reference Book:

1. Paul Deital and Harvey Deital, "Android How to Program" ,Detial associates publishers, ISBN-10: 0132990547 ISBN-13: 978-0132990547, 2013.
2. Zigurd Mednieks, Laird Dornin, G. Blake Meike, Masumi Nakamura, "Programming Android Java Programming for the New Generation of Mobile Devices", O'Reilly Media, ISBN-10: 1449316646 | ISBN-13: 978-1449316648.

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI

DEPARTMENT OF COMPUTER SCIENCE

(Students admitted from the academic year 2018 – 2019 onwards)

B.C.A

Sem.	S. Code	Courses	Title of the paper	Hours	Credits	Total Credits
I		LC I	Tamil I	6	3	20
		ELC I	English I	6	3	
		CC I – Theory	C Programming	5	5	
		CC II – Practical	Practical - I – C Programming	2	2	
		AC I – Theory	Mathematics I	9	5	
		VBC	Human Value Based Course	2	2	
II		LC II	Tamil II	6	3	20
		ELC II	English II	6	3	
		CC III – Theory	C++ programming and Data Structures	5	5	
		CC IV – Practical	Practical II – C++ Programming and Data Structure	2	2	
		AC II – Theory	Mathematics II	9	5	
		ES	Environmental Studies	2	2	
III		LC III	Tamil III	6	3	20
		ELC III	English III	6	3	
		CC V – Theory	Web Technology	5	5	
		CC VI – Practical	Practical III – Web Design	2	2	
		AC III – Theory	Accountancy I	9	5	
		SBC I	Business Communication Tools	2	2	
IV		LC IV	Tamil IV	6	3	20
		ELC IV	English IV	6	3	
		CC VII – Theory	Java Programming	6	6	
		CC VIII – Practical	Practical IV – Java Programming	2	2	
		AC IV – Theory	Accountancy II	9	5	
		EA I	Gender Studies	1	1	
V		CC IX – Theory	Relational Database Management System	5	5	30
		CC X - Theory	Principles of Operating System	5	5	
		CC XI – Theory	Software Engineering	4	4	
		CC XII – Practical	Practical V – RDBMS	5	5	
		EC I	Elective I – Computer System Architecture	5	5	
		NMEC I	Basic Electronics	2	2	
		SBC II	DTP Lab	2	2	
		SSD	Soft Skills Course	2	2	
VI		CC XIII – Theory	Dot Net Programming	4	4	29
		CC XIV – Theory	Computer Networks	4	4	
		CC XV – Theory	Multimedia and Its Applications	4	4	
		CC XVI – Practical	Practical VI – Dot Net Programming	6	5	
		EC II	Elective II – E-Commerce	4	4	
		EC III	Elective III – Internet of Things	4	4	
		NMEC II	Computer Electronics	2	2	
		SBC III	Graphics and Animation Lab	2	2	
		EA II	Extension Activity	-	1	1
		TOTAL				**140**

Elective : I

1. **Computer System Architecture**
2. Data mining and Warehousing
3. Introduction to Microprocessors

Elective : II

1. **E-Commerce**
2. Management Information System
3. Business Process Outsourcing

Elective : III

1. **Internet of Things**
2. Network Security
3. Object oriented analysis and design

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B.C.A. – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2018-2019 onwards)

Code	Core Course – I	Hrs.	Credits	Marks (CIA+ESE)
	C Programming	5	5	25+75

Objectives:

- To acquire knowledge on programming skills using 'C' language.
- To understand the concepts of Pointers and File concepts.

Unit - I: **15 Hrs.**

Datatypes and Operators: Identifiers and keywords – Constants – C Operators – Type Conversion.

Writing a program in C: Variable declaration – Statements – Simple C programs – Simple I/O statements.

Unit - II: **15 Hrs.**

Control Statements: Conditional Expressions - Loop statements – Breaking control statements.

Functions and program structures: Introduction – Defining a function – return statement – Types of functions – Actual and formal arguments – Local and global variables – Multifunction program – The scope of variables – Recursive functions.

Unit - III: **15 Hrs.**

Arrays : Array notations, Declaration and Initialization - Processing with arrays – Arrays and functions – Multidimensional array – Character array.

Pointers : Pointer declaration and arithmetic – Pointers and functions – Pointers and arrays – Pointers and strings – Arrays of pointers.

Unit - IV: **15 Hrs.**

More on functions: Preprocessors – Macros – Header files – Standard functions.

Structures, Unions and Bitfields : Declaration and initialization of structure – Functions and structures – Arrays of structures – Arrays within a structures – structures within a structure – Pointers and structures – Unions – Bitfields – Typedef – Enumerations.

Unit - V: **15 Hrs.**

Dynamic memory allocations: Memory management functions – sizeof statement.

Data file Operations : Review of I/O functions – Opening and closing of functions – Simple file Operation – Structure and file operations – Block read/write – Random access file processing.

Text Books :

1. Programming in C by D. Ravichandran , New age international private limited publisher, 2011.

References:

1. "A Workbook on C", Vikas Verma, Cengage Learning, 2nd Edition, 2012
2. "Programming in ANSI C " – Kumar Agrawal,
3. "Computer Programming in C", V. Rajaraman.
4. "Computer Programming", Ashok N Kamthane, Pearson education, Second Impression, 2008.
5. "Programming in ANSI C", Balagurusamy E –Tata McGraw Hill, 6th edition, 2012.

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B.C.A. – Semester - I
(For candidates admitted to the course under CBCS Pattern from 2018-2019 onwards)

Code	Core Course – II	Hrs.	Credits	Marks (CIA+ESE)
	Practical – I : C Programming	2	2	40 + 60

Objectives:

- To acquire knowledge on programming skills in 'C' language
- To understand the functions and file operations.

LIST OF PRACTICALS

1. Write a C program to generate Fibonacci series for a given number.
2. Quadratic equation
3. Sorting of numbers
4. String functions (user defined)
5. Recursion
6. Matrix multiplication
7. Write a C program to convert decimal number to other number systems.
8. File creation (using command line arguments and structures)
9. File copy (using command line arguments)
10. File concatenation (using command line arguments)

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B.C.A. – Semester - II
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Code	Core Course – III	Hrs.	Credits	Marks (CIA+ESE)
	C++ Programming and Data Structures	5	5	25+75

Objectives:

- To understand the difference between the Structured and Object oriented programming.
- To learn the Object oriented programming and Data Structures concepts.
- To acquire knowledge on C++ language features using Data Structures.

Unit – I: **15 Hrs.**

Object Oriented programming paradigm - Basic concepts of Object Oriented programming -structure of C++ program.

Functions in C++ : Introduction – the main function – function prototyping – call by reference – return by reference – Inline function – Default, const arguments – recursion – function overloading – friend and virtual functions

Classes and Objects : Introduction – specifying a class- Defining member function – a C++ program with class – Making an outside function inline – Nesting of member function – Private member functions - Arrays within a class – Memory allocation for objects – Static data members – Static member functions – Arrays of objects – Objects as function arguments – Friendly functions.

Unit – II: **15 Hrs.**

Constructor and Destructor: Introduction – Constructions - Parameterized constructors - Multiple constructors in a class – Constructors with default arguments – Dynamic initialization of objects – Copy constructor – Dynamic constructors – Destructor.

Operator Overloading and Type Conversions : Defining operator overloading – Overloading unary operators – Overloading binary operators – Rules for overloading operators – Type conversions.

Unit – III: **15 Hrs.**

Inheritance: Defining derived classes – Single inheritance – Making a private member inheritance – Multilevel inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance – Virtual base classes – Abstract classes.

Pointers, Virtual Functions and Polymorphism: Pointers – Pointers to objects – this pointer – Pointers to derived classes – virtual functions – Pure virtual functions.

Unit – IV: **15 Hrs.**

Managing Console I/O Operators: C++ streams, stream classes – unformatted I/O operations – Formatted console I/O operations – Managing output with manipulators.

Working with files: Classes for file stream operations – Opening and closing a file – Detecting end of file – More about open() : file modes – File pointer and there manipulations – Sequential Input Output operations – Updating a file : random access – Error handling during file operations – Command line arguments.

Exception Handling: Basics – Exceptions handling mechanism – throwing mechanism – Catching mechanism - rethrowing an exception- specifying exceptions.

Unit - V: **15 Hrs.**

Introduction to data structures: Data structures, Operations.

Arrays : Representation of one dimensional array in memory – Multidimensional arrays – Operations on arrays.

Linked List : Introduction to lists and linked lists – Operations on linked list – Circular linked list – Doubly linked lists.

Stacks : Introduction – Representation of stack through arrays - Representation of stack through linked lists.

Queues : Introduction – Representation of queues – Circular queues - Doubly ended queues.

Text Book:

1. ” Object Oriented Programming with C++’, 6e, E.Balagurusamy, Tata McGraw Hill Publishing Company Limited, 2015.(For Unit I to IV)
2. “Data Structures through C++”, ISRD group, Tata McGraw Hill Publications, 2011. (For Unit V).

Reference Books:

1. "The Waite Group's Object oriented Programming in TURBO C++", Robert Lafore, Galgotia Publications.
2. " C++ and Object Oriented Programming Paradigm " Jana, 2nd Edition, PHI Learning pvt. Ltd.
3. " C++ How to program " , Deitel & Deitel , 7th Edition, PHI Learning pvt. Ltd.
4.. " Object Oriented C++ Programming ", Hirday Narayan Yadav, 1st Edition, Laximi publication pvt. Ltd., 2008.
5. "The Essence of Data Strucrires Using C++", Ken Brownsey, Pearson Education, 2004.
6. "Data Structures and Algorithm Analysis in C++". Mark Allen Weiss, Third Edition, Pearson Education, 2008.

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B.C.A. – Semester - II
(For candidates admitted to the course under CBCS Pattern from 2018-2019 onwards)

Code	Core Course – IV : Practical	Hrs.	Credits	Marks (CIA+ESE)
	C++ Programming and Data Structures	2	2	40 + 60

Objectives:

- To enable students to understand the Object oriented programming and Data Structures concepts
- To gain programming skills in 'C++' language

C++:

1. Write an OOP Program to Perform Complex Arithmetic Operations which passes objects from functions.
2. Write a class to represent a vector. Include member functions to perform the following tasks:
    a. To create the vector
    b. To modify the value of a given element
    c. To multiply by a scalar value
    d. To display the vector in the form (10,20,….)
3. Write an OOP Program for matrix manipulation using constructor with dynamic allocation of memory.
4. Write an OOP Program to prepare mark sheet using inheritance and manipulator functions
5. Write an OOP Program to perform Runtime Polymorphism.
6. Write an OOP Program to perform the following Conversion Operations:
    a) From Built-in type to class type
    b) From Class type to Built-in type.
    c) From one class type to another class type.
7. Write an OOP program to create a data file for storing student's data and print mark list for a particular student.
8. Write an OOP program to create and manipulate employee data file.
9. Write a OOP program to sort the data using selection sort.
10. Write an OOP program to implement Stack.
11. Write an OOP program to implement Queue.
12. Write an OOP program to implement List.

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B.C.A. – Semester - III
(For candidates admitted to the course under CBCS Pattern from 2018-2019 onwards)

Code	Core Course – V	Hrs.	Credits	Marks (CIA+ESE)
	Web Technology	5	5	25+75

Objectives:

- To acquire the knowledge HTML.
- Be familiar with javascript
- gain the knowledge of AJAX.
- To understand the importance of PHP, its fundamentals and Programming techniques.

Unit – I: INTRODUCTION TO HTML AND CSS **(15 Hours)**

HTML: Introducing HTML Document Structure – Creating Headings on a Web page – Working with Links – Creating a Paragraph – Working with Images – Working with Tables – Working with Frames – Introduction to Forms and HTML Controls. **Cascading Style Sheets**: Inline styles – External style sheets – Internal Style Sheets – Style Classes – Multiple Styles.

Unit – II: JAVASCRIPT **(15 Hours)**

Introduction: Client-side benefits of using javascript over vbscript – Embedding javascript in an HTML page – Handling Events – Using variables in javascript – Using Array in javascript – creating objects in javascript – Using operators – Working with control flow statements – working with functions.

Unit - III: INTRODUCTION TO PHP **(15 Hours)**

Introduction - Features – Introduction to XHTML – Advantages of PHP over other Scripting languages – Creating, running and handling errors in PHP Script – Escape characters. **Working with Variables and Constants:** Using Variables – Constants – Data types in PHP – Operators in PHP. **Controlling Program flow:** Conditional statements – Looping statements – Break, Continue and Exit statements.

Unit - IV: **(15 Hours)**

Working with Functions, Arrays, Files and Directories: User-defined functions in PHP – Built-in functions in PHP: String, Date, Time, Mathematical functions – Recursive, Variable and Callback functions – Introducing Arrays- Creating, accessing Arrays – Types of Arrays: Numeric, Associative, Multidimensional Arrays – Traversing Arrays using Loops and Array Iterators – Built-in Array functions – Working with Files – Working with Directories.

Working with Forms and Database: Introducing Web Forms – Working with the <form> Tag and Form Elements – Processing a Web Form – Validating a Form – Introducing Databases – Using PHP and MySql. **Exploring Cookies, Sessions:** Working with Cookies – Working with Sessions – Differentiating Cookies and Sessions.

Unit - V: AJAX **(15 Hours)**

Introduction: The solution – creating a sample AJAX application – creating the XMLHttpRequest object – opening XMLHttpRequest object for asynchrounous downloads – document object model definition – methods avaiable in DOM for accessing objects – DOM levels – creating javascript application without AJAX – javascript and AJAX – creating javascript application with AJAX. Asynchronous data transfer with XMLHttpRequest: XMLHttpRequest object – browser difference – reading a file sychronously – reading a file asychronously – basic AJAX techniques – XMLHttpRequest object vs. Iframes – using Iframes.

Text Book:

"Web Technologies – HTML, JavaScript, PHP, Java, JSP, ASP.NET, XML and AJAX" – Black Book (New), DT Editorial Services, Dreamtech Press, New Delhi, 2017 **(Relevant portions only).**

Reference Books:

1. "Developing Web Applications", R.Moseley and M.T. Savaliya, Wiley publication.
2. "Web programming: building internet applications, Chris Bates, Wiley India.
3. "PHP: A Beginner's Guide, Vikram Vaswani, McGraw Hill Education.

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B.C.A., COMPUTER SCIENCE – Semester - III
(For candidates admitted to the course under CBCS Pattern from 2018-2019 onwards)

Code	Core Course – VI	Hrs.	Credits	Marks (CIA+ESE)
	Practical: III – Web Design	2	2	40 + 60

Objectives:

- To acquire knowledge on HTML Programming.
- To understand the Programming techniques of PHP.

LIST OF PRACTICALS

HTML:

1. Write a HTML Program to demonstrate the Tables.
2. Write a HTML Program to demonstrate the Frames.
3. Write a HTML Program for creating Lists, Hyperlinks and loading Images on web page.

JAVASCRIPT:

4. Write a HTML Program to demonstrate javascript event handler.
5. Write a HTML Program to display the current date-time using javascript.

PHP:

6. Write PHP script to demonstrate String functions.
7. Write PHP script to demonstrate Array functions.
8. Write PHP Script to create Website Registration Form using Text box, Check box, radio button, Select, Submit buttons. Store it in a File and display the details on a new page.
9. Write PHP Script to generate Result and display Grade.
10. Write a PHP script for User authentication using PHP-MYSQL. Use session for storing username.
11. Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.
12. Write a program in PHP to add, update and delete using Student database.

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B.C.A., COMPUTER SCIENCE – Semester – III
(For candidates admitted to the course under CBCS Pattern from 2018–2019 onwards)

Code	Skill Based Course – SBC I	Hrs.	Credits	Marks (CIA+ESE)
	Business Communication Tools	2	2	40 + 60

Objectives:

- To learn the important facilities, commands and menu options available in Word Processing, Spreadsheets, Presentation and Database.

Word Processing:

1. Create a Word document in which perform the following operations:
    a. Create bookmarks
    b. Adding End notes and comments
    c. Find and Replace the text
    d. Entering the text with Autocorrect and Autotext
    e. Use Dropcaps to emphasize your text.

2. Create a Word document and perform the following operations on the text:
    a. Edit the document using cut, copy and paste
    b. Format the text with Bullets and Numbers
    c. Check for Spelling and Grammar
    d. Modifying Font, Line Spacing
    e. Protecting document by setting password.

3. Create a Word document and perform the following operations on it:
    a. Inserting and Deleting Manual Page Break
    b. Format the document using page setup
    c. Adding lines, borders, shading, background and watermarks, dates and page numbers to your document
    d. Creation and Deletion of Headers and Footers to your document
    e. Opening, Closing and Printing of a document.

4. Create a Table in the document and perform the following operations on it:
    a. Convert text to a table
    b. Convert a table to text
    c. Merging and Splitting cells, tables
    d. Applying Table formats
    e. Change case of typed text
5. Create a document which uses Advanced Mail-Merge techniques.
6. Prepare a resume using word document.

Spreadsheet:

7. Create a worksheet and perform various operations on it.
   (Apply different types of Formulas and Built-in functions)
8. Create a worksheet and prepare a Graph using :
    a. Possible types of charts with Gridlines, Datalables, Legends, and Titles.
    b. Adding Background Colour and Pictures.
9. Create a Data-Entry form just like an Invoice of an organization and maintain the information in a database.
10. Modify the worksheet layout by,
    a. Changing column width and row height
    b. Inserting and deleting columns, rows and cell
    c. Moving and Copying cell contents.
11. Create a worksheet to do the following:
    a. Generate the series using File Series command
    b. Transferring data between worksheets.

Presentation:

12. Create a presentation using Autocontent Wizard.
13. Create a Slide show which should use graphics, multimedia, transition, animation and Special effects.
14. Create presentation slides using Design Templates.
15. Method of using the different views of slides to create presentation: Normal, Outline, Slide, Slide sorter views.

Database:

16. Create a Student database using design view and generate a student report using Wizard.
17. Create an employee database and design a Form to maintain the database.

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B.C.A., COMPUTER SCIENCE – Semester - IV
(For candidates admitted to the course under CBCS Pattern from 2018-2019 onwards)

Code	Core Course – VII	Hrs.	Credits	Marks (CIA+ESE)
	Java Programming	6	6	25+75

Objectives:

- To understand Classes and Objects;
- To apply the concept of Inheritance and Polymorphism;
- To know the concept of Multithreading;
- To develop GUI based applications using Abstract Windowing Toolkit.

Unit – I: **(18 Hours)**

Java Evolution: Java History – Features – How java differs from C and C++ – Java and internet – Java and WWW – Web browsers – H/W and S/W requirements – Java support support systems – Java environment. **Overview of Java Language:** Introduction – Simple Java program – More of Java – An application with two classes – Java program structure – Java tokens – Java statements – Installing and configuring Java – implementing a Java program – Java Virtual Machine – Command Line Arguments – Programming style. **Constants, Variables and Data Types:** Introduction – Constants – Variables – Data Types – Declaration of variables – Giving values to variables – scope of variables – symbolic constants – type casting – getting values of variables – standard default values.

Unit – II: **(18 Hours)**

Operators and Expressions: Introduction – arithmetic operators – relational operators – logical operators – assignment operators – increment and decrement operators – conditional operators – bitwise operators – special operators. Arithmetic expressions – evaluation of expressions – precedence of Arithmetic operators – Type conversions in expressions – operator precedence and associativity –Mathematical Functions. **Decision Making and Branching:** Introduction – Decision making with If Statement – Simple If Statement – the *If...Else* Statement – Nesting of *If...Else* Statement – The *Else...If* Ladder – the Switch Statement – the?: Operator. **Decision Making and Looping:** Introduction– while statement – do statement – for statement – Jumps in Loops – Labeled Loops.

Unit – III: **(18 Hours)**

Classes, Objects, and Methods: Introduction– Defining a Class– fields Declaration – Methods Declaration– Creating Objects– Accessing Class Members– Constructors– Method overloading– Static Members– Nesting of Methods– Inheritance: Extending a Class– Overriding Methods– Final Variables and Methods– Final Classes – Finalizer Methods– Abstract Methods and Classes– Methods with varargs– Visibility Control. **Arrays, Strings and Vectors:** Introduction– One–dimension Arrays– Creating an Array– Two–dimensional Arrays– Strings– Vectors– Wrapper Classes – enumerated Types– Annotations. **Interfaces: Multiple Inheritance:** Introduction– Defining Interfaces– Extending Interfaces– Implementing Interfaces– Accessing Interface Variables

Unit – IV: **(18 Hours)**

Packages: Putting Classes together: Introduction– Java API Packages– Using System Packages– Naming conventions– Creating packages– Accessing a package– Using a Package– Adding a Class to a package– Hiding Classes– Static Import. **Multithreaded Programming:** Introduction– Creating Threads– Extending the Thread Class– Stopping and Blocking a Thread– Life Cycle of a Thread– Using Thread Methods– Thread Exceptions– Thread Priority– Synchronization– Implementing the 'Runnable' Interface– Inter–thread communication. **Managing Errors and Exceptions:** Introduction– Types of Errors– Exceptions– Syntax of Exception handling code– Multiple Catch Statements– Using finally Statement– Throwing our Own Exceptions– Using Exceptions for Debugging.

Unit – V: **(18 Hours)**

Applet Programming: Introduction– How Applets differ from Applications– Preparing to Write Applets– Building Applet code– Applet Life cycle– Creating an executable Applet– Designing a Web page– Applet tag– Adding Applet to HTML file– Running the applet– More about Applet tag– passing Parameters to Applets– aligning the Display– More about HTML Tags– displaying Numerical Values– Event Handing. **Graphics programming:** Introduction– The Graphical Class– Lines and Rectangles– Circles and ellipses– Drawing Arcs– Drawing Polygons.

Managing Input/output files in Java: Introduction– concept of Streams– Stream classes– Byte stream classes– Character stream classes– Using streams– Other useful I/O Classes– Using the File class– Input/output Exceptions– Creation of Files– Reading/writing Characters– reading/writing Bytes– Handing Primitive Data types– Random Access Files.

Text Book:

1.Balagurusamy.E, "*Programming with Java A Primer"*, Tata McGraw Hill, 5th edition,2015.

Reference Books:

1. Herbert Schildt, "*Java – The Complete Reference*", Tata McGraw Hill, 11th edition.
2. K. Rajkumar, "*Java Programming*", Pearson India, 1st edition, 2013.
3. P. Radha Krishna, "*Object Oriented Programming through Java*", University Press,2011.
4. C.Muthu, "*Programming with JAVA*", Vijay Nicole Imprints, Chennai, 2014.
5. Hari Mohan Pandey, "*JAVA Programming*", 1st edition, Pearson Education, 2012.

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B.C.A., COMPUTER SCIENCE – Semester - IV
(For candidates admitted to the course under CBCS Pattern from 2018-2019 onwards)

Code	Core Course – VIII	Hrs.	Credits	Marks (CIA+ESE)
	Practical: IV – Java Programming	2	2	40 + 60

Objectives:

- To understand Classes and Objects;
- To apply the concept of Inheritance and Polymorphism;
- To create knowledge on Multithreading;
- To develop GUI based applications using Abstract Windowing Toolkit;

LIST OF PRACTICALS

1. Write a Java program to compute the nCr value.
2. Write a Java program to generate Fibonacci series for the given number.
3. Write a Java program to handle various Mathematical functions.
4. Write a Java program to demonstrate the usage of classes and objects.
5. Write a Java program to demonstrate the usage of Constructor inside the class.
6. Write a Java program to handle various string functions.
7. Write a Java program to demonstrate the usage of vector class.
8. Write a Java program to create and import the package.
9. Write a Java Program to implement the concept of multiple inheritance using Interfaces.
10. Write a Java program to handle multithreading processes.
11. Write a Java program to demonstrate the uses of exception handling process.
12. Write a Java program to create and use your own exception.
13. Write an applet program to display your personal details.
14. Write an applet program to draw the various geometric figures.
15. Write a Java Program which open an existing file and append text to that file.

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III – B.C.A., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – IX: Theory
Title of the Paper: Relational Database Management System
Subject Code:

No. of Hours: 5
No. of Credits: 5

Learning Objectives:

- To enable students to learn the database concepts, DBMS, relational databases and Normal forms
- To understand the usage of SQL commands

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To acquire the detailed Knowledge about the database system.

CO2: To understand the basic features of Relations and the Relational Algebra.

CO3: To explore knowledge in SQL queries and Triggers in PL/SQL.

CO4: To understand the basic features of Integrity and Views.

CO5: To develop applications by using the concept of Normalization.

Unit – I: **(15 Hours)**

An overview of Database Management: Database System – Database – Its importance – Data Independence. **Database System Architecture:** Introduction – Three Levels of Architecture – The External Level – Conceptual Level – The Internal Level – Mappings – The

Database Administrator – The Database Management System – Client server architecture – Distributed processing.

Unit – II: **(15 Hours)**

An Introduction to SQL: Introduction – overview - The catalog – Views –Transactions Embedded SQL – Dynamic SQL and SQL/CLI. **Relations:** Introduction – Tuples – Relation types – Relation values - Relation variables. **Relational Algebra:** Introduction – Relational Operators - Examples.

Unit – III: **(15 Hours)**

SQL: Interactive SQL : Table Fundamentals – Viewing data in the Tables – Eliminating duplicate rows when using a select statement – Sorting data in a table – Creating a table from a table –Inserting data into a table from another table – Delete operations – Updating the contents of a table – Modifying the structure of tables – Renaming tables – Truncating tables – Destroying tables- Creating synonyms . I/O constraints: primary key constraint, Foreign key constraint, Unique key constraint – Null value concepts – NOT NULL constraint defined at the column level – The check constraint. ORACLE FUNCTIONS - Aggregate functions – Numeric functions – String functions – Conversion functions- Manipulating dates in SQL using the Date(). Grouping data from tables in SQL – Sub queries – Joins.

Interactive Pl-SQL: Cursor – Trigger - Before Trigger - After Trigger - Types of Triggers – Row Trigger-Database Trigger-Deleting a Trigger-Program using Triggers-Exception Handling.

Unit – IV: **(15 Hours)**

Integrity: Introduction –Internal vs External predicates – Correctness vs consistency – Integrity and views – Constraints classifications scheme – keys. **Views:** Introduction – Views – View Retrieval – View Updates.

Unit – V: **(15 Hours)**

Normalization : Introduction, **Functional Dependencies** – Non loss decomposition and functional dependencies – First, Second and Third Normal forms – Dependency preservation – Boyce/Codd Normal form.**Further Normalization : Higher Normal Form:** Introduction –

Multi valued Dependencies and fourth normal form – Join dependencies and fifth normal form – A note on Denormalizations – Normalization procedure summarized.

Text Books:

(1) Date, C.J., Kannan, A. and Swamynathan, S. 2012. *An Introduction to Database Systems*, Eighth edition, Pearson Publication.

(2) Ivan Bay Ross, 2013, *SQL, PL/SQL The Programming Language of Oracle*, Fourth revised edition, BPB Publications,

Reference Books:

(1) Silberchartz korth, and Sudarashan, 2002, *Database system concepts*, Fourth edition, Tata McGraw Hill.

(2) Shah, 2002, *Database system using Oracle a simplified guide to SQL & PL/SQL*, Second edition, PHI Learning Pvt. Ltd.

(3) Sharad Maheswari, Ruchin Jain, 2007, *Introduction to SQL & PL/SQL* , Second edition, Laximi publication Pvt. Ltd.

(4) Das Gupta, 2009, *Database management system, Oracle, SQL & PL/SQL*, PHI Learning Pvt.Ltd.

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III – B.C.A., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – X: Theory
Title of the Paper: Principles of Operating System **Subject Code:**

No. of Hours: 5
No. of Credits: 5

Learning Objectives:

- To understand the history, concepts and structure of Operating Systems.
- To gain knowledge on scheduling, deadlocks, storage and I/O management.
- To know the concept of file systems and process management.

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To understand the services provided by an operating system and system calls.

CO2: To understand what a process is and how processes are synchronized.

CO3: To provide a detailed description of various process scheduling techniques and deadlock management.

CO4: To describe various memory management techniques.

CO5: To explore the physical structure of secondary storage devices, file system implementation and the design principles of LINUX operating system.

Unit – I: **(15 Hours)**

Introduction: Operating System – Computer system organization – computer system architecture – operating systems structure – operating system operations – process management – memory management – storage management – protection and security – kernel data structures – computing environments – open source operating systems.

Operating System structures: Operating System Services – user and operating system interface – System calls – types of system calls – System Programs – operating system design and Implementation – operating system structure – operating system debugging – operating system generation – system boot.

Unit – II: **(15 Hours)**

Processes: Process concept - process scheduling – operation on processes – Interprocess communication.

Threads: Overview – multicore programming- multithreading models.

Process Synchronization: The critical section problem – Peterson's solution – Synchronization hardware – Mutex locks – Semaphores.

Unit –III: **(15 Hours)**

CPU Scheduling: Basic concepts - scheduling criteria - scheduling algorithms –thread scheduling - multiple- processor scheduling – Algorithm Evaluation.

Deadlocks: System model – Deadlock characterization – Methods of handling deadlocks – deadlock prevention – deadlock avoidance – deadlock detection – recovery from deadlock.

Unit – IV: **(15 Hours)**

Main Memory: Background – swapping – Continuous memory allocation – Segmentation Paging – structure of page table – segmentation.

Virtual Memory: Background – Demand Paging – Copy on write – page replacement – allocation of frames – Thrashing – Memory mapped files – allocating kernel memory – other considerations.

Unit –V: **(15 Hours)**

Mass Storage Structure: Overview of mass storage structure - Disk structure – Disk attachment – Disk scheduling – Disk management – Swap Space management.

File System Interface: file concept – access methods – directory and disk structure.

Case study.

The Linux System: History – Design principles – Kernel Modules – Process management – scheduling-memory management – file systems.

Text Book:

Abraham Silberschatz, Peter BaerGalvin and Greg Gagne, 2016, *Operating System concepts,* Ninth India edition, Wiley Publication.

Reference Books:

(1) Tenenbaum and Woodhull, 2006, *Operating System: Design and Implementation*, PHI Learning Pvt.Ltd.

(2) Gill, P.S. 2006, *Operating system concepts*, First edition, Laxmi Publications Pvt. Ltd.

(3) Stuart E. Madnick and John J. Donovan, 2008, *Operating Systems*, Third edtion, Tata McGraw Hill Publishing Company Ltd.

(4) Achyut S. Godbole and AtulKahate, 2011, *Operating systems*, Tata McGraw Hill Publishing.

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III – B.C.A., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – XI: Theory
Title of the Paper: Software Engineering **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To understand the basic concepts of software engineering
- To learn the methods of planning a software project, software cost estimation, requirements definition, software design implementation, testing and maintenance

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To understand the basic concepts of Software Engineering and to learn the methods of planning a Software Planning.

CO2: To gain the knowledge of Software Cost Estimation and Software Requirement Definition.

CO3: To illustrate the usage of Software Design.

CO4: To acquire the knowledge about Implementation issues.

CO5: To learn the techniques of Verification, Validation and Maintenance.

Unit – I: **(15 Hours)**

Introduction to Software Engineering: Definitions – Size factors: Total Effort Devoted to Software, Distribution of Effort, Project Size Categories, Programmers Spend their Time – Quality and Productivity factors.

Planning a Software Project: Defining the problem – Developing a solution strategy – Planning the development Process: The Phased Life Cycle Model, Milestones, Documents, and Reviews, The Cost Model, The Prototype Life-Cycle Model, Successive Versions – Planning an organizational structure: Project Structure, Programming Team Structure,Management by Objectives – Other Planning activities.

Unit – II: **(15 Hours)**

Software Cost Estimation: Software cost factors: Programmer Ability, Product Complexity, Product Size, Available Time, Required Level of Reliability, Level of Technology – Software cost estimation techniques: Expert Judgment, Delphi Cost Estimation, Work Breakdown Structures, Algorithmic Cost Models-Staffing-level Estimation-Estimating Software Maintenance Costs.

Software Requirement Definition: Software requirement specification – Formal specification techniques: Relational Notations and State-Oriented Notations**.**

Unit – III: **(15 Hours)**

Software Design: Fundamental design concepts: Abstraction, Information Hiding, Structure, Modularity, Concurrency, Verification, Aesthetics – Modules and modularization criteria: Coupling and cohesion, other modularization criteria -Design notations: Flow Diagrams, Structure Charts, HIPO Diagrams, Procedure Templates, Pseudo code, Structured Flowcharts, Structured English, Decision Tables – Design techniques: Stepwise Refinement, Level of Abstraction, Structured Design, Integrated Top-Down Development, Jackson Structured Programming.

Unit – IV: **(15 Hours)**

Detailed Design Considerations-Real Time and Distributed System Design-Test Plans-Milestones, Walkthroughs and Inspections-Design Guidelines.

Implementation Issues: Structured coding techniques: Single Entry, Single Exit Constructs, Efficiency Considerations, Violations of Single Entry, Single Exit, Data Encapsulation, The Goto Statement, Recursion– Coding style – Standards and Guidelines – Documentation Guidelines: Supporting Documents, Program Unit Notebooks, Internal Documentation.

Unit – V: **(15 Hours)**

Verification and Validation Techniques: Quality assurance – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing: Integration Testing, Acceptance Testing**.**

Software Maintenance: Enhancing Maintainability during development – Managerial Aspects of Software Maintenance-Configuration Management-Software Code Metrics-Other Maintenance Tools and Techniques.

Text Book:

Richard Fairly, 2012, , *Software Engineering Concepts*, Thirty seventh reprint, Tata McGraw Hill Publishing Company Limited (Relevant portions only).

Reference Books:

(1) James E.Tomayko, Orit Hazzan, 2005, *Human aspects of Software Engineering*, Laximi publication Pvt. Ltd.

(2) Kelkhar, 2007, *Software Engineering: A Concise study*, PHI Learning Pvt. Ltd.

(3) Bharat, Bhushan, Agarwal, Sumit and Prakash Tayal, 2007, *Software Engineering*, First edition, Laximi publication Pvt. Ltd.

(4) Rogan S Pressman, 2010, *Software Engineering Applications approach*, Twelfth edition, Tata McGraw Hill.

(5) James, 2011, *Software Engineering*, PHI Learning Pvt. Ltd.

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III – B.C.A., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – XII: Practical – V
Title of the Paper: RDBMS **Subject Code:**

No. of Hours: 5
No. of Credits: 5

Learning Objectives:

- To acquire knowledge on DDL, DML and DCL commands
- To understand the usage of SQL queries
- To learn the features on PL/SQL programming and Oracle forms

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To become familiar in creating tables and doing all the manipulations in it.

CO2: To gain knowledge in Arithmetic functions and string functions.

CO3: To explore vast knowledge in SQL queries, sub queries etc.

CO4: To establish skills in Triggers and Cursors in PL/SQL.

CO5: To acquire practical skills in forms and reports.

SQL:

1. Table creation with various data types and constraints.
2. DDL statements (CREATE, ALTER, DROP)
3. DML statements (Retrieval, Update, Delete, Insertion)

4. Arithmetic, Character and String Functions.
5. Group functions
6. Conversion functions Date functions
7. JOINS (Self, Equi and Outer,Inner)
8. Sub queries and correlated sub queries.

PL/SQL:

9. Bank transactions using a table.
10. Exception handling.
11. Explicit and Implicit cursors.
12. Program using Triggers.

FORMS:

13. Design a Form in oracle for student detail using default form.
14. Design a Report in oracle for Employee detail using controls**.**

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III – B.C.A., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Elective Course – I:

Title of the Paper: 1.Computer System Architecture **Subject Code:**

No. of Hours: 5
No. of Credits: 5

Learning Objectives:

- To learn functions of digital logic circuits
- To understand basic computer organization and design
- To gain knowledge on CPU, Memory and I/O organization, and Multiprocessors

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To understand the structure, components of a computer, their functions and their Interconnection Structures.

CO2: To gain knowledge on Cache, Internal, External Memory working principles and its design principles.

CO3: To Learn I/O devices, module, I/O methods, DMA, Number systems and addressing modes, formats in Instruction set.

CO4: To acquire knowledge on Processor, Register organization, Instruction cycle, Pipelining, RISC.

CO5: To understand the Multiprocessor organization, Parallel processing, Cloud computing, and Control unit operations.

Unit – I: **(15 Hours)**

Basic Concepts and Computer Evolution: Organization and Architecture - Structure and Function - The Evolution of the Intel x86 Architecture - Embedded Systems - Arm Architecture - Cloud Computing.

A Top-Level View Of Computer Function and Interconnection: Computer Components - Computer Function - Interconnection Structures - Bus Interconnection - Point-to-Point Interconnect.

Unit – II: **(15 Hours)**

Cache Memory: Computer Memory System Overview - Cache Memory Principles - Elements Of Cache Design.

Internal Memory: Semiconductor Main Memory - Error Correction - DDR DRAM - Flash Memory.

External Memory: Magnetic Disk - RAID - Optical Memory.

Unit – III: **(15 Hours)**

Input/ Output: External Devices - I/O Module - Programmed I/O - Interrupt- Driven I/O - Direct Memory Access - Direct Cache Access - I/O Channels and Processors.

Number Systems: The Decimal System - Positional Number Systems - The Binary System - Converting Between Binary and Decimal - Hexadecimal Notation.

Instruction Set: Addressing Modes and Formats : Addressing Modes - Instruction Formats - Assembly Language.

Unit – IV: **(15 Hours)**

Processor Structure and Function: Processor Organization - Register Organization - Instruction Cycle - Instruction Pipelining.

Reduced Instruction Set Computers: Instruction Execution Characteristics - The Use of Large Register File - Compiler- Based Register Optimization - Reduced Instruction Set Architecture - RISC Pipelining.

Unit – V: **(15 Hours)**

Parallel Processing: Multiple Processor Organizations - Symmetric Multiprocessor - Cache Coherence and The MESI Protocol - Multithreading and Chip Multiprocessor - Clusters - Non-Uniform Memory Access - Cloud Computing.

Control Unit Operation: Micro Operation - Control of the Processor - Hardwired Implementation.

Text Book:

William Stallings, 2016, *Computer Organization and Architecture Designing for performance*, Tenth Edition, Pearson Education Publication.

Reference Books :

(1) Usha, M. Srikanth, T.S. 2012, *Computer System Architecture and Organization*, First Edition, Wiley Publications.

(2) John L. Hennessy , David A. Patterson, 2014, *Computer Architecture*, Fifth Edition: A Quantitative Approach, Fifth Edition, Morgan Kaufmann Publishers.

(3) Linda Null, Julia Lobur, 2015, *The Essentials of Computer Organization and Architecture*, Fourth Edition, Viva Publishers.

(4) Ikvinderpal Singh, Baljinder Singh, 2015, *Computer Organization and Architecture*, First Edition, Khanna Publishers.

(5) Morris Mano, M. 2016, *Computer System Architecture*, Third Edition, Fourteenth reprint, Pearson Education.

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III – B.C.A., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Elective Course – I:

Title of the Paper: 2. Data Mining and Warehousing **Subject Code:**

No. of Hours: 5

No. of Credits: 5

Learning Objectives:

- To understand the basic concepts of Data mining and Data warehouse.
- To acquire knowledge on Learning concepts, Knowledge discovery process and Learning algorithms.

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To learn the basic concepts of Data Mining and its applications.

CO2: To understand the Data Warehouse fundamentals.

CO3: To acquire the knowledge on Classification algorithms.

CO4: To know the stages in Knowledge Discovery process.

CO5: To gain knowledge on Learning algorithm, Noise and Redundancy.

Unit – I: **(15 Hours)**

Introduction to Data mining - An expanding universe of data - Information as production factor - Computer systems that can learn - Data mining – Data mining versus Query tools- Data mining in Marketing – Practical applications of Data mining.

Unit – II: **(15 Hours)**

Introduction to Learning – Self-learning Computer systems - Machine learning and the Methodology of Science - Concept Learning - a Kangaroo in Mist.

Data mining and data warehouse: Introduction – the need of Data warehouse - Integration with Data mining – Client-server and Data warehousing - Multiprocessing machines - Cost justification.

Unit – III: **(15 Hours)**

Introduction to Knowledge discovery process - Data selection – Cleaning – Enrichment – Coding - Data mining - Preliminary analysis of the Data set using Traditional Query tool- Visualizations techniques - Likelihood and Distance – OLAP tools - k-Nearest neighbor - Decision trees - Association tools - Neural network - Genetic algorithms - reporting.

Unit – IV: **(15 Hours)**

Introduction to KDD environment – different forms of Knowledge - getting started - Data selection – Cleaning – Enrichment – Coding - Data mining – Reporting - The KDD environment - The golden rules.

Real-life applications: Introduction - Customer profiling - Predicting bid behaviour of pilots - Discovering foreign key relationships – results.

Unit – V: **(15 Hours)**

Introduction to formal aspects of Learning algorithms- Learning as compression of Data sets - The information content of a Message - Noise and Redundancy - the significance of Noise - Fuzzy databases - the traditional theory of Relational database - from Relations to Tables- from Keys to Statistical dependencies – Denormalization - Data mining primitives.

Text Books:

Pieter Adriaans and Dolf Zantinge, 2003, *Data mining*, Fourth impression, Pearson education.

Reference books:

(1) Kargupta, et al, 2004, Data mining: Next generation challenges and future directions, PHI Learning Pvt. Ltd.

(2) Gopalan and Siva selvan, 2009, Data mining : Techniques and trends, PHI Learning Pvt. Ltd.

(3) Bharat Bhushan Agarwal and Sumit prakash Tayal, 2009, Data mining and Data warehousing, Laxmi Publications Pvt. Ltd.

(4) Gupta, 2014, Introduction to Data mining with case studies, PHI Learning Pvt. Ltd.

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PG & Research Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III – B.C.A., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Elective Course – I: Theory
Title of the Paper: 3.Introduction to Microprocessor **Subject Code:**

No. of Hours: 5
No. of Credits: 5

Learning Objectives:

- To enable students to learn Microprocessor Architecture, Assembly language programming.
- To understand the 8085 instructions, Counters, Time delays, Interrupts and I/O communication.
- To acquire knowledge on Pentium processors.

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To acquire the basic Knowledge of Microprocessor.

CO2: To explore the programming knowledge using 8085.

CO3: To gain the complete knowledge of 8086 Microprocessor.

CO4: To understand the concept of Microprocessor Applications.

CO5: To become familiar with Pentium Processor and other processors

Unit – I: **(15 Hours)**

Evaluation of Microprocessors – Single Chip Microcomputer Microprocessor Applications – Embedded Microprocessor - types of Microprocessor - Programming Digital

Computers – Memory – Buses – Memory addressing capacity and CPU – Microcomputers – Processor Architecture – Intel 8085 – Instruction Cycle.

Unit – II: **(15 Hours)**

Instruction set of Intel 8085 – Instruction and Data Formats – Addressing Modes – Status flags – Intel 8085 Instructions- Stacks and Subroutines – MACRO – Microprogramming- Assembly language Programming – Simple examples. Addition and Subtraction of Binary and Decimal Numbers – Complements – Shift – Masking – Finding the largest and smallest numbers in an Array- Multiplication – Division – Multibyte Addition and Subtraction.

Unit – III: **(15 Hours)**

Intel 8086 Microprocessor- classification of Intel 8086 instructions- Description of Intel 8086 instrucions-examples of intel 8086 assembly language programs- binary address of Intel 8086 registers- assembler directives- assembler directives for Intel 8086 Microprocessor in alphabetical order.

Unit – IV: **(15 Hours)**

Microprocessor Applications – Delay Subroutines – Interfacing of 7 Segment Displays – Frequency measurement – Temperature measurement and Control – Water Level Indicator – Microprocessor based Traffic Control.

Unit – V: **(15 Hours)**

Intel 80186- Intel 80286- Intel 8088- Intel 80386- Intel Pentium processor-An introduction to the Pentium Microprocessor: Introduction-real mode and protected mode operation-the s/w model of the Pentium-A functional description of the Pentium- Pentium register- Pentium data organization - instruction types- addressing modes- interrupts-pentium instructions.

Text Books:

(1) Badri Ram, 1993, *Fundamentals of Microprocessors and Microcomputers*, Fourth Revised and Enlarged Edition, Dhanpat Rai and Sons.

(2) James L. Antonakos, 1997, *The Pentium Microprocessor*, Pearson Education.

Reference Books:

(1) Romesh S.Gaonkar , 1990, Microprocessor Architecture, Programming and Applications with the 8085 / 8080A, Wiley Eastern.

(2) Douglas V. Hall, 1999, Microprocessors and Interfacing, Tata Mcgraw Hill.

(3) Barry B. Brey, 1998, The Intel Microprocessors – 8086/8088,80186,286,386,486, Pentium Pro Processor, Prentice Hall of India Pvt. Ltd.

(4) Mathur Adithya, P. 2006, Introduction to Microprocessor, Third Edition, Tata Mcgraw Hill.

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
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III – B.C.A., Semester – V
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Skill Based Course - II
Title of the Paper: DTP Lab **Subject Code:**

No. of Hours: 2
No. of Credits: 2

Learning Objectives:

- To acquire the knowledge on Desktop publishing
- To learn the method of preparation of document and manipulation of pictures

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To gain knowledge about picture attributes.

CO2: To understand the setting background and stroke effect for the image.

CO3: To learn the working principles of built-in tools

CO4: To understand the manipulation of text.

CO5: To update the knowledge of drawing tools

List of Exercises:

1. Change the color modes, resize and rotate the picture.
2. Define the background pattern for a canvas
3. Apply stroking effects to the picture.
4. Merge a picture and a text into the single layer

5. Create a shadow of the image without using the in-built tool.
6. Create and manipulate text using text wrap, anti-aliasing, formatting text and paragraph.
7. Create and modify the particular area of that picture using selection tools.
8. To draw an arbitrary and regular paths using Freehand and Bezier tool.
9. To draw a straight lines and curves using basic tools.
10. To create an object, edit and apply the stroke and fill.
11. To create shadows, blurs and other useful filters.

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III – B.C.A., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – XIII: Theory
Title of the Paper: Dot Net Programming **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To enable students to learn ASP.NET framework.
- To understand the Control structures, Procedures and Arrays and validation.
- To gain skills on Graphical User Interface Controls and Databases.

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To outline the concept of Web Programming.

CO2: To understand the Validation and Rich controls in ASP.NET.

CO3: To acquire the Knowledge of Database Access.

CO4: To gain the knowledge of Display data using grid, simple controls.

CO5: To understand the data access using controls, usage of cookies and session variables.

Unit – I: **(12 Hours)**

Building ASP.NET pages: ASP.NET and the .NET framework: Understanding the framework class library, Understanding the Common Language Runtime – Understanding ASP.NET Controls : Overview of ASP.NET Controls, Understanding HTML Controls, Understanding and Handling Control Events, Understanding View State .

Using the Standard Controls: Displaying Information: Using the Label Control , Using the Literal Control – Accepting User Input : Using the Text box Control, Using the Check box Control, Using the Radio Button Control – Using the Button Control.

Unit – II: **(12 Hours)**

Using validation controls: Using the RequiredFieldvalidator Control, Using the RangeValidator Control, Using the CompareValidator Control, Using the RegularExpressionValidator Control.

Using Rich Controls: Accepting File Uploads : Saving Files to the File System, Saving Files to a Database – Displaying a Calendar : Creating a Pop-Up date picker – Displaying Advertisements : Storing Advertisement in an XML File, Storing Advertisement in a database Table – Displaying different page views: Display a Tabbed Page View, Displaying a Multipart Form.

Unit – III: **(12 Hours)**

Performing Data Access: Using DataBound controls: Working with List Controls, Working with Tabular DataBound Controls, Working with Hierarchical DataBound Controls – using DataSource controls : Using ASP.NET Parameters with Data Source Controls – Using Programmatic DataBinding.

Using the SqlDataSource control: Creating database connections : Connecting to Microsoft SQL Server , Connecting to other Databases – Executing database commands : Executing Inline SQL Statements, Executing Stored Procedures, Filtering Database Rows, Changing the Data Source Mode , Handling SQL Command Execution Errors, Cancelling Command Execution - Programmatically Executing SqlDataSource commands: Adding ADO.NET Parameters, Executing Insert, Update and Delete Commands , Executing Select Commands – Catching database data with the SqlDataSource control.

Unit – IV: **(12 Hours)**

Using the GridView Control: GridView Control Fundamentals : Displaying Data ,Seleting Data, Using data Keys, Sorting Data, Paging through Data , Editing Data, Displaying Empty Data, Formatting the Gridview Control, Using Viewstate and Gridview Control – using fields with the GridView control : Using BoundFields , Using CheckBoxFields, Using Command

Fields, Using Button Fields – working with GridView control Events : Highlighting GridViewRows , Displaying Column Summaries , Displaying Nested Master/Details Forms.

Unit – V: (12 Hours)

Using Repeater and DataList controls: Using the Repeater Control : Displaying Data with the Repeater Control, Using Templates with the Repeater Control, Handling Repeater Control Events – using the DataList Control: Displaying data with the DataList Control, Displaying data in Multiple Columns, Using Templates with the DataList Control, Selecting Data with the Data List Control, Editing Data with the Data List Control, Formatting the DataList Control.

Maintaining Application State: Using browser cookies : Cookie Security Restriction, Creating Cookies, Reading Cookies – using session state : Storing Database data in Session State.

Text Book:

Stephen Walther, 2016, *ASP.NET 4.0 unleashed*, Pearson Education.

Reference Books:

(1) Donny Mack, Doug Seven, 2002, *Programming Data-driven Web Applications with ASP.NET*, SAMS publishing.
(2) Marco Bellinaso, 2006, *Asp .Net 2.0 Website Programming*.
(3) Doug Seven, 2002, *Programming Data-driven Web Applications with ASP.NET*.
(4) Carl Rippon, 2019, *ASP.NET Core 3 and React: Hands-On full stack web*.
(5) Lisa Lopuck, 2012, *Web Design for Dummies*.

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III – B.C.A., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – XIV: Theory
Title of the Paper: Computer Networks **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To learn the concepts of Data communications and networks and Transmission Errors, Topologies and Routing Algorithms.
- To understand the Classification of Networks and Internetworking Concepts
- To acquire knowledge on TCP/IP, DNS, FTP and UDP

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To understand the fundamental concepts of Data Communication and networks, Signals and Modes of data transmission.

CO2: To gain the knowledge of Network Topologies, Protocols, routing algorithms.

CO3: To illustrate the usage of ISDN, X.25.

CO4: To acquire the knowledge about IEEE standards, Wireless Communications and internetworking.

CO5: To learn the techniques of TCP/IP.

Unit – I: **(12 Hours)**

Introduction to data communications and networks: Fundamental concepts, Data communications, Protocols, Standards, Standards organizations, Signal propagation, Analog and Digital signals, Bandwidth of a signal and a medium – Fourier analysis and the concept of Bandwidth of a signal, Data Transmission Rate and Bandwidth- **Analog and digital transmission methods:** Analog signal, analog transmission, Digital signal and Digital transmission, Digital signal and analog transmission, Baud rate and bits per second, Analog signal and digital transmission, Nyquist Theorem **- Modes of data transmission and multiplexing:** Introduction, parallel and serial communications, asynchronous, synchronous and isochronous communication, simplex, half duplex and full duplex communication - multiplexing and demultiplexing - types of multiplexing.

Unit – II: **(12 Hours)**

Transmission media - Guided media - Unguided media. **Transmission errors: Deduction and correction:** Error Classification, Types of Errors, Error Detection **- Network topologies, switching and routing algorithm:** Mesh Topology, star Topology, Tree Topology, Ring Topology, Bus Topology, Hybrid Topology, Basics of switching, Router and routing, Routing algorithms **- networking protocols and OSI model:** Protocols in computer communications, The OSI Model, OSI layer functions.

Unit – III: **(12 Hours)**

LAN, MAN, WAN Networks- **Medium Access sublayer and ISDN:** Static and dynamic channel allocation, Medium Access Control sublayer, ISDN and Its background, ISDN Architecture, ISDN Interfaces, Functional grouping, Reference points, ISDN protocol Architecture, Narrowband-ISDN and Broadband ISDN – **X.25 protocol:** Understanding X.25 works, Characteristics of X.25, Packet Format, X.25 Operation, CCITT X.21 **- Frame relay and congestion control:** The need for frame relay, Frame relay frame format, congestion control, congestion control algorithms, traffic control.

Unit – IV: **(12 Hours)**

Wireless Communications - IEEE Standards **-** Infrared communication - Bluetooth-802.11 Wireless LAN. **Internetworking Concepts, Devices, Internet basics, History and Architecture:** Repeaters, bridges, routers, gateways.

Unit – V: **(12 Hours)**

TCP/IP Part 1: TCP/IP basics , IP addresses, ARP, RARP, ICMP. **TCP/IP – Part 2: TCP and UDP:** TCP Basics, Feature of TCP – Relationship between TCP and IP –Ports And sockets – TCP Connections –TCP Packet Format - UDP Packet -Differences between UDP and TCP. **TCP/IP –Part 3:** DNS – Email – FTP – TFTP. **TCP/IP –Part 4:** Web Browser Architecture-Telnet.

Text Book:

Achyut and Godbole, 2011, *Data communications and networks*, Second edition, Tata McGraw Hill Publishing Company limited. (Relevant portions only).

Reference Books:

(1) Behrouz A.Forouzan, 2013, *Data communications and Networking*, Fifth edition, Tata McGraw Hill Publication company limited.

(2) Gupta, 2014, *Data Communication and Computer Networks*, PHI Learning Pvt. Ltd.

(3) Singh, 2014, *Data Communication and Computer Networks*, Fourth edition, PHI Learning Pvt. Ltd.

(4) Black, 2005, *Data Communication and Distributed Networks*, Third edition, PHI Learning Pvt. Ltd.

(5) Amutha, S.A. and Jeevakumari, 2008, *Elements of Data Communications Networks*, First edition, Laxmi Publications.

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III – B.C.A., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – XV: Theory
Title of the Paper: Multimedia and its Applications **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To enable students to learn the introduction of multimedia, Setting up a Multimedia Studio and Multimedia Elements
- To acquire knowledge on Multimedia Text, Audio, Animation and Multimedia Projects

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To acquire the basic knowledge of Multimedia concepts.

CO2: To explore the knowledge about image processing.

CO3: To gain complete knowledge about graphics and audio.

CO4: To understand the concepts of animation and video.

CO5: To become familiar with compression technique and multimedia application development.

Unit – I: **(12 Hours)**

Multimedia-An overview: Introduction – Multimedia Presentation and Production – Characteristics of multimedia presentation – Hardware and Software requirements – Uses of Multimedia – Analog and Digital Representations – Digitization.

Text: Introduction – Types of Text – Unicode standard – Font – Insertion of Text – Text File Formats.

Unit – II: **(12 Hours)**

Image: Introduction - Image Data Representation – Image Acquisition – Image Processing: Binary Image processing – Gray Scale Image Processing:Edge detection -

Intensity transformation – Histogram processing- Color Image Processing :Color models and spaces – CIE XYZ and CIE LAB ,RGB,CMYK models.

Unit – III: **(12 Hours)**

Graphics: Introduction – Advantages of Graphics – Uses of Graphics – Components of a Graphics System – 2D co-ordinate systems – 2D Transformations – Line Drawing Algorithms – Circle Drawing Algorithms.

Audio: Introduction – Acoustics – Sound waves – Types and Properties of Sounds – Psycho-Acoustics – Components of an Audio Systems – Digital Audio – Synthesizers – Musical Instrument Digital Interface – Digital Audio Processing – Speech – Sound Card.

Unit – IV: **(12 Hours)**

Video: Introduction – Motion Video – Analog Video Camera – Analog Video Signal Representation – Television Systems – Digital Video – Digital Video Processing – Video Recording and Storage Formats.

Animation: Introduction – Historical Background – Uses of Animation – Traditional Animation – Principles of Animation – Computer Based Animation – Animation on the Web – 3D Animation .

Unit – V: **(12 Hours)**

Compression: Introduction – Basic Concepts – Lossless compression Techniques – Lossy compression Techniques.

Multimedia Application Development: Introduction - Software Life Cycle Overview – ADDIE Model – Multimedia Production Steps – Case Study – Authoring Software.

Text Book:

Ranjan Parekh, 2013, *Principles of Multimedia*, Second edition, TMH publication, (Relevant portions only)

Reference Books:

(1) Steinmetz and Nahrstedt, 2003, Multimedia fundamentals: Vol – 1: Media coding and content processing, PHI Learning Pvt. Ltd.

(2) Andreas and Holzinger, 2004, Multimedia basis – Technologies (Vol-1), Andreas, Laximi Publication Pvt. Ltd.

(3) Rao, Bojkovic and Milovanovic, 2007, Multimedia communication systems – Techniques, Standards and Networks, First edition, PHI Learning Pvt. Ltd.

(4) Sharadha, 2009, Multimedia information networking, PHI Learning Pvt. Ltd.

(5) Tay Vaughan, 2011, *Multimedia making it work*, Eighth edition, Tata McGraw Hill.

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III – B.C.A., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Core Course – XVI: Practical – VI
Title of the Paper: Dot Net Programming **Subject Code:**

No. of Hours: 6
No. of Credits: 5

Learning Objectives:

- ❖ To enable the student to learn application designing and handling events.
- ❖ To acquire knowledge on developing database programs.
- ❖ To enable students to learn the database concepts and DBMS.

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To illustrate the usage of validation Controls, Ad Rotator Control.

CO2: Display required output using controls.

CO3: Illustration of file uploading methods.

CO4: Interpret interactive design using web forms.

CO5: To develop real time applications using database.

ASP .NET:

1. Design a web page using Required Field validator and Compare validator controls.
2. Design a web page to display the advertisements using Ad Rotator Control.
3. Demonstrate the usage of grid control.
4. Demonstrate the usage of calendar control.
5. Demonstrate the file upload control usage.
6. Prepare shopping cart using database.
7. Prepare employee pay slip using SQL connection.

8. Design a banking application for doing deposit, withdrawal and balance enquiry.
9. Prepare a database application for library management.

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III – B.C.A., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Elective Course – II:

Title of the Paper: 1.E – Commerce **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To understand the fundamentals of E-Commerce, Software agents and Internet technologies essential for E-commerce.
- To learn the Network security and Firewalls, E-payment systems – E-marketing and E-business portals.

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To understand the E-Commerce and its Business models.

CO2: To gain the knowledge of E-Marketing strategies and its security.

CO3: To learn digital payments, customer managements and e-logistics.

CO4: To update the knowledge management for mobile commerce.

CO5: To understand the e-business, legal and ethical issues.

Unit – I : **(12 Hours)**

History of E-Commerce: Electronic commerce –Emergence of the internet – Emergence of the World Wide Web – Advantages and Disadvantages of E-commerce – E-transaction challenges for Indian Corporate. **Business models for E-Commerce:** Business model – E-Business models based on the Relationship of Transaction Parties – E-Business models based on

the Relationship of Transaction Types. **Enabling technologies of the World Wide Web:** Akshaya project – Internet Client Server Applications – Networks and Internet.

Unit – II : (12 Hours)

E-Markeing: Google – Traditional marketing – Identifying web presence goals – The Browsing Behavior Model – Online Marketing – E-Advertising – E-branding – Marketing Strategies**. E-Security**: Security Breach – Information system security – Security on the internet – E-business risk management issues – Information security environment in India.

Unit – III : (12 Hours)

E-Payment Systems: Digital Payment Requirements – Digital token-based e-Payment systems – Transition to Digital payments in India – Digital Signature. **E-customer relationship management**: Customer Relationship Management – Typical business touch-points – CRM and Workflow Automation. **e-Supply chain management**: *Supply Chain:* The new way – e-logistics of UPS – seven ways to reduce inventory – benefits – e-supply chain components – Architecture.

Unit – IV : (12 Hours)

E-Strategy and Knowledge Management: Definitions of Knowledge and Management – Importance of Knowledge Management – Stages in developing knowledge management systems – Seven Dimension of e-Commerce strategy – Value chain and e-Strategy – Planning the e-commerce project. **Information systems for mobile commerce**: History of Smartphones – Impacts of smartphones on human life – Mobile Commerce – Cellular networks – Different generation in Wireless communication – Security issues pertaining to cellular technology.

Unit – V: (12 Hours)

Portals for E-Business: Portals – Requirements of intelligent websites – setting website goals and objectives – Portals for mass collaboration – Portals for Enterprise Resource Planning – ERP – SAP AG as a successful ERP system – Intranet portals: HRIS – Human Resource Management – various HRIS modules. **Legal and ethical issues:** Ethical issues in a digital economy – Cyberstalking – Cybersquatting – Phishing – Application fraud – Skimming – Copyright violations – Internet Gambling – Threats to children – Loss of privacy – Cookies and privacy.

Text Book:

P.T. Joseph S.J. 2019, *E-Commerce: An Indian Perspective*, Sixth edition, PHI Learning Pvt. Ltd. (Relevant chapters only).

Reference Books:

(1) Kalakota Whinston, 2012, *Frontiers of Electronic Commerce*, Sixth impression, Pearson Education.

(2) Award, 2012, *E-Commerce – From Vision to Fulfillment*, Third edition, PHI Learning Pvt. Ltd.

(3) Parag Diwan and Sunil Shavana, 2012, *E-Commerce - a Management Guide.*

(4) Edi, 2013, *Cyber laws intellectual property & E-commerce security*, Dominant publishers and distributors.

(5) Rajaraman, 2013, *Essentials of E-Commerce Technology*, PHI Learning Pvt. Ltd.

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III – B.C.A., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Elective Course – II:
Title of the Paper: 2.Management Information System Subject Code:

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To enable students to learn the Information system concepts.
- To understand the need of IT in MIS, Business applications, stages in development and challenges for the Management.

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To understand the basic concepts of information systems and its components.

CO2: To gain knowledge on computer hardware and software.

CO3: To know the nature of business applications like ERP, CRM and SCM.

CO4: To understand the development process in business systems.

CO5: To know the management challenges.

Unit – I: Foundation Concepts (12 Hours)

Information system in Business – Components of information systems – Fundamentals of strategic advantages – using information technology for strategic advantages.

Unit – II: Information Technology (12 Hours)

Computer Hardware: Computer systems – computer peripherals. **Computer software:** Application software – system software. Data resource management: Managing data resources.

Unit – III: Business Applications (12 Hours)

Enterprise Business systems – Functional business systems – customer relationship management (CRM) – Enterprise Resource Planning (ERP) – supply chain management (SCM) – E-Commerce fundamentals.

Unit – IV: Development Process (12 Hours)

Planning fundamentals – Implementation challenges – Developing business system – implementing business systems.

Unit – V: Management Challenges (12 Hours)

Security, Ethical and Societal challenges of IT – Security management of Information technology – Managing information technology.

Text Book:

James A O'Brien, George M. Marakas and Ramesh Behl, 2012, *Management Information Systems*, Special India Nineth edition, Tata McGraw Hill Publications. Chapters (1 to 14)

Reference Books:

(1) Kelkar, 2008, *Management Information Systems: A Concise Study*, Second edition, PHI Learning Pvt. Ltd.

(2) Chatterjee, 2010, *Management Information Systems*, PHI Learning Pvt. Ltd.

(3) Gupta, 2014, *Management Information Systems,* S.Chand company Ltd., New Delhi.

(4) Sadagopan, 2014, *Management Information Systems*, PHI Learning Pvt. Ltd.

(5) Joseph and Mohapatra, 2014, *Management Information System in Knowledge Economy*, PHI Learning Pvt. Ltd.

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(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Elective Course – II:

Title of the Paper: 3.Business Process Outsourcing **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To learn the concepts of Business Process Outsourcing
- To understand the planning stage, process strategy
- To acquire knowledge on contract, measuring performance and human resources

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To understand the scope of BPO, categories and various planning stages.

CO2: To know the procedure in selecting the vendor.

CO3: To learn the method of measuring performance.

CO4: To gain the knowledge on international policies and considerations.

CO5: To learn the procedure of post negotiations activities, renegotiations and terminations.

Unit – I: **(12 Hours)**

Overview: The Emerging Market – BPO – BPO categories – Reasons for outsourcing Business Process – Integration: Making BPO Fit – BPO Vendors.

Planning Stage: Outsourcing as an Option - Defining the Scope of the Transaction - Selecting a Group of Potential Vendors - Request for Proposal.

Unit – II: **(12 Hours)**

Selecting the Vendor: Evaluating the Proposals - Notifying the Preferred Vendor. **Negotiations Strategy and Process:** Forging the Legal Relationship - Negotiating Process - Exposure Analysis - People Negotiate, Not Companies - Negotiating Strategy. BPO outsourcing contract: Overview - Use of Attorneys - Key Contract Issues - Regaining Strategic Control - Pricing Considerations.

Unit – III: **(12 Hours)**

Measuring Performance: Overview – Service levels – Benchmarking**. Human Resources**: Transitioning employees to the vendor – Due Diligence – Terms and conditions of employment – Transitioning employees from customer to vendor – Human resources representatives – contract-related issues. **Transformational outsourcing:** Project definition – maintaining multiple environments – using subcontractors.

Unit – IV: **(12 Hours)**

International considerations: international transactions – contract and legal issues. Information privacy and security issues: introduction – selected information privacy laws – selected information security laws – company privacy policies – Global issues – Offshore outsourcing. Exhibits and ancillary agreements: A critical part of the BPO contract – Exhibits listings – Checklist for the exhibits.

Unit – V: **(12 Hours)**

Post negotiation activities: Contract signing – Autopsy – Risk analysis – Contract administration – Implementation the transition plan - Notifying third parties. **Renegotiation and Termination:** overview – Renegotiation/Termination process – Contract say – Additional issues to consider – Termination plan.

Text Book:

John K. Halvey and Barbara M. Melby, 2005, *Business Process Outsourcing Process, Strategies and Contracts*, Second edition, John Wiley & Son's, Inc.

Reference Books:

(1) Nakkiran, S. and John Franklin, D. 2008, *Business Process Outsourcing: Concept, Current Trends, Management, Future Challenges.*

(2) Saxena, K.B. and Sangeeta Shah Bharadwaj, 2007, *Business Process Outsourcing: for strategic advantage,* First edition, Anurag Jain for Excel books.

(3) James Wanyama, 2016, *Business process outsourcing (BPO) strategy, A conceptual approach,* GRIN Publishing.

A.V.C. College (Autonomous)
PG & Research Department of Computer Science
Mannampandal-609 305, Mayiladuthurai.
III – B.C.A., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Elective Course – III:
Title of the Paper: 1.Internet of Things **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To learn the basics and technology of IOT.
- To understand the fundamentals of Internet of Things.
- To apply the concept of Internet of Things in the real world scenarios

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To outline the concept of Internet of Things.

CO2: To understand the Smart Appliance and Smart Homes.

CO3: To acquire the Knowledge of Smart Clothing and Smart Shopping.

CO4: To gain the knowledge of Smart Cars and Smart Aircrafts and Smart Welfare.

CO5: To Understand the Smart Medicine and Smart Cities and Smart World.

Unit – I : **(12 Hours)**

Smart Connectivity: Welcome to the Internet of Things: Welcome to the Future - Internet of Things - Kinds of Things that can be connected to the Internet of Things - All Those Connected Things do - Internet of Things Arrive - Importance of Internet of Things - Smart Connectivity and You **Smart Technology: 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 **Smart TVs: Viewing in a Connected World :** Smart TV – Consideration Smart TV Operating System – Examining a Typical Smart TV – Exploring Smart TV Set Top Devices.

Unit – II: (12 Hours)

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: (12 Hours)

Smart Clothing: Wearable Tech: Wearable Technology Today - and Tomorrow - Watching the Smart watches - 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 - Your Data – Smart Shopping and You.

Unit – IV: (12 Hours)

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 -** Drones - They Aren‘t - Drones Are Used Today for - The Future of Drone Aircraft -Regulating Drone Aircraft-Fly the Scary Skies: The Problems with Drones – Other Smart Aircraft Technologies – Smart Aircraft and You

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.

Unit – V: (12 Hours)

Smart Medicine: We have the Technology: Welcome to the internet of Medical Things – Smart Medical Devices and Monitoring – Smart Meds – Smart Hospital – Smart Medical Records. **Smart Businesses: Better Working Through Technology:** Smart Offices - Smart Stores - Smart Inventory Management – **Smart Cities: Everyone's Connected:** Understanding the Smart City – Smart Infrastructure – Smart Roads and Traffic 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:

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

Reference Books:

(1) Arshdeep Bahga and Vijay Madisetti, 2015, *Internet of Things, A Hands on Approach*, Universities Press.

(2) www.libelium.com/top_50_iot_sensor_applications_ranking/

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III – B.C.A., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)

Elective Course – III:

Title of the Paper: 2.Network Security **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To enable students to learn Information security, Policies and Process.
- To understand the Security Monitoring technologies and Risk management.
- To acquire knowledge on Internet Security.

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To understand the basic of network security.

CO2: To learn the information security services and policies.

CO3: To gain knowledge on information security process and the way of managing risk.

CO4: To acquire the knowledge on best practices and technologies in network and information security.

CO5: To learn the technologies of Monitoring and Encryption.

Unit – I : **(12 Hours)**

Information Security basics: Information Security – Define Security as a process, Not point products – Types of Attacks – Hacker techniques.

Unit – II : **(12 Hours)**

Information Security Service: Confidentiality service- Integrity service – Availability service – Accountability service. **Policy:** Policy importance –various policies used by organization – Creating appropriate policy – Deploying Policy – Using policy effectively.

Unit – III : **(12 Hours)**

Managing Risk: Define Risk – Measuring risk. **The Information security process:** Conducting an assessment – Developing Policy – Implementing security – Awareness training – Audits – Policy adherence audits.

Unit – IV : **(12 Hours)**

Information security Best practices: Administrative security practices – Technical security practices. **Network Security technology:** Perimeter technology: Perimeters and perimeter policy basics – perimeter controls – creating perimeter architecture.

Unit – V : **(12 Hours)**

Monitoring technology: Purpose of monitoring – Monitoring technologies – creating a Monitoring architecture – Correlating events – Separation of duties. **Encryption technology:** Basic encryption concepts – Encryption terms – Symmetric key encryption – Public key encryption – Digital signature – Key management.

Text Book:

Eric Maiwald, 2013, *Network security - A Beginners Guide*, Third edition, Tata McGraw Hill.

Reference Books:

(1) William Stallings, 1998, *Cryptography and Network Security*, First edition, Pearson Education.

(2) Ankit Fadia,1998, *Network Security*, First edition, McMillan Publications.

(3) Singh, 2011, *Network security & Management*, Second edition, PHI Learning Pvt. Ltd.

(4) Kaufman, Perlman and Speciner, 2002, *Networks Security: Private Communication in a public world*, Second edition, PHI Learning Pvt. Ltd.

(5) Balvir Singh, 2009, *Networking*, Second edition, Laxmi Publications Pvt. Ltd.

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III – B.C.A., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Elective Course – III:
Title of the Paper: 3.Object oriented analysis and design

Subject Code:

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To learn the basics of object, object-oriented systems development methodologies.
- To understand the usage of UML and the process involved in object-oriented analysis.
- To enable students to learn the procedure of ensuring software quality assurance.

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To understand the basic concepts of object and object oriented SDLC.

CO2: To learn various object oriented methodologies and UML.

CO3: To gain knowledge on object oriented analysis process.

CO4: To acquire the knowledge on object-oriented design process and design axioms.

CO5: To understand about software quality assurance, usability and user satisfaction.

Unit – I: **(12 Hours)**

Object Basics: Introduction – An Object-Oriented Philosophy – Objects – Object are grouped in classes – Attributes: Object state and properties – Object Behavior and methods –

Object respond to message – Encapsulation and Information hiding – class hierarchy – polymorphism – Object relationship and associations – Aggregations and object containment.

Object-Oriented systems development life cycle: Introduction – The software development process – Building high-quality software – Object-Oriented system development: A use-case driven approach- Reusability.

Unit – II: (12 Hours)

Object-Oriented Methodologies: Introduction – Survey of some of the object-oriented methodologies – Rumbaugh et al.'s object modeling technique – the Booch methodology – the Jacobson et al. methodologies – Patterns – Frameworks – The Unified Approach.

Unified Modeling Language: Introduction – static and dynamic models –Modeling importance – Introduction to the Unified modeling language – UML Diagrams – UML Class Diagram – Use-case Diagram – UML Dynamic modeling – Model Management: packages and model Organization – UML Extensibility – UML Meta-model.

Unit – III: (12 Hours)

Object-Oriented analysis process: Identifying use cases – Introduction – Analysis is a difficult activity – business object analysis: understanding the business layer – use-case driven object-oriented analysis: the unified approach – business process modeling – use-case model – Developing effective documentation.

Object analysis: Classification – Introduction – classification theory – Approaches for identifying classes – Noun Phrase Approach – common class patterns approach – **Use-case driven approach:** Identifying classes and their behavior through sequence / collaboration modeling – Classes, Responsibilities, and Collaborations- Naming classes.

Unit – IV: (12 Hours)

Identifying object relationships, attributes, and methods: Introduction – Associations – Super-sub class relationships – A-part-of relationships-Aggregation- Class Responsibility: Identifying attributes and methods – Class Responsibility: Defining attributes by analyzing use case and other UML Diagrams – Defining attributes for ViaNet Bank objects – Object Responsibility: methods and messages – Defining methods for via net bank objects.

The object-oriented design process and design axioms: Introduction – the object-oriented design process – object-oriented design axioms – corollaries – design patterns.

Unit – V: **(12 Hours)**

Software quality assurance: Introduction – Quality assurance tests – testing strategies – impact of object orientation on testing – test cases – test plan – continuous testing – Myers's debugging principles.

System usability and measuring user satisfaction: Introduction – usability testing – user satisfaction test – A tool for a analyzing user satisfaction: the user satisfaction test template.

Text Book:

Ali Bahrami, 2010, *Object Oriented Systems Development*, International edition, Tata McGraw Hill.

Reference Books:

(1) Gredy Booch , 2006, *Object Oriented Analysis and Design with applications*, Third edition, Addision Wesley.

(2) Andrew Haigh, 2002, *Object Oriented Analysis and Design*, Tata McGraw Hill.

(3) Dixit, J.B. Raj Kumar, 2007, *Structured Analysis and Design*, First edition, Laxmi Publications Pvt. Ltd.

(4) Preeti Gupta, 2005, *Structured Analysis and Design, First edition*, Laxmi Publications Pvt. Ltd.

(5) Matha,, 2008, *Object Oriented Analysis and Design using UML: An Introduction to Unified Process and Design patterns*, PHI.

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III – B.C.A., Semester – VI
(For candidates admitted to the course under CBCS Pattern from 2018-2019)
Skill Based Course – III:
Title of the Paper: Graphics and Animation Lab **Subject Code:**

No. of Hours: 4
No. of Credits: 4

Learning Objectives:

- To understand the concepts of animation.
- To enable students to creating animations.

Programme Specific Outcomes:

PSO1: To apply knowledge of mathematics, computer science and management in real time applications.

PSO2: To develop effective communications, critical thinking and problem solving skills.

PSO3: To analyze a problem, develop an algorithm to solve it and try new approaches in solving problems of different domains.

PSO4: To inculcate various real time applications using latest technologies and programming languages.

Course Outcomes:

CO1: To become familiar with animation features.

CO2: To get an exposure to additional effects.

CO3: To perform manipulations using buttons.

CO4: To explore vast knowledge in morphing.

CO5: To learn various motion of the objects.

Using Flash:

1. Move an animated Object in path using GUIDE layer
2. Perform Dynamic Masking in the Text.
3. Retrieve the Drive information in the system Using URL.

4. Apply the animation on an image.

5. Design Drag masking application Using Movie Clip.

6. Design the Arithmetic Calculator. Use BUTTON and get the user input through Mouse.

7. Create a changing shape motion: Change the shape of drawn image or text to another shape of image or text.

8. Create an animation for cloud effect.

Using Photoshop:

9. Create Image morphing.

10. Create Animated Buttons which is used for Web design.

11. Create animated GIF for use as Banners, Titles and Buttons.

12. Create a mirror image effect.