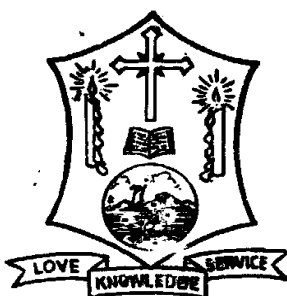


**B.Sc. COMPUTER SCIENCE**

**Course Structure 2018-2019**

**CHOICE BASED CREDIT SYSTEM (CBCS)**



**THANTHAI HANS ROEVER COLLEGE (Autonomous)**  
**(Approved by NAAC, Affiliated to Bharathidasan University)**  
**ELAMBALUR, PERAMBALUR - 621 220**

**Thanthai Hans Roever College (Autonomous)**  
**Elambalur, Perambalur - 621 220**

## UG Course Structure

**Department: Computer Science**

**Batch: 2018 - 2021**

**Programme: B.Sc.**

Semester	Part	Course Code	Title of the Course	Hour s/ Week	Credi t	Exam Hour s	CIA (Max )	ESE (Max )	Total (Max )
1	I	18UT1	Tamil-I (Ilakiyam-Kavithai, Sirukathai, Urainadai, Ilakkiya Varalaru)	6	3	3	25	75	100
1	II	18UE1	English-I (Prose for Effective Communication and Grammar)	6	3	3	25	75	100
1	III	18UCS1CC1	Programming in C	6	5	3	25	75	100
1	III	18UMA1AC1	Mathematics-I (Numerical Methods and Statistics)	6	4	3	25	75	100
1	III	18UCS1CP1	Programming in C Lab	4	3	3	40	60	100
1	IV	18UVE	Value Education	2	2	3	25	75	100
			Total	<b>30</b>	<b>20</b>	-	-	-	<b>600</b>
2	I	18UT2	Tamil-II (Idaikkala Ilakkiyam, Nadagam, Puthinam, Ilakkiya Varalaru)	6	3	3	25	75	100
2	II	18UE2	English-II (Poetry for Effective Communication and Grammar)	6	3	3	25	75	100
2	III	18UCS2CC2	Programming in C++	6	6	3	25	75	100
2	III	18UMA2AC2	Mathematics-II (Operation Research)	6	4	3	25	75	100
2	III	18UCS2CP2	Programming in C++ Lab	4	3	3	40	60	100
2	IV	18UES	Environmental Studies	2	2	3	25	75	100
			Total	<b>30</b>	<b>21</b>	-	-	-	<b>600</b>
3	I	18UT3	Tamil-III (Kappiya Ilakkiyam , Nadagam, Ilakkiya Varalaru)	6	3	3	25	75	100
3	II	18UE3	English-III (Short Story and Effective Communication Skill)	6	3	3	25	75	100
3	III	18UCS3CC3	Java Programming	6	5	3	25	75	100
3	III	18UCS3CP3	Java Programming Lab	3	3	3	40	60	100
3	III	18UPH3AC3	Applied Physics –I	4	4	3	25	75	100
3	IV	18UPH4AP1	Applied Physics Lab-II	3	-	-	-	-	-

3	IV	18UCS3NME1	NME I Working principles of internet	2	2	3	25	75	100
			Total	<b>30</b>	<b>20</b>	-	-	-	<b>600</b>
4	I	18UT4	Tamil-IV (Palan Ilakkiyam, Ilakiya Varalaru, Podhu katturai)	6	3	3	25	75	100
4	II	18UE4	English-IV(One Act Play and Effective Communication Skill)	6	3	3	25	75	100
4	III	18UPH4AC4	Applied Physics – III	4	4	3	25	75	100
4	III	18UPH4AP1	Applied Physics Lab –II	3	3	3	40	60	100
4	III	18UCS4CC4	Database Systems	4	4	3	25	75	100
4	III	18UCS4CP4	Database Systems Lab	3	3	3	40	60	100
4	IV	18UCS4NME2	NME II Fundamentals of information technology	2	2	3	25	75	100
4	IV	18UCS4SBE1	SBE1-Pagemaker	2	2	3	25	75	100
			Total	<b>30</b>	<b>24</b>	-	-	-	<b>800</b>
5	III	18UCS5CC5	Data Communication Network	6	5	3	25	75	100
5	III	18UCS5CC6	Data Structure & Algorithms	6	5	3	25	75	100
5	III	18UCS5CC7	Microprocessor and its Applications	6	5	3	25	75	100
5	III	18UCS5CP5	Microprocessor Lab	3	3	3	40	60	100
5	III	18UCS5MBE1:1 18UCS5MBE1:2 18UCS5MBE1:3	Programming inPHP HTMLprogramming Web designing	3	3	3	25	75	100
5	IV	18UCS5SBE2	SBE2-Corel Draw	2	2	3	25	75	100
5	IV	18UCS5SBE3	SBE3-Dream Weaver	2	2	3	25	75	100
5	IV	18USSD	Soft Skill Development	2	2	3	25	75	100
			Total	<b>30</b>	<b>27</b>	-	-	-	<b>800</b>
6	III	18UCS6CC8	Operating System	6	6	3	25	75	100
6	III	18UCS6CC9	Computer Graphics and Multimedia	6	6	3	25	75	100
6	III	18UCS6CP6	Multimedia Lab	5	4	3	40	60	100
6	III	18UCS6MBE2:1 18UCS6MBE2:2 18UCS6MBE2:3	E-Commerce VB.Net Cloud Computing	6	5	3	25	75	100
6	III	18UCS6PW 18UCS6MBE3:1 18UCS6MBE3:2	Mini Project(Students to do it in their respective	6	5	3	40	60	100

			Department) Dot Net Lab LINUX Lab						
6	V		Extension Activities	-	1	-	-	-	-
6	V	18UGS	Gender Studies	1	1	3	25	75	100
			Total	<b>30</b>	<b>28</b>	-	-	-	<b>600</b>
			Grand Total	<b>180</b>	<b>140</b>				<b>4000</b>

### Paper Details:

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

\* for those who studied Tamil up to 10th +2 (Regular Stream)

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

# those who studied Tamil up to 10th +2 but opt for other languages in degree level under Part I should study special Tamil in Part IV

\*\* Extension Activities shall be outside instruction hours

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

a) Basic Tamil I & II for other language students

b) Special Tamil I & II for those who studied Tamil up to 10th or +2 but opt for other languages in degree programme

**Note:**

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

**FOR THEORY**

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

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

**FOR PRACTICAL**

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

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

**Course Code :18UCS1CC1**  
**Hours : 6**  
**Credits : 5**

**Semester: I**

**Total Marks :100**  
**External Marks : 75**  
**Internal Marks : 25**

**CORE COURSE-I**

## **PROGRAMMING IN C**

### **Objective:**

- To Know the basic terminology used in structured programming
- To understand various features of C
- To develop the programming skills using C language

### **UNIT I**

Overview of C- History of C - Importance of C - Basic Structure of C Programs - Constants- Variables and Data Types - Operators and Expressions.

### **UNIT II**

Managing Input and Output Operations - Decision Making and Branching - Decision Making and Looping- if- if\_else- nested\_ if - for - do - do\_while.

### **UNIT III**

Arrays- One Dimensional Arrays - Two Dimensional Arrays -Multi dimensional Arrays - Character Arrays and Strings- Reading Strings from Terminals - Writing Strings to Screen - Arithmetic operations on characters - Putting Strings Together - String-handling Functions.

### **UNIT IV**

User defined Functions- Definition of Functions - Return Values and their Types - Function Calls - Function Declaration - Category of Functions - Nesting of Functions - Recursion - Structure and Unions- Defining Structure - Declaring Structure Variables - Arrays of Structures - Arrays within Structures - Structures within Structures - Structures and Functions - Unions.

### **UNIT V**

Pointers- Declaring Pointer Variables - Initialization of Pointer Variables - Accessing a variable through its Pointer- Pointer Expression - Pointers and Arrays - Pointers and Character Strings - Array of Pointers - Pointers to Function Arguments - Functions Returning Pointers - Pointers to Functions - Pointers and Structures.

### **Text Book(s):**

1. E. Balagurusamy, "Programming in ANSI C", 4<sup>th</sup> Edition, Tata McGraw Hill Publications, 2008.

### **Reference Book(s):**

1. Brain W. Kerighan, Dennis Ritchi," The C Programming Language" 2<sup>nd</sup> Edition, 2015.
2. Herbert Schildt, "C: The Complete Reference", 4<sup>th</sup> Edition,2017
3. Yashavant Kanetkar," Let US C", 16<sup>th</sup> Edition, 2016

Total Number of Topics Present in the course: 54

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	4	7.41
2.	Regional	0	0.00
3.	National	0	0.00
4.	Global	50	92.6

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Course Code :18UCS1CP1**

**Hours : 4**

**Credits : 3**

**Semester: I**

**Total Marks :100**

**External Marks : 60**

**Internal Marks : 40**

**CORE COURSE PRACTICAL-I**

### **PROGRAMMING IN C LAB**

1. Write a program to check odd or even of the given number
2. Write a program to find the roots of quadratic equation
3. Write a program to find the biggest of three numbers using if statement
4. Write a program to generate Fibonacci Series using while and for loops
5. Write a program to determine the character vowel or not using switch statement
6. Write a program to sort the given array of numbers (Ascending, Descending)
7. Write a program for matrix operations (addition, subtraction, multiplication)
8. Write a program to swap the values using call by value and call by reference
9. Write a program to find the factorial value using recursion function
10. Write a program to prepare your HSC mark statement using structure
11. Write a program to demonstrate string manipulations using pointers (copy, compare, length, join & reverse)
12. Write a program to array list.

Total Number of Topics Present in the course: 12

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	1	8.33
2.	Regional	0	0.00
3.	National	0	0.00
4.	Global	11	91.7

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Course Code :18UCS2CC2**  
**Hours : 6**  
**Credits : 6**

**Semester: II**  
**CORE COURSE -II**

**Total Marks :100**  
**External Marks : 75**  
**Internal Marks : 25**

## **PROGRAMMING IN C++**

### **Objectives:**

- To understand the principles of Object Oriented Programming
- To know the fundamental C++ programming techniques
- To Illustrate the C++ files and Exception handling mechanisms

### **UNIT I**

Basic concepts of Object oriented programming - Benefits of OOPs - Application of OOPs - Structure of C++ program - Basic data type- Integer-float-String-variables-object-classes - Derived data type - User defined data type- operators in C++- Control statements- inline function- function overloading.

### **UNIT II**

Class Introduction- Specifying a class - defining member function- nesting of member function- array of object - friend function -constructor- parameterized constructor- copy constructor- destructor. Defining operator overloading- overloading unary operator -overloading binary operator -rules for operator overloading

### **UNIT III**

Inheritance-single inheritance-multilevel inheritance-multiple inheritance-hierarchical inheritance-hybrid inheritance- virtual base class- polymorphism- pointer - pointer to object- this pointer-virtual function-pure virtual function - pointers to object-this pointer-pointers to derived class-virtual function-pure virtual function.

### **UNIT IV**

I/O Operation- Introduction- C++ Streams -C++ stream classes-unformatted I/O operations-formatted console I/O Operation- Managing Output with manipulators.

### **UNIT V**

Files- Introduction-class for file stream operations-opening and closing files-detecting end of file-more about open ()- File Modes-File pointer and their manipulation-sequential input and output operations-updating a file: Random access-error handling during file Operation-Command line argument -Exception Handling- Exception handling mechanisms.

### **Text Book:**

1. E. Balagurusamy, "Object Oriented Programming with C++", Third Edition, Tata McGraw Hill Publishing Company, 2007.

### **Reference Books:**

1. Herbert Schildt, "The Complete reference C++", Fourth Edition, Tata McGraw Hill, 2003.
2. AL Stevenson,"C++ Programming", 7th Edition, Wiley India Pvt ltd, 2003.

Total Number of Topics Present in the course: 69

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	9	13
2.	Regional	0	0.00
3.	National	0	0.00
4.	Global	60	87

Local – Green, Regional – Pink, National – Blue, Global – Brown

Course Code :18UCS2CP2  
Hours : 4  
Credits : 3

Semester: II

Total Marks :100  
External Marks : 60  
Internal Marks : 40

## CORE COURSE PRACTICAL-II

### PROGRAMMING IN C++ LAB

1. Program to find factorial of a given number.
2. Create a class called EMPLOYEE that has EMPCODE and EMPNAME as data members, and create member function getdata () for input data, display () for output data. Create a main function EMP as an array of EMPLOYEE objects. Accept and display the details of employees.
3. Program to sort an array of integer in ascending order using call by value call by reference methods.
4. a) Program to find the largest of three numbers using inline function.  
b) Program to find mean of N numbers using friend function.
5. Program to implement function overloading.
6. Program to over load the operators.
7. Create a class 'COMPLEX' to hold a complex number, and use friend function to add two complex numbers. Create a main function to add two COMPLEX objects.
8. Program to read the derived class data members such as name roll number, sex, height and weight from the keyboard and display the contents of a class on the screen. Write a Program to demonstrate a single inheritance
9. Program to check whether the given string is a palindrome or not using pointer
10. Program that uses a single file for both reading and writing the data.
11. Program that uses constructors and parameterized constructors.

Total Number of Topics Present in the course: 11

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	2	18.2
2.	Regional	0	0.00
3.	National	0	0.00
4.	Global	9	81.8

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Course Code :18UCS3CC3**

**Semester: III**

**Total Marks :100**

**Hours : 6**

**Credits : 5**

**External Marks : 75**

**Internal Marks : 25**

**CORE COURSE -III**

## **JAVA PROGRAMMING**

### **Objectives:**

- To understand the basic concepts of Object oriented programming
- To know the various Java syntax with programming techniques
- To introduce the Java Packages and its working principles
- To understand the Multithreading concepts and Exception handling mechanisms

### **UNIT I**

Fundamentals of Object Oriented Programming - Java Evolution - Overview of Java Language - Constants- Variables and Data types - Operators- arithmetic-assignment-relational-logical-Operators and Expressions - Branching and Looping Statements.

### **UNIT II**

Classes- Objects and Methods - Defining a Class-Creating Objects - Constructors -Method Overloading - Static Members - **Inheritance**- Extending a Class - Overriding Methods - Final Classes - Abstract Methods and Classes - Visibility Control - Arrays- Strings.

### **UNIT III**

Interfaces-Defining Interfaces - Extending Interfaces - Implementing Interfaces - Accessing Interface Variables - Packages - Multithreaded Programming-Creating Threads - Extending the Thread Class - Stopping and Blocking a Thread - Life Cycle of a Thread - Using Thread Methods - Thread Exceptions - Thread Priority

### **UNIT IV**

Exceptions-Types of Errors - Exceptions - Syntax of Exception Handling Code - Multiple Catch Statements - Using Finally Statement - Throwing our own Exceptions - Managing Input/output Files in Java - Stream Classes - Character Stream- Byte Stream - Using Streams - Using the File Classes - Input/output Exceptions - Creation of Files - **Reading/Writing Characters** - Reading/Writing Bytes- Random Access Files.

### **UNIT V**

Applet- Building Applet Code - Applet Life Cycle - Creating an executable Applet - Applet Tag - Adding Applet to HTML File - Running the Applet - Passing Parameters to Applets - Event Handling - Graphics Class- Line and Rectangles- Circle and Ellipses - Drawing Arcs - Drawing Polygons.

### **Text Book:**

1.E. Balagurusamy, "Programming with Java a Primer", Fourth Edition, McGraw Hill Education, 2010.

### **Reference Book(s)**

1. Patrick Naughton and Herbert Schildt "Complete Reference", 3rd Edition, Tata McGraw Hill Publishing Company Ltd., 1999.

2. P. Radha Krishna, “Object Oriented Programming through Java”, University Press (India) Private Ltd., 2007.

Total Number of Topics Present in the course: 73

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	2	2.74
2.	Regional	0	0.00
3.	National	0	0.00
4.	Global	71	97.3

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Course Code :18UCS3CP3**  
**Hours : 3**  
**Credits : 3**

**Semester: III**

**CORE COURSE PRACTICAL-III**

**Total Marks :100**  
**External Marks : 60**  
**Internal Marks : 40**

### **JAVA PROGRAMMING LAB**

1. Program to define a class, describe its constructor, overload the constructors and instantiate its object.
2. Program to over load the functions.
3. Program to demonstrate use of sub class
4. Program to implement array of objects
5. Program to implement inheritance and demonstrate use of method overriding.
6. Program to demonstrate use of Packages and interfaces.
7. Program to implement the concept of Multithreading.
8. Program to implement the concept of Exception Handling using user defined Exception
9. Program using Applet for configuring Applets by passing parameters
10. Programs for using Graphics class, to create and display the followings
  - a. Display basic shapes and fill them
  - b. Set background and foreground Colors
11. Program using class and creating objects.

Total Number of Topics Present in the course: 11

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	-	-
2.	Regional	-	-
3.	National	-	-
4.	Global	11	100

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Code : 18UCS3NME1**  
**Hours : 2**  
**Credits : 2**

**Semester: IV**  
**NME-I**

**Total Marks :100**  
**External Marks : 75**  
**Internal Marks : 25**

### **Non Major Elective - I Working Principles of Internet (Theory)**

Objective:

To understand the working Principles of Internet

Unit I

Introduction about Internet - The Internet's underlying Architecture

Unit II

Connecting to the Internet – Communicating on the Internet

Unit III

How the World Wide Web works. Common Internet tools

Unit IV

Multimedia on the Internet – Intranet and shopping on the Internet

Unit V

Safeguarding the Internet

Text Book:

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

Reference Book :

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

Total Number of Topics Present in the course: 9

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	4	44.4
2.	Regional	3	33.3
3.	National	1	11.1
4.	Global	1	11.1

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Course Code: 18UCS4CC4**

**Semester: IV**

**Total Marks :100**

**Hours : 4**

**Credits : 4**

**CORE COURSE-IV**

**External Marks : 75**

**Internal Marks : 25**

## **DATABASE SYSTEMS**

### **Objectives:**

- To write data manipulation commands in SQL
- To write data definition commands in SQL
- To specify the functional and data requirements for a typical database application
- To produce detailed data models and their associated logical schemas

### **Unit I:**

Database Systems and Data Models File systems and databases- data- information- databases- database management systems- data redundancy- database systems- DBMS functions- and connecting a client to the Oracle DBMS. Data models- entities- attributes- relationships- business rules- Data abstraction- conceptual- internal- external models.

### **Unit II:**

Relational Databases and ER Models - The relational database model- tables- keys- integrity- operators- **linking tables**- data redundancy-The basics of SQL- ER Modeling- Entities- Relationships- Weak- Recursive- Composite- Developing an ER Diagram.

### **Unit III:**

Normalization and Advanced Data Modeling Normalization of database tables- Data redundancies- data anomalies- bottom up modeling of data using normal forms. **1NF- 2NF- 3NF- refinement- BCNF- and 4NF**- Advanced Data Modeling- The extended entity relationship (EER) model- generalization- specialization- **super types- subtypes**- clusters- primary key selection- data modeling checklist.

### **Unit IV:**

Advanced SQL: **SQL functions**- Oracle sequences- updatable views- procedural SQL- triggers- stored procedures- embedded SQL-Database Design- systems development life cycle- database life cycle- database revisions- **top-down versus bottom-up design**- centralized versus decentralized design.

### **Unit V:**

Database Design and Transaction Management and Concurrency Control Transactions and concurrency control- locking- time stamping and data recovery.

### **Text Book:**

1. Coronel, C. M., Morris, S. & Rob, P. (2013). Database systems: Design, implementation, and Management (10th ed.). Boston: Cengage Learning.

### **Reference books:**

1. Murach's SQL Server 2008 for Developers by Bryan Syverson and Joel Murach ISBN-13: 978-1-890774-51-6
2. SQL Server 2005 Bible (Paperback) by Paul Nielsen Publisher: Wiley (November 6, 2006) ISBN-13: 978-0764542565

Total Number of Topics Present in the course: 69

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	2	2.9
2.	Regional	4	5.8
3.	National	6	8.7
4.	Global	57	82.6

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Course Code : 18UCS4CP4**  
**Hours : 3**  
**Credits : 3**

**Semester: IV**

**Total Marks :100**  
**External Marks: 60**  
**Internal Marks : 40**

**CORE COURSE PRACTICAL-IV**

**DATABASE SYSTEMS LAB**

1. Create a table and perform the following basic mysql operations
  - a) Set the primary key
  - b) Alter the structure of the table
  - c) Insert values
  - d) Delete values based on constraints
  - e) Display values using various forms of select clause
  - f) Drop the table
2. Develop mysql queries to implement the following set operations
  - a) Union
  - b) Union all
  - c) Intersect
  - d) Intersect all
3. Develop mysql queries to implement the following aggregate functions
  - a) Sum
  - b) Count
  - c) Average
  - d) Maximum
  - e) Minimum
  - f) Group by clause & having clause
4. Develop mysql queries to implement following join operations
  - a) Natural join
  - b) Inner join
  - c) Outer join-left outer, right outer, full outer
  - d) Using join conditions
5. Develop mysql queries to implement nested subqueries
  - a) Set membership (int, not int)
  - b) Set comparison (some, all)
  - c) Empty relation (exists, not exists)
  - d) Check for existence of Duplicate tuples(unique, not unique)
6. Develop mysql queries to create a views and expand
7. Develop mysql queries to implement
  - a) String operations using %
  - b) String operations using ‘\_’
  - c) Sort the element using asc,desc [\*create necessary relations with requires attribute]
8. Consider the following database for a banking enterprise  
BRANCH(branch-name:string, branch-city:string, assets:real)  
ACCOUNT(accno:int, branch-name:string, balance:real)  
DEPOSITOR(customer-name:string, accno:int)  
CUSTOMER(customer-name:string, customer-street:string, customercity:string)  
LOAN(loan-number:int, branch-name:string, amount:real)  
BORROWER(customer-name:string, loan-number:int)
  - i. Create the above tables by properly specifying the primary keys and the foreign keys
  - ii. Enter at least five tuples for each relation
  - iii. Find all the customers who have at least two accounts at the Main branch.
  - iv. Find all the customers who have an account at all the branches located in a city.

9. Consider the following database for a banking enterprise.
- Demonstrate how you delete all account tuples at every branch located in a city.
  - Generate suitable reports.
  - Create suitable front end for querying and displaying the results.

Total Number of Topics Present in the course: 9

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	2	22.2
2.	Regional	0	0.00
3.	National	0	0.00
4.	Global	7	77.8

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Code : 18UCS4NME2**  
**Hours : 2**  
**Credits : 2**

**Semester: IV**  
**NME-II**

**Total Marks :100**  
**External Marks : 75**  
**Internal Marks : 25**

**Non-Major Elective –II Fundamentals of Information Technology (Theory)**

**Objective:**

To Provide the Basic Concepts in Information Technology

**Unit I**

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

**Unit II**

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

**Unit III**

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

**Unit IV**

Computer Networks - WWW and Internet - Email - Web Design

**Unit V**

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

**Text Book:**

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

**Reference Book:**

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

Total Number of Topics Present in the course: 26

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	8	30.8
2.	Regional	1	3.8
3.	National	1	3.8
4.	Global	16	61.5

Local – Green, Regional – Pink, National – Blue, Global – Brown

Course Code: 18UCS4SBE1

Semester: V

Total Marks: 100

Hours : 2

Credits : 2

SKILL BASED ELECTIVE-I

External Marks: 75

Internal Marks : 25

## PAGE MAKER

### Objectives:

- To impart knowledge in advanced skills in creating and designing newsletters, brochures and quality publications.
- To become experts in typesetting and editing.

### UNIT I:

Getting Started with Adobe Page Maker 7.0 - Creating a Publication - Working with Text.

### UNIT II:

Modifying Text - Working with Multiple Pages

### UNIT III:

Working with Graphics - Formatting Text

### UNIT IV:

Using Advanced Graphics - Adding Color and Using Mail Merge

### UNIT V:

Working in Long Documents - Publishing Electronically.

### Text Book:

1. Adobe PageMaker 7.0, Kevin Proot, Cengage Learning

### Recommended Web sites

1. [http://handouts.tamu.edu/html/Adobe\\_Pagemaker.html](http://handouts.tamu.edu/html/Adobe_Pagemaker.html)
2. <http://allgraphicdesign.com/graphics/graphics-software/layoutsoftwareadobepagemaker/>
3. [http://online.caup.washington.edu/courses/larcwi01/LARC440/pagemaker\\_home.html](http://online.caup.washington.edu/courses/larcwi01/LARC440/pagemaker_home.html)

Total Number of Topics Present in the course: 11

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	3	27.3
2.	Regional	4	36.4
3.	National	2	18.2
4.	Global	2	18.2

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Code : 18UCS5CC5**  
**Hours : 6**  
**Credits : 5**

**Semester: V**  
**CORE COURSE -V**

**Total Marks :100**  
**External Marks : 75**  
**Internal Marks : 25**

## **DATA COMMUNICATION NETWORK**

### **Objective:**

- \*To learn the concepts of data communications and to be familiar with the transmission media.
- \*To understand the functions of OSI layers and the security aspects in networks.

### **UNIT- I**

Data Communications- Characteristics- Components-Networks-Distributed Processing- Network Criteria - Applications-Protocols- Standards-Basic concept-Line Configuration- Topology- MESH- STAR- TREE- BUS- RING-Transmission mode-Categories of Networks- LAN- MAN-WAN. OSI Model- Organization of the Layers -Function of the layers.

### **UNIT-II**

Signals-Analog and Digital - Periodic and non-periodic signals-Digital data transmission- Parallel-Serial-DTE - DCE Interface-DTE - #DCE-MODEMS- Transmission Media-Guided Media. Multiplexing-FDM- WDM- TDM.

### **UNIT-III**

Error Detection and Correction - Types of Errors - Types of Redundancy Check - Error Correction-Data Link Control-Line Discipline - #Flow control# - Error control-LAN- Project802-Ethernet-Tokenbus-Token ring-FDDI.

### **UNIT-IV**

Switching-Circuit switching - Packet Switching - Message switching-Networking and Internetworking Devices- Repeaters - Bridges - Routers -Gateways- Routing Algorithms- Distance vector Algorithm - Link state Algorithm-Dijkstra Algorithm- TCP/IP Protocol Suite- Part-I- Network Layer-Internetwork Protocol(IP). Transport layer- UDP-TCP.

### **UNIT-V**

TCP/IP Protocol Suite- Part-II-Application Layer- FTP- TFTP- SMTP MAN - IEEE 802.6- Network Security- Four Aspects of Security - Encryption/Decryption Methods- Digital Signature.

### **Text Book:**

1.BehrouzA.Forouzan, Data Communications and Networking, Tata McGraw Hill, Second Edition.

### **Reference Book:**

1.Andrew S. Tanenbaum, Computer Networks, PHI, Fourth Edition, 2003

Total Number of Topics Present in the course: 86

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	5	5.81
2.	Regional	7	8.14
3.	National	6	6.98
4.	Global	68	79.1

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Course Code : 18UCS5CC6**  
**Hours : 6**  
**Credits : 5**

**Semester: V**  
**CORE COURSE -VI**

**Total Marks :100**  
**External Marks : 75**  
**Internal Marks : 25**

## **DATA STRUCTURE AND ALGORITHMS**

**Objectives:** To provide an introduction to basic data Structures and algorithms for manipulating them.

### Unit I

Introduction of Data Structure-Basic data structure-Arrays and sequential representations - **ordered lists** - Stacks and Queues - Evaluation of Expressions - **Multiple Stacks and Queues** - Singly Linked List - Linked Stacks and queues -Polynomial addition.

### Unit II

Trees - Binary tree representations - Tree Traversal - Threaded Binary Trees - Binary Tree Representation of Trees - Graphs and Representations -Traversals- Connected Components and Spanning Trees - Shortest Paths and Transitive closure - Activity Networks - Topological Sort and Critical Paths.

### Unit III

Algorithms - Pseudo code conventions - Sorting -Types of Sorting- Heap Sort - Merge Sort - Quick Sort -Binary Search - Finding the Maximum and Minimum.

### Unit IV

Greedy Method- The general method - optimal storage on tapes - Knapsack Problem - Job Sequencing with deadlines - Optimal Merge Patterns.

### Unit V

Back tracking- The general method - **The 8-Queens Problem** - Sum of Subsets - Graph Coloring.

### **Text Book:**

1. Fundamentals of Data Structure - Ellis Horowitz, SartajSahni and Sanguthevar, 2011

### **Reference Book:**

Data Structures - LIPSCHUTA, Tata Mcgraw Hill, Schaum's Outline Series, 2006.

Total Number of Topics Present in the course: 41

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	2	4.9
2.	Regional	2	4.9
3.	National	0	0.0
4.	Global	37	90.2

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Course Code : 18UCS5CC7**

**Semester: V**

**Total Marks :100**

**Hours : 6**

**External Marks : 75**

**Credits : 5**

**CORE COURSE -VII**

**Internal Marks : 25**

## **MICROPROCESSOR AND ITS APPLICATIONS**

### **Objective :**

- To understand basic architecture of 16 bit and 32 bit microprocessors.
- To understand interfacing of 16-bit microprocessor with memory and peripheral chips involving system design.
- To understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors.

### **Unit I**

Evaluation of Microprocessors - Application of Microprocessor - Architecture of Microprocessor - Types of Microprocessor - Single Chip Microcomputer Microprocessor Applications - Programming Digital Computers - Memory - Buses - Memory addressing capacity and CPU - Microcomputers - Processor Architecture - Intel 8085 - Instruction Cycle - Timing diagram.

### **Unit II**

Instruction set of Intel 8085 - Instruction and Data Formats - Addressing Modes - Status flags - Intel 8085 Instructions - Programming of Microprocessors - Assembly language - Assemblers - Stacks and Subroutines - MACRO - Microprogramming.

### **Unit III**

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 - Arranging a series of numbers - Sum of a series of Numbers - Multiplication - Division - Multisystem Addition and Subtraction.

### **Unit IV**

Peripheral Devices and Interfacing - Address Space Partitioning - Memory and I/O Interfacing - Data transfer schemes - Interrupts of Intel 8085 - Interfacing memory and I/O devices - I/O ports - Programmable peripheral Interface - Programmable Counter / Interval Timer - A/D Converter and D/A Converter.

### **Unit V**

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

### **Text Book:**

1.Fundamentals of Microprocessors and Microcomputers - Badri Ram - Fourth Revised and Enlarged Edition - Dhanpat Rai and Sons - 1993.

### **Reference Book:**

1. Microprocessor Architecture, Programming and Applications with the 8085 / 8080A - Ramesh S. Gaonkar - Wiley Eastern - 1990

Total Number of Topics Present in the course: 54

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	7	13
2.	Regional	4	7.41
3.	National	3	5.6
4.	Global	40	74.1

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Course Code : 18UCS5CP5**  
**Hours : 3**  
**Credits : 3**

**Semester: V**  
**CORE COURSE PRACTICAL-V**

**Total Marks :100**  
**External Marks : 60**  
**Internal Marks : 40**

### **MICROPROCESSOR LAB**

1. To write and execute simple programs in assembly language using 8085 Simulator:
  - i) Write a program for addition and subtraction of 8-bit Numbers,
2. To find the 1's and 2's complement of an 8-bit Numbers
3. Write a program for multiplication and division of 8-bit Numbers
4. To find the maximum and minimum number in an array
5. To calculate the sum of series in N Numbers
6. Write a program to sort given N numbers
7. Write a program to convert the ASCII to decimal number
8. Design a microprocessor system to control traffic lights
9. Interface an 8-digit 7 segment LED display using 8255 to the 8085
  - a. Microprocessor system modules.
10. a) Binary to BCD code Conversions.  
b) BCD to Binary code Conversions.

Total Number of Topics Present in the course: 10

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	0	0.00
2.	Regional	0	0.00
3.	National	0	0.00
4.	Global	10	100

Local – Green, Regional – Pink, National – Blue, Global – Brown

Semester: V

Total Marks :100

Hours : 6

Credits : 6

MAJOR BASED ELECTIVE-I(A)

External Marks : 75

Internal Marks : 25

## PROGRAMMING IN PHP

### Objective :

To understand the Concepts of PHP and Ajax.

### Unit I

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

### Unit II

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

### Unit III

Object Oriented Programming -Advanced Object\_Oriented Programming.

### Unit IV

File Handling -Working with Databases - Sessions- Cookies- and FTP

### Unit V

Ajax - Advanced Ajax - Drawing Images on the Server.

### Text Book:

1. The PHP Complete Reference, Steven Holzner, McGrawHillEducation, 2007

### Reference Book:

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

Total Number of Topics Present in the course: 17

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	1	5.88
2.	Regional	3	17.6
3.	National	1	5.88
4.	Global	12	70.6

Local – Green, Regional – Pink, National – Blue, Global – Brown

Course Code :18UCS5MBE1:2  
Hours : 3  
Credits : 3

Semester: V

Total Marks :100  
External Marks : 75  
Internal Marks : 25

MAJOR BASED ELECTIVE-I(B)

## HTML PROGRAMMING

### Objective:

- Learn how to design and develop a Web page using HTML and CSS.
- Learn how to link pages so that they create a Web site.
- Design and develop a Web site using text, images, links, lists, and tables for navigation and layout

### Unit I

Fundamentals- A Brief Introduction to the Internet - The World Wide Web - Web Browser - Web Servers - Uniform Resource Locators - Multiple Internet Mail Extensions - The Hypertext Transfer Protocol - The Web Programmers Tool Box - [HTML Tag List](#) - [HTML/Subscript](#) - [HTML/Superscript tag](#).

### Unit II

Introduction to HTML- Designing a Home Page - HTML Document - [Anchor Tag](#) - Hyperlinks - Head and Body Sections - Header Section - Title - Prologue - Links - Colorful Pages - Comments - Body Section - Heading - Horizontal Ruler - Paragraph - Tabs - Images and Pictures - [Lists and their Types](#) - Nested Lists - [Table Handling](#).

### Unit III

Frames- Frameset Definition - Frame Definition - Nested Framesets -Forms- Forms and their Elements.

### Unit IV

DHTML and Style Sheets - Defining Styles - Elements of Styles - [Linking a Style Sheet to a HTML Document](#) - Inline Styles - External Style Sheets - Internal Style Sheets - Multiple Styles - Web Page Designing.

### Unit V

Introduction to XML- Introduction - The Syntax of XML - [XML Document Structure](#) - Document Type Definitions - [Namespaces](#) - [XML Schemas](#) - Displaying Raw XML Documents - Displaying XML Documents with CSS - XML Processors.

### Text Books:

1. Programming the World Wide Web, Robert. W.Sebesta, Pearson Education, Third Edition, 2007. For Units I and Unit V.
2. World Wide Web Designing, C.Xavier, Tata McGraw Hill, 2000. For Units II, III and IV

Total Number of Topics Present in the course: 57

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	0	0
2.	Regional	6	10.5
3.	National	4	7.02
4.	Global	47	82.5

Local – Green, Regional – Pink, National – Blue, Global – Brown

Course Code:18UCS5MBE1:3  
Hours : 3  
Credits : 3

Semester: V

Total Marks :100  
External Marks : 75  
Internal Marks : 25

## MAJOR BASED ELECTIVE-I(C)

### WEB DESIGNING

**Objective:** Giving the students the insights of the internet programming and how to designs and implement complete application on the web using CSS- JavaScript- PHP and MySQL.

**UNIT I :** Introduction to HTML Introduction Basic of HTML Tag - Web designing and uses - Types of Web design - Editing HTML5 - First HTML5 example- W3C HTML5 validation service - headings - linking - images - Special characters and horizontal rules - lists - Tables - forms - Internal linking - Meta elements - New HTML5 form input type - input and data list elements and auto complete attribute - page - structure elements.

**UNIT II :** Cascading Style Sheets Introduction to CSS - Importing a style sheet - embedded style settings- CSS Rules- Style types- CSS Selectors- CSS cascade- Measurements- Fonts and Typography- Managing Text styles- CSS colors- positioning elements- pseudo classes- pseudo elements- shorthand rules- the box model and layout -advances CSS with CSS3

**UNIT III:** Java Script Exploring JavaScript- Expressions and control flow in java script- JavaScript functions- objects- and arrays.

**UNIT IV:** PHP The structure of PHP -Expression and control flow in PHP- PHP functions and objects - PHP arrays.

**UNIT V:** MySql & PHP Accessing MySQL using PHP - Form handling - Cookies- Sessions- Authentication

#### Text Books:

1. Internet and World wide web How to Program, Paul J.Deitel - Harvey M.Deitel - Abbey Deitel , Prentice Hall Edition, Fifth Edition Year , 2012
2. Learning PHP, MySQL,Javascript and CSS , A step by step Guide to creating Dynamic Web Sites Robin ,Nixon Publisher : O'Reilly Media , Second Edition Year , 2012

#### Reference Book:

1. Web Technology A Developer's -Perspective , N.P.Gopalan and J.Akilandeswari. Publisher : PHI Learning Pvt.Lt Edition , 4th Year , 2010

Total Number of Topics Present in the course: 45

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	1	2.22
2.	Regional	11	24.4
3.	National	20	44.4
4.	Global	13	28.9

Local – Green, Regional – Pink, National – Blue, Global – Brown

Course Code : 18UCS5SBE2  
Hours : 2  
Credits : 2

Semester: V  
SKILL BASED ELECTIVE-II

Total Marks :100  
External Marks : 75  
Internal Marks : 25

## COREL DRAW

### Objective :

- The main objective of the training is to give publishers, project, managers, designers and architects
- Systematic understanding and practical experience of the CorelDraw drawing tools and applications
- Drafting and powerful drawing environment, design professional quality pages, artwork and create text effects, flyers, menus, letters and others.

### Unit I :

Corel Draw Basics - Types of CorelDraw.

### Unit II :

Drawing and Selecting

### Unit III :

Working with Text

### Unit IV :

Working with Images

### Unit V:

Page Layout and Background

### Text Book :

DTP Course Kit, Vikas Gupta, Dreamtech Press, 2009.

Total Number of Topics Present in the course: 6

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	1	16.7
2.	Regional	0	0.00
3.	National	0	0.00
4.	Global	5	83.3

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Course Code : 18UCS5SBE3**  
**Hours : 2**  
**Credits : 2**

**Semester: V**

**Total Marks :100**  
**External Marks : 75**  
**Internal Marks : 25**

**SKILL BASED ELECTIVE-III**

**DREAM WEAVER**

**Objective:**

- To understand Dream Weaver for designing web pages.
- To implement various methods in designing webpage
- To train students in Style Sheet and JavaScript

**UNIT I:**

Introduction to Dreamweaver CS4 - Working with Dreamweaver Websites - Designing web pages in Dreamweaver.

**UNIT II:**

Working with Web Pages - Working with HTML Tables - Framesets and Frames.

**UNIT III**

Introduction to Cascading Style Sheets.

**UNIT IV:**

Working with Templates - Working with Flash Contents and HTML Forms.

**UNIT V:**

Working with JavaScript - Finalizing the Site.

**Text Book:**

1. Dreamweaver CS4 in Simple Steps, Kogent Learning Solutions Inc, Dreamtech Press, 2010

Total Number of Topics Present in the course: 11

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	1	9.09
2.	Regional	3	27.3
3.	National	0	0.00
4.	Global	7	63.6

Local – Green, Regional – Pink, National – Blue, Global – Brown

Course Code : 18UCS6CC8

Semester: VI

Total Marks :100

Hours : 6

External Marks : 75

Credits : 6

CORE COURSE-VIII

Internal Marks : 25

## OPERATING SYSTEM

### Objectives:

1. To understand the services provided by and the design of an operating system.
2. To understand the structure and organization of the file system.
3. To understand what a process is and how processes are synchronized and scheduled.

**Unit-I Introduction:** operating system structure-operating-system operations-process management memory management-storage management-production and security. Process management- process-concept: process scheduling-operation on process-inter process communication. Process scheduling- scheduling criteria-scheduling algorithms-multiple-processor scheduling thread scheduling.

**Unit-II Process coordination:** synchronization- the critical section Problem-Peterson's solution synchronization hardware-semaphores. Deadlocks- deadlock characterization-methods for handling deadlocks-deadlock prevention-deadlock avoidance-deadlock detection-recovery from deadlock. Memory management: strategies- swapping-contiguous memory allocation paging structure of the page table-segmentation. Virtual memory management- demand paging-copy on-write-page replacement-allocation of frames-thrashing memory-mapped files.

**Unit-III Storage management:** file system- file concept-access methods-directory structure-file sharing-protection-file-system implementation. Secondary-storage structure: overviews of mass storage structure-disk structure - disk attachment-disk scheduling. I/O systems -I/O hardware-application I/O interface-kernel I/O subsystem-transforming I/O request to hardware operations.

**Unit-IV The Kernel and Shell - Files - User names - Logging in - Logging out - Commands - Communication with other users - Files - Input and Output. Files: Directory hierarchy - Files systems - Manipulating and protecting files - File contents - Printing files - File archives and file compression. Process and Devices- Processes and Devices: Processes - Environment - Program control - Quotes and escapes - Devices - back quotes.**

**Unit-V Introduction to shells:** Shell syntax - Arithmetic - Making decisions - Loops - Searching for files - Formatted output - Passing information to scripts - Simple arithmetic - Pattern Matching -Entering and leaving the Shell - Scripts with options - Symbolic links - Setting up terminals - Sending and Trapping signals - Functions - Aliases -exec and eval mechanism - Sending data across networks -Make files - Safe programming.

### TEXT BOOKS :

1. Abraham silberschatz, Peter Baer Galvin, Greg Game "Operating system Principles" Seventh Edition, Willy Asia Student Edition, 2006

**REFERENCE BOOKS:**

1. Charles Crowley, Operating System a Design Oriented Approach, Tata McGraw Hill Publishing Company limited 2005.

Total Number of Topics Present in the course: 90

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	4	4.4
2.	Regional	13	14.4
3.	National	6	6.7
4.	Global	67	74.4

Local – Green, Regional – Pink, National – Blue, Global – Brown

<b>Course Code :18UCS6CC9</b>
<b>Hours : 6</b>
<b>Credits : 5</b>

**Semester: VI**  
**CORE COURSE-IX**

<b>Total Marks :100</b>
<b>External Marks : 75</b>
<b>Internal Marks : 25</b>

## **COMPUTER GRAPHICS AND MULTIMEDIA**

### **OBJECTIVES**

- To study the graphics techniques and algorithms. To study the multimedia concepts and various I/O technologies. To enable the students to develop their creativity.

### **Unit I**

Overview of graphics systems: Video display devices - Raster-scan systems - Random-scan systems - Graphics monitors and workstation - Input devices - Hard-copy devices - Graphics software.

### **Unit II**

Output primitives: Points and lines - Line-drawing algorithms - DDA algorithm - Bresenham's line algorithm - Attributes of output primitives: Line attributes - Area-fill attributes - Character attributes - Bundled attributes.

### **Unit III**

Two-dimensional Geometric transformations: Basic transformations - Matrix representations - Composite transformations - Other transformations.

### **Unit IV**

Multimedia in Use: Introducing Multimedia for Today and Tomorrow - What is Multimedia - using Multimedia: Applications- Benefits and Problems - Technology: System Components - Multimedia Platforms.

### **Unit V**

Technology: Development Tools - Image - Audio - Video.

### **Text Books:**

1. Computer Graphics C Version Second Edition, Donald Hearn and M.Pauline Baker, Pearson Education, 2006.

### **Reference Book:**

1. William M. Neuman, Robert R. Sprout, "Principles of interactive Computer Graphics", McGraw Hill International Edition, 2012.

Total Number of Topics Present in the course: 35

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	2	5.71
2.	Regional	4	11.4
3.	National	4	11.4
4.	Global	25	71.4

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Course Code : 18UCS6CP6**  
**Hours : 3**  
**Credits : 3**

**Semester: VI**

**Total Marks : 100**  
**External Marks : 60**  
**Internal Marks : 40**

**CORE COURSE PRACTICAL-VI**

**MULTIMEDIA LAB**

1. Write a program to draw a hut or another geometrical figures.
2. Write a program to draw a line through Bresenham's Algorithm.
3. Write a program to draw a line using DDA Algorithm.
4. Write a program to draw a line using Mid-Point Algorithm.
5. Write a program to draw a circle using Mid-Point Algorithm.
6. Write a program to draw an ellipse using Mid-Point Algorithm.
7. Write a program to rotate a circle around any arbitrary point or around the boundary of another circle.
8. Write a program to perform line clipping.
9. Write a program to implement reflection of a point, line.
10. Write a program to perform shearing on a line.

Total Number of Topics Present in the course: 10

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	0	0.00
2.	Regional	0	0.00
3.	National	0	0.00
4.	Global	10	100

Local – Green, Regional – Pink, National – Blue, Global – Brown

Course Code:18UCS6MBE2:1  
Hours : 6  
Credits : 5

Semester: VI

Total Marks :100  
External Marks : 75  
Internal Marks : 25

MAJOR BASED ELECTIVE-II(A)

## E-COMMERCE

**Objective:** To acquire the knowledge in Electronic Commerce, Electronic Payment Systems, security systems, online advertising and marketing.

**UNIT I** Welcome to Electronic Commerce: Technology and Prospects- needs of E\_Commerce- Electronic Commerce framework - Electronic Commerce and media convergence - The anatomy of E-Commerce applications - Electronic Commerce consumer applications.

**UNIT II** Electronic Commerce organization applications - The network infrastructure for electronic Commerce: Components of I-Way - #Network Access Equipment# - Global Information Distribution Networks.

**UNIT III** The Internet As Network Infrastructure: The Internet Terminology - NSFNET architecture and components - National Research And Education Network - The Business of Internet Commercialization: Telco/Cable/On-line Companies - National Independent ISPs - Regional Level of ISPs - Local Level of ISPs - #Internet Connectivity Options#

**UNIT IV** Electronic Commerce and The World Wide Web: Architectural Framework for Electronic Commerce - World Wide Web as The Architecture - Technology Behind the Web - Security and the Web Consumer - Oriented Electronic Commerce: Consumer - Oriented Applications -Mercantile Process Models.

**UNIT V** Electronic Payment Systems: Types of Electronic Payment Systems-Digital Tokens-Based Electronic Payment Systems - Smart Cards and Electronic Payment Systems - Credit Card Electronic Payment Systems - Risk and Electronic Payment Systems - Designing Electronic Payment Systems # ..... # self-study portion.

**Text Book:** 1. Ravikalakota & Andrew Whinston, Frontiers of Electronic Commerce, Addison Wesley, 2000.

### Reference Book

1. S. Jaiswal, E-Commerce, Galgotia publications private limited, Revised Edition, 2009.

Total Number of Topics Present in the course: 36

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	1	2.78
2.	Regional	9	25
3.	National	6	16.7
4.	Global	20	55.6

Local – Green, Regional – Pink, National – Blue, Global – Brown

Course Code :18UCS6MBE2:2  
Hours : 3  
Credits : 3

Semester: VI

MAJOR BASED ELECTIVE-II(B)

Total Marks :100  
External Marks : 75  
Internal Marks : 25

## VB.NET

**Objective:** To provide fundamental concepts of .Net Framework.

**UNIT I** Creating a windows application - Creating a web application - Creating a console application - What's new in VB.Net - The .Net framework and the Common Language Runtime - The System Namespaces - Building VB.Net Applications - The Visual Basic IDE - The Visual Basic Keywords - Visual Basic Statements - Statement syntax - Overview - Understanding Attributes - #The option and Imports statements#.

**UNIT II** Declaring constants - Declaring variables - Data types - Converting between data types - Declaring arrays and dynamic arrays - Handling strings - Using Visual Basic operators - Commenting our code - Decisions with if...else statements - Using select case - Selections with switch and choose - Using the do loop - For loop - For Each. Next loop - While loop - With statement - #Sub procedures and functions# - Creating sub procedures - Creating functions.

**UNIT III** Windows forms - Windows MDI forms - Adding controls to forms - Handling events - Windows form in code - Using the MsgBox function - Using the Input Box function - Working with multiple forms - Handling mouse and keyboard events - The control class - Text boxes - Creating multiline- word wrap text boxes - Accessing text- adding scrollbars- aligning text in text boxes - Rich Text boxes - #Labels#.

**UNIT IV** Command Button - Checkboxes - Radio buttons - List boxes - Combo boxes - Picture boxes - Scroll bars - Splitters - Timers - Menus - Built in dialog boxes - Image lists - Tree views - List views - Toolbars - Status bars - Progress bars - Tab controls - Validation controls - Required field validators - Comparison validators - Range validators - Regular expression validators - Calendars - Ad Rotators.

**UNIT V** What are Databases? - Accessing data with the server explorer - Accessing data with data adaptors and datasets - Working with ADO.NET - Creating a new data connection - Creating a dataset - Populating a dataset - Displaying data in a data grid - Selecting a data provider - Data access using data adaptor controls - Connecting to an MS Jet Database - Using relational databases - #Adding multiple tables to a dataset# - Using data views. # ..... # self-study portion.

### Text Book :

1. Steven Holzner, Visual Basic .NET Black Book, 2007.

### Reference Book:

C. Muthu, Visual Basic .Net, Vijay Nicole Publication, 2007. 2. Shirish Chavan, Visual Basic .Net, Pearson Education, 2007.

Total Number of Topics Present in the course: 91

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	1	1.1
2.	Regional	0	0.00
3.	National	0	0.00
4.	Global	90	98.9

Local – Green, Regional – Pink, National – Blue, Global – Brown

Course Code: 18UCS6MBE2:3

Semester: VI

Total Marks: 100

Hours : 6

External Marks: 75

Credits : 5

MAJOR BASED ELECTIVE-II(C) Internal Marks : 25

## CLLOUD COMPUTING

### Objectives

- To know the fundamental concepts of cloud computing
- To understand the cloud models and services
- To design and implement applications in the cloud environment

**Unit I: Introduction to the Cloud: What is the Cloud? - Cloud Architecture - Types of cloud computing - Cloud Drivers - Cloud Adoption Inhibitors**

**Unit II: Laying the Groundwork: Introduction-Authentication- Computing Concepts - Hardware Virtualization - Web Development Technologies**

**Unit III: Cloud Deployment Models: Introduction - Public Clouds - Private Clouds - Community Clouds - Hybrid Clouds - Cloud Service Models: Introduction - Software as a Service - Platform as a Service - Infrastructure as a Service - Additional Service Models**

**Unit IV: Making the Decision: Introduction - To Go to the Cloud or Not? - Choosing a Cloud Service Model - Choosing a Cloud Deployment Model - Choosing a Public Cloud Service Provider.**

**Unit V: Evaluating Cloud Security: Evaluating Cloud Security - Tools - Checklists for Evaluating Cloud Security - Foundational Security - Business Considerations - Defence in Depth - Operational Security - Metrics for the Checklists. Operating a Cloud: From Architecture to Efficient and Secure Operations - Security Operations Activities.**

### Text Book

1.Derrick Rountree, Ileana Castrillo, "The Basics of Cloud Computing: Understanding the Fundamentals of Cloud Computing in Theory and Practice", Newnes Publication, 2013

### Reference Book

- 1.Ravi Shankar, Navin Sabharwal, "Cloud Computing First Steps: Cloud Computing for Beginners", CreateSpace Independent Publishing Platform, 2012
2. George Reese, "Cloud Application Architecture", Shroffo reilly", ISBN : 8184047142, 2009
3. Naresh Kumarsehgal, Pramod Chantra P.Bhatt Cloud Computing Concepts and Practices, Springer Internation Publishing, 2018.

Total Number of Topics Present in the course: 34

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	6	17.6
2.	Regional	5	14.7
3.	National	7	20.6
4.	Global	16	47.1

Local – Green, Regional – Pink, National – Blue, Global – Brown

<b>Course Code : 18UCS6PW</b> <b>Hours : 6</b> <b>Credits : 5</b>
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**Semester: VI**

<b>Total Marks :100</b> <b>External Marks : 75</b> <b>Internal Marks : 25</b>
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### **MINI PROJECT**

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

Note:

- Attending all the review is compulsory
- PPT and necessary Documentation should be brought for each Review
- Font size in documentation has to be 12, Times New Roman, Space 1.5
- Document should be neatly aligned and justified
- No change can be made in the review marks later
- Internal mark will be submitted at the same day of review to controller section.

**Course Code:18UCS6MBE3:1**  
**Hours : 6**  
**Credits : 5**

**Semester: VI**

**Total Marks :100**  
**External Marks : 75**  
**Internal Marks : 25**

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

### **DOT NET LAB**

- 1.Design ASP.Net web form using Html Server Controls to enter job seeker's details.
- 2.Create an ASP.Net web form using Web control to enter E-Mail registration form.
- 3.Apply appropriate validation techniques in E-Mail registration form using validation controls.
4. Write an ASP.Net application to retrieve form data and display it the client browser in a table format.
- 5.Create a web application using ADO.Net that uses which performs basic data manipulations: (i). Insertion (ii) Updating (iii) Deletion (iv) Selection Hint: Do operations using Ms-Access and SQL-Server
6. Create an application using Data grid control to access information's from table in SQL server
7. Create an application using Data list control to access information's from table in SQL server and display the result in neat format.
8. Job Search Portal.
- 9.College Portal.
10. Company Portal.

Total Number of Topics Present in the course: 10

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	1	10
2.	Regional	5	50
3.	National	1	10
4.	Global	3	30

Local – Green, Regional – Pink, National – Blue, Global – Brown

**Course Code:18UCS6MBE3:2**  
**Hours : 6**  
**Credits : 5**

**Semester: VI**

**Total Marks :100**  
**External Marks : 75**  
**Internal Marks : 25**

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

### **LINUX LAB**

Write Shell Programs for the following using the Linux Operating System

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

For first 100 units - Rs.0.75/ unit

For next 100 units - Rs.1.50/unit

Above 200 units - Rs.3.00/unit.

Prepare the bill for the following format:

Customer No. -----

Customer Name -----

Pre. Reading -----

Cur. Reading -----

Units Consumed -----

Charge -----

Signature

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

Total Number of Topics Present in the course: 11

<b>S.No</b>	<b>Category (local/regional/global)</b>	<b>No. of Topics covered</b>	<b>Percentage</b>
1.	Local	3	27.3
2.	Regional	1	9.09
3.	National	1	9.09
4.	Global	6	54.5

Local – Green, Regional – Pink, National – Blue, Global – Brown

# **M.Sc. COMPUTER SCIENCE**

**SYLLABUS:2018-2019**

**CHOICE BASED CREDIT SYSTEM (CBCS)**



**THANTHAI HANS ROEVER COLLEGE  
(Autonomous)**

**(Approved by NAAC- Affiliated to Bharathidasan University)**

**Perambalur– 621212**

**Thanthai Hans Roever College (Autonomous)-Elambalur-Perambalur - 621 212**

**M.Sc.- COMPUTER SCIENCE - Course Structure Under CBCS**

(For the candidates admitted from the academic year 2018-2019 onwards)

Sem	Course Code	Title of the Course	Ins. Hours/ Weeks	Credit	Exam Hours	CIA (Max)	ESE (Max)	Total (Max)
1	18PCS1CC1	Mathematical Foundations for Computer Science	6	4	3	25	75	100
1	18PCS1CC2	Web Technologies	6	4	3	25	75	100
1	18PCS1CC3	Distributed Operating Systems	6	4	3	25	75	100
1	18PCS1CC4	Mobile Communication	6	4	3	25	75	100
1	18PCS1CP1	Web Technologies Lab	6	4	3	40	60	100
<b>Total</b>			<b>30</b>	<b>20</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>500</b>
2	18PCS2CC5	OOAD and UML	6	5	3	25	75	100
2	18PCS2CC6	Distributed Computing	6	5	3	25	75	100
2	18PCS2EC1:1 18PCS2EC1:2 18PCS2EC1:3	Wireless Sensor Networks Artificial Intelligence Embedded Systems	6	5	3	25	75	100
2	18PCS2EC2:1 18PCS2EC2:2 18PCS2EC2:3	Design Thinking Advanced Computer Architecture Pervasive Computing	6	5	3	25	75	100
2	18PCS2CP2	Distributed Computing Lab	6	4	3	40	60	100
<b>Total</b>			<b>30</b>	<b>24</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>500</b>
3	18PCS3CC7	Data Mining and Ware Housing	6	5	3	25	75	100
3	18PCS3CC8	Compiler Design	6	5	3	25	75	100
3	18PCS3EC3:1 18PCS3EC3:2 18PCS3EC3:3	Soft Computing Computer Simulation and Modeling Pattern Recognition	6	5	3	25	75	100
3	18PCS3EC4:1 18PCS3EC4:2 18PCS3EC4:3	Cryptography and Network Security Graphics and Multimedia Human Computer Interaction	6	5	3	25	75	100
3	18PCS3CP3	Data Mining Lab	6	4	3	40	60	100
<b>Total</b>			<b>30</b>	<b>24</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>500</b>
4	18PCS4CC9	Parallel Computing	6	5	3	25	75	100
4	18PCS4CC10	Python Programming	6	5	3	25	75	100
4	186PCS4EC5:1 18PCS4EC5:2 18PCS4EC5:3	Big Data Analytics MANET Digital Image Processing	6	4	3	25	75	100
4	18PCS4CP4	Python Programming Lab	6	4	3	40	60	100
4	18PCS4PW	Project	6	4	-	-	-	100
<b>Total</b>			<b>30</b>	<b>22</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>500</b>

<b>Grand Total</b>	<b>120</b>	<b>90</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>2000</b>
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### List of Elective Courses

Elective -1	1.Wireless Sensor Networks 2.Artificial Intelligence 3.Embedded Systems
Elective –2	1.Design Thinking 2.Advanced Computer Architecture 3.Pervasive Computing
Elective - 3	1.Soft Computing 2.Computer Simulation and Modeling 3.Pattern Recognition
Elective - 4	1.Cryptography and Network Security 2.Graphics and Multimedia 3.Human Computer Interaction
Elective –5	1.Big Data Analytics 2.MANET 3. Digital Image Processing

**Note:**

Project : 100 Marks  
Dissertation : 80 Marks  
Viva Voce : 20 Marks

Core Papers - 10  
Core Practical - 4  
Elective Papers - 5  
Project - 1

Sl.No	Subject	Internal	External
1	Theory	25 Marks	75 Marks
2	Practical	40 Marks	60 Marks

**Note:**

1. Theory Internal 25 marks External 75 marks
2. Practical " 40 marks " 60 marks
3. Separate passing minimum is prescribed for Internal and External
  - a) The passing minimum for CIA shall be 40% out of 25 marks (i.e. 10 marks)
  - b) The passing minimum for University Examinations shall be 40% out of 75 marks (i.e. 30 marks)
  - c) The passing minimum not less than 50% in the aggregate.

**Course Code: 18PCS1CC1**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - I**

**External Mark:75**

**Credits: 4**

**Internal Mark:25**

## **Core Course I -MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE**

### **Objective :**

- To learn the basis of the mathematical applications for developing the program.

### **Unit I**

Propositions - evaluation - precedence rules - tautologies - reasoning using equivalence transformation - laws of equivalence - substitution rules - a natural deduction system - Deductive proofs- inference rules proofs - sub proofs.

### **Unit II**

Introduction - Cryptography - Ceaser Cyphor Coding - Matrix encoding - scrambled codes - Hamming metric - Hamming distance - Error detecting capability of an encoding.

### **Unit III**

Assignment problem and its solution by Hungarian method - travelling salesMan Problem - Project Scheduling by PERT - CPM: Phases of project scheduling - Arrow diagram - Critical path method - Probability - Cost Considerations in project scheduling - Crahing of Networks.

### **Unit IV**

Testing of hypothesis-Tests based on normal population - Applications of chi\_square- Student's t - F distributions -chi square Test - goodness of fit Test based on mean- means- variance- correlation and regression of coefficients -ANOVA-One way- Two way classification.

### **Unit V**

Graph - Directed and undirected graphs - Sub graphs - Chains - Circuits- Paths- Cycles - Connectivity - Relations to partial ordering - adjacency and incidence matrices - Minimal paths - Elements of transport network- Trees- Applications.

### **Text Books**

1. "The Science of Programming"- David Gries. Narosa Publishing House- New Delhi- 1993.
2. "Application Oriented Algebra"- James L. Fisher- Dun Donnelly Publisher- 1977.
3. "Operation Research - An Introduction"-HamdyA.Taha- Macmillan Publishing Co.- 4th Edn.- 1987.
4. "Fundamentals of Mathematical Statistics"- Gupta-S.C. and V.K.Kapoor- Sultan Chand & Sons- New Delhi- 8th Edn.- 1983.
5. "Fundamentals of Applied Statistics"-Gupta.S.C. and V.K.Kapoor- Sultan Chand & Sons- New Delhi- 2nd Edn.- 1978.

### **References**

1. "Discrete Mathematics"- Seymour Lipschutz and Marc Laris Lipson- Second edition- Schuam's Outlines by Tata McGraw- Hill publishing Company Limited- New Delhi 1999.
2. "Operations Research"-Kanti Swarup-P.K.Gupta and Man Mohan- Sultan Chand & Sons- New Delhi- 1994.

3. "Introductory Mathematical Statistics"- Erwin Kryszig- John Wiley & Sons- New York- 1990.
4. "Probability and Statistics Engineering and Computer Science"- Milton- J.S. and J.C.Arnold- McGraw Hill- New Delhi- 1986.

Total Number Of Topics : 55

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	10	18.18
2	Regional	15	27.27
3	National	20	36.36
4	Global	10	18.18

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

**Course Code: 18PCS1CC2**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - I**

**External Mark:75**

**Credits: 4**

**Internal Mark:25**

## **Core Course II - Web Technologies**

### **Objectives:**

- To know the fundamentals of web technology
- To understand the protocols and web servers
- To learn the client and server side scripting

### **Unit I**

**Internet Basics- Basic Concepts - IP Address - TCP/IP Protocol - The WWW - The Telnet - Introduction to HTML - Web server - Web client / browser - Tags Text Formatting Lists - Tables Linking Documents - Frames.**

### **Unit II**

**JavaScript - Java Scripting Web Pages - The Advantages of JavaScript - Writing JavaScript into HTML - Syntax - Operators - Expressions - Constructs and conditional checking - Functions - Placing text in a browser - Dialog Boxes - Form object's methods - Built in objects - user defined objects.**

### **Unit III**

**XML - Comparison with HTML - DTD - XML elements - Content creation - Attributes -Entities - XSL - XLINK - XPATH - XPOINTER - Namespaces -Applications - integrating XML with other applications.**

### **Unit IV**

**JSP Fundamentals - Basics - Directive basics - Page directive - The taglib directive - The include directive -JSP Standard Actions -Java Beans - Error Handling.**

## Unit V

ASP - Introduction to ASP - Objects - Components - Working with HTML forms - **Connecting to Microsoft SQL Server & MS Access Database - SQL statements with connection object - Working with record sets.**

### Text Book(s)

1. Ivan Bayross- “Web Enabled Commercial Application Development Using HTML- DHTML- JavaScript- Perl CGI”- BPB Publication-2005(**UNIT I & II**)
2. Elliotte Rusty Harold- “XML Bible”- 2nd Edition-Wrox Publication-2001(**UNIT III**)
3. Vivek Chopra- Sing Li- Rupert Jones- Jon Eaves- John T. Bell- “Beginning Java Server Pages”-Wrox Publications- 2005.(**UNIT IV**)
4. Ivan Bayross-“Practical ASP”- BPB Publication-2008.(**UNIT V**)

### Reference Book(s)

1. Ivan Bayross-” Web Enabled Commercial Application Development Using HTML- JavaScript- DHTML and PHP”- 4<sup>th</sup> Edition-2009
2. XML and JavaScript- ASP- [www.w3schools.com](http://www.w3schools.com)
3. Duane K.Fields and Mark A.Kolb-” Web Development with JavaServer Pages”- 2<sup>nd</sup> Edition- 2000

Total Number Of Topics:57

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	7	12.28
2	Regional	5	8.77
3	National	33	57.89
4	Global	12	21.05

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

**Course Code: 18PCS1CC3**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - I**

**External Mark:75**

**Credits: 4**

**Internal Mark:25**

## **Core Course III–Distributed Operating Systems**

### **Objectives:**

To study the concepts of distributed computing systems and cryptography.

### **Unit I**

**Fundamentals -What is Distributed Operating System -Evolution of Distributed Computing System - Distributed Computing System Models -Why are Distributed Computing Systems gaining popularity - What is a Distributed Computing System -Issues in Designing Distributed Computing System - Introduction to Distributed Computing Environment- Introduction to Computer Networks - Network types -LAN-WAN -Communication protocols- Internetworking - ATM Technology**

### **Unit II**

**Message Passing - Introduction - Desirable features - Issues in PC Message Passing - Synchronization-Buffering - Multidatagram Messages -Encoding and Decoding - Process Addressing - Failure Handling - Group Communication**

### **Unit III**

**Distributed Shared Memory- Introduction -General Architecture of DSM system -Design and Implementation Issues of DSM -Granularity - Structure of Shared Memory -Replacement Strategy -Thrashing - Heterogeneous DSM- Advantages Synchronization - Introduction - Clock Synchronization - Event Ordering - Mutual Exclusion - Deadlock - Election Algorithm**

### **Unit IV**

**Distributed File System - Introduction - Desirable features - File Models - File Accessing Models - File Sharing Semantics - File Caching Schemes- File Replication - Fault Tolerance - Atomic Transactions- Design Principles**

### **Unit V**

**Security - Introduction -Potential Attacks to Computer System - Cryptography - Authentication - Access Control - Digital Signatures -Design Principles**

### **Text Book(s)**

1. Pradeep K Sinha-“Distributed Operating Systems - Concepts and Design”- PHI- 2003.

### **Reference Book(s)**

1. Andrew S Tanenbaum -“Distributed Operating Systems”- First Edition- PHI.2002
2. George Coulouris- Jean Dollimore- and Tim Kindberg-”Distributed Systems: Concepts and Design”- 5th Edition-1988
3. Doreen L.Galli- “Distributed Operating Systems: Concepts and Practice”- 2000

Total Number Of Topics:61

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	5	8.20
2	Regional	5	8.20
3	National	9	14.75
4	Global	42	68.85

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

Course Code: 18PCS1CC4

Maximum Mark:100

Hours : 6

SEMESTER – I

External Mark:75

Credits: 4

Internal Mark:25

## Core Course IV - Mobile Communication

### Objectives:

- To know the basic concepts of wireless communications
- To learn the different architecture in the wireless medium
- To analyse the various broadcasting systems

### Unit I

Introduction - Applications - History of wireless communication - Simplified Reference Model - Wireless Transmission - Frequencies for Radio transmission - Signals - Multiplexing - Spread Spectrum and cellular systems .

### Unit II

Medium Access Control - SDMA- FDMA- TDMA - CDMA - Comparisons - Telecommunications System: GSM - DECT - UMTS and IMT 2000.

### Unit III

Satellite System - Application - Basics - Routing - Localization - Handover - Wireless LAN - IEEE S02.11 - Hiper LAN - Bluetooth.

### Unit IV

Mobile Network Layer - Mobile IP - Dynamic host configuration Protocol - Mobile adhoc networks.

### Unit V

Mobility - World Wide Web - Wireless Application Protocol (version1.x) - WAP 2.0.

## Text Book(s)

1. Jochen Schiller- “Mobile Communication”- Pearson Education- Delhi- 2000.  
Unit I(Chapter 1-2)- Unit II( Chapter 3-4)- Unit III(Chapter 5-7)- Unit IV(Chapter 9)-  
Unit V (Chapter 11)

## Reference Book(s)

1. David Tse- Pramod Viswanath- “Fundamentals of Wireless Communication”- Cambridge University Press- 2005.
2. Sandeep Singhal-“The Wireless Application Protocol: Writing Applications for the Mobile Internet”- Paperback- 2002.
3. Rappaport- “Wireless Communication: Principles and Practice”- Second Edition Paperback- 2010.

Total Number Of Topics : 36

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	6	16.67
2	Regional	5	13.89
3	National	5	13.89
4	Global	20	55.56

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

Course Code: 18PCS1CP1

Maximum Mark:100

Hours : 6

SEMESTER - I

External Mark: 75

Credits: 4

Internal Mark: 25

## Core Course Practical I-Web Technologies Lab

### Objectives:

To provide fundamental concept of Internet- JavaScript- XML- JSP- ASP with a view to Developing professional software development skills.

1. Write a XML program for job listing in HTML.
2. Write a JavaScript code block- which checks the contents entered in a form's text element. If the text entered is in the lower case- convert to upper case.
3. Write a JavaScript code block- which validates a username and password.
  - a) If either the name or password field is not entered display an error message.

- b) The fields are entered do not match with default values display an error message
- c) If the fields entered match- display the welcome message.
4. Write a JavaScript code to display the current date and time in a browser.
  5. Write a JSP Program for user authentication.
  6. Write a JSP Program for a simple shopping cart.
  7. Write a JSP Program to prepare a bio data and store it in database.
  8. Write an ASP Program using Response and Request Object.
  9. Write an ASP Program using AdRotator Component.
  10. Write an ASP program using database connectivity for student's record.

Total Number Of Topics:10

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	1	10
2	Regional	1	10
3	National	6	60
4	Global	2	20

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

**Course Code: 18PCS2CC5**

**Hours : 6**

**Credits: 5**

**SEMESTER - II**

**Maximum Mark:100**

**External Mark: 75**

**Internal Mark: 25**

### **Core Course V-OOAD & UML**

**Objectives:**

- To understand the structure approach in structure construction
- To learn various behaviours- structures and methods in UML
- To analyse the different design methodologies adopted in UML

**Unit I**

**Structured approach to system construction - SSADM/SADT - An overview of object oriented systems development - Life cycle**

**Unit II**

## Various object oriented methodologies - Introduction to UML

### Unit III

Object oriented analysis - Use cases - Object classification - relationships - attributes - methods

### Unit IV

Object oriented design - Design axioms - Designing classes - Layering the software design- data access layer - User interface layer - Control/business logic layer

### Unit V

UML - Examples on Behavioural models - Structural models - Architectural models from real world problems - Use case diagram - Activity Diagram - Static structural Diagram.

### Text Book(s):

1. Bahrami Ali-“Object oriented systems development”- Irwin McGraw-Hill- 2005(Unit I-II-III- & IV)
2. Booch Grady- Rumbaugh James- Jacobson Ivar-“The Unified modelling language - User Guide”- Pearson education- 2006 (Unit V)

### Reference Book(s)

1. Gandharba Swain- “Object-Oriented Analysis and Design Through Unified Modeling Language”- Laxmi Publications- Ltd.- 2010
2. Grady Booch Robert A. Maksimchuk Michael W. Engle Bobbi J. Young- Ph.D. Jim Conallen Kelli A. Houston-”Object-Oriented Analysis and Design with Applications “ -Third Edition - 2007
3. Erich Gamma- Richard Helm- Ralph Johnson- John Vlissides-”Design Patterns: Elements of Reusable Object Oriented software”- First Edition-1995.

Total Number Of Topics:26

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	5	19.23
2	Regional	5	19.23
3	National	3	11.54
4	Global	13	50

\*Local – Green, Regional – Pink, National – Blue, Global - Brown

**Course Code: 18PCS2CC6**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - II**

**External Mark: 75**

**Credits: 5**

**Internal Mark: 25**

## **Core Course VI-Distributed Computing**

### **Objectives:**

- To understand the principles of distributed computing
- To illustrate the distributed system architecture
- To analyze the issues of distributed technologies

### **Unit I**

Introduction to Distributed System-Goals- Hardware concepts-Software concepts and ClientServer model - Examples of distributed systems

### **Unit II**

Communication - Layered protocols - Remote procedures call - Remote object invocation-Messageoriented communication - Streamoriented communication.

### **Unit III**

Resource -Processes - Threads - Clients - Servers- Code Migration-Software agent - Naming- Naming entities- locating mobile entities - removing unreferenced entities - Distributed File System - Sun network file system - CODA files system - Desirable Features of global Scheduling algorithm.

### **Unit IV**

Synchronization - Clock synchronization - Logical clocks - Global state - Election algorithms- Mutual exclusion -Distributed transactions - Consistency and Replication - Introduction -Data centric consistency models -Client centric consistency models - Distribution protocols- Consistency protocols

### **Unit V**

Introduction to replication and consistency -Data-Centric - ClientCentric Consistency Models- Replica Management -Fault Tolerance- Induction- Process resilience-Reliable client server Communication- Reliable group communication -Distributed commit-Recovery - Security- Introduction- Secure channels- Access control-Security management.

**Case Study- CORBA-Distributed COM- Globe - Comparison of CORBA-DCOM and Globe.**

### **Text Book(s):**

1. Taunenbaum- "Distributed Systems: Principles and Paradigms"-2006

### **Reference Book(s):**

1. M. Singhal- N. Shivaratri- "Advanced Concepts in Operating Systems"- TMH.
2. Carlos A.Varela- Gul Agha- " Programming Distributed Computing Systems : A Foundational (The MIT Press) Hardcover"- 2013
3. Ajay D.Kshemkalyani- Mukesh Singhal-" Distributed Computing: Principles- Algorithms and Systems"- Cambridge University Press- 2011

Total Number Of Topics:61

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	5	8.2
2	Regional	24	39.34
3	National	11	18.3
4	Global	21	34.43

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

**Course Code: 18PCS2EC1:1**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - II**

**External Mark: 75**

**Credits: 5**

**Internal Mark: 25**

## **Elective Course I (1)-Wireless Sensor Networks**

### **Objectives:**

- To understand the basic technologies and supporting protocols of WSN
- To learn the key routing and design issues
- To illustrate various tools and platforms of WSN

### **Unit I**

Overview of Wireless Sensor Networks - Challenges for Wireless Sensor Networks - Enabling Technologies for Wireless Sensor Networks.

### **Unit II**

Architectures - SingleNode Architecture - Hardware Components - Energy Consumption of Sensor Nodes - Operating Systems - Execution Environments- Network Architecture - Sensor Network Scenarios- Optimization Goals - Figures of Merit- **Gateway Concepts**.

### **Unit III**

Networking Sensors - Physical Layer and Transceiver Design Considerations - MAC Protocols for Wireless Sensor Networks - Low Duty Cycle Protocols and Wakeup Concepts - S MAC - **The Mediation Device Protocol - Wakeup Radio Concepts - Address and Name Management- Assignment of MAC Addresses - Routing Protocols Energy-Efficient Routing- Geographic Routing**.

### **Unit IV**

Infrastructure Establishment- Topology Control- Clustering- Time synchronization - **Localization and Positioning - Sensor Tasking and Control -Radio Communication and Link Management - Radio Waves and Modulation/Demodulation - Properties of Wireless Communications - Medium Access Protocols - Wireless Links Introduction - Properties of Wireless Links - Error Control - Naming and Addressing - Topology Control**

## Unit V

Sensor Network Platforms and Tools\_ - Sensor Node Hardware - Berkeley Motes - Programming Challenges - Node level software platforms - Node level Simulators - State-centric programming - Wireless Standards - **Protocol Stack**.

### Text Book(s)

1. Holger Karl & Andreas Willig- "Protocols and Architectures for Wireless Sensor Networks"- John Wiley- 2005. Unit I( Chapter 1)- Unit II(Chapter 2-3)- Unit III(Chapter 4-5-7)
2. Feng Zhao & Leonidas J. Guibas- "Wireless Sensor Networks- An Information Processing Approach"- Elsevier- 2007 Unit IV (Chapter 4-5)- Unit V(Chapter 7)

### Reference Book(s)

1. Kazem Sohraby- Daniel Minoli-&Taieb Znati- "Wireless Sensor Networks-Technology- Protocols- and Applications"- John Wiley- 2007.
2. Anna Hac- John Wiley "Wireless Sensor Network Designs"- 2003.
3. Christian Poellabauer and waltenegus Dargie- "Fundamentals of Wireless Sensor Networks: Theory and Practice"- First Edition-2010

Total Number Of Topics:51

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	22	43.13
2	Regional	8	15.69
3	National	12	23.59
4	Global	9	17.65

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

Course Code: 18PCS2EC1:2

Maximum Mark:100

Hours : 6

SEMESTER - II

External Mark: 75

Credits: 5

Internal Mark: 25

## Elective Course I (2) -Artificial Intelligence

### Objectives:

- To understand basics of the AI & Expert Systems.
- To Learn the heuristic techniques and reasoning

### Unit I

Introduction- AI Problems - AI techniques - Criteria for success Problems - Problem Spaces – Search State - space search - Production Systems-**Artificial Intelligence - the World Representation in AI -Properties of Internal**.

## Unit II

Heuristic Search techniques-**Generate and Test - Hill Climbing**- Best First - Means-end analysis.  
Knowledge representation issues- Representations and mappings - Approaches to Knowledge representations -**Issues in Knowledge representations - Frame Problem.**

## Unit III

Using Predicate logic-Representingsimple facts in logic - Representing Instance - Is a relationships -  
**Computable functions - predicates - Resolution.**

## Unit IV

**Representing knowledge using rules -Procedural Vs Declarative knowledge** - Logic programming  
- Forward Vs Backward reasoning - Matching - Control knowledge

## Unit V

**Game playing - The minimax search procedure - Expert System - Perception - Action**

### Text Book(s)

1. Elaine Rich and Kevin Knight-" Artificial Intelligence"- Tata McGraw Hill Publishers Company Pvt Ltd- Second Edition- 1991.  
Unit1: Chapter 1- 2-Unit2: Chapter 3- 4-Unit3: Chapter 5-Unit4: Chapter 6-Unit5: Chapter 12- 20 -21.

### Reference Book(s)

1. S Russell- P Norvig- "Artificial Intelligence : Pearson New International Edition: A Modern Approach"-Third Edition- 2013
2. Saroj Kaushik-" Artificial Intelligence"- Cengage Learning India- 2012
3. S S V Chandra- S Anand Hareendran " Artificial Intelligence and Machine Learning"-2014

Total Number Of Topics : 38

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	19	50
2	Regional	4	10.53
3	National	4	10.53
4	Global	11	28.95

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

**Course Code: 18PCS2EC1:3**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - II**

**External Mark: 75**

**Credits: 5**

**Internal Mark: 25**

## **Elective Course I (3) - Embedded Systems**

### **Objectives:**

To provide fundamental concept of Embedded systems and real time operating systems.

### **Unit I**

Introduction to Embedded systems -Categories and requirements of embedded systems - Challenges and issues related to embedded software development - Hardware/Software codesign- processor in the system - software embedded into a system - structural units in a processor - processor- memory selection- Memory devices - Allocation of memory to program segments and blocks and memory map of a system.

### **Unit II**

**Device drivers - Interrupt servicing mechanisms - context and periods for context switching - Programming concepts** -Embedded programming in C and C++ -Software programming in ALP and in high level language 'C' - 'C' program elements - Header source files and pre-processor directives - Macros and functions: Data types - data structures - modifiers - statements - loops and pointers - Embedded programming in C++ and Java.

### **Unit III**

Program modelling concepts in single and multiprocessor systems - software - development process modelling- process for software analysis - programming model for event controlled or response time constrained real time program- modelling of multiprocessor systems - Multiple processes - sharing data by multiple tasks and routines - inter process communications.

### **Unit IV**

Real time operating systems- **OS services - IO sub systems - Real time and embedded operating systems - Interrupt routines in RTOS environment-RTOS task scheduling models - Interrupt latency and response times of the task as performance metrics - performance metrics in scheduling models.**

### **Unit V**

Hardware Software code design: Embedded system project management - Embedded system design and Codesign Issues - Design Cycle - uses of target system - use of software tools for development - use of scopes and logic analysers for system hardware tests - issues in embedded system design.

### **Text Book(s):**

1. Raj Kamal -"Embedded systems - Architecture- Programming and Design"-TMH- 2007.

### **Reference Book(s):**

1. Mohamed Ali Maszidi& Janice GillispieMaszidi- "The 8051 Microcontroller and Embedded System"- Pearson Publishers
2. A.P.Godse- A.O. Mulani-"Embedded Systems"- Technical Publications- 2009
3. Philip Koopman-" Better Embedded System Software"-Drumnadrochit Education- 2010.

Total Number Of Topics : 50

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	20	40
2	Regional	10	20
3	National	10	20
4	Global	10	20

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

Course Code: 18PCS2EC2:1

Maximum Mark:100

Hours : 6

SEMESTER – II

External Mark: 75

Credits: 5

Internal Mark: 25

## Elective Course II (1) -Design Thinking

### Objectives:

- To develop a creative thinking skill among students
- To gain deep insights about users of the product and reframe problems
- To generate alternative approaches and to finalize for solving the problem

### Unit I

Introduction - Why Design thinking? - Standish group chaos report- Software crisis- Software failures - Key steps to Design Process- Design Ability- How to Design?

### Unit II

Stakeholder Analysis - Converting Need to Demand - Identifying Stakeholders - Insight - Observation and Empathy - Mental Matrix

### Unit III

Design -Principles of Good Design - Articulating Design- Design to think - Design to win - **Design to Please - Designing to use**

### Unit IV

Meeting the Corporate Expectation- Story telling - **Modeling Systems - Designing together - Impact of human Psychology on Design - Design activism - Design for tomorrow**

### Unit V

**New Social Contract- Product to Customers - Usability test - Business canvas model - Applicability to could users - Economic Feasibility**

### Text Book(s):

1. Nigel Cross- “Design thinking”- Berg Publishers- 2011.

- Roger L. Martin- “The Design of Business: Why Design Thinking is the Next Competitive Advantage”- Harvard Business Press- 2009.

**Reference Book(s):**

- Business canvas model :  
[http://www.businessmodelgeneration.com/downloads/business\\_model\\_canvas\\_poster.pdf](http://www.businessmodelgeneration.com/downloads/business_model_canvas_poster.pdf)
- Standish survey:  
<https://www.projectsmart.co.uk/white-papers/chaos-report.pdf>
- Design Activism: <http://theprotocity.com/designing-activism-an-interview-with-ann-thorpe/>

Total Number Of Topics:34

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	17	50
2	Regional	6	17.65
3	National	4	11.76
4	Global	7	20.59

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

Course Code: 18PCS2EC2:2

Maximum Mark:100

Hours : 6

SEMESTER - II

External Mark: 75

Credits: 5

Internal Mark: 25

## Elective Course II (2) - Advanced Computer Architecture

**Objectives:**

- To understand advanced computer Architecture-
- To define theories of parallel computing- network properties
- To solve problems for cost effective computer systems to meet the requirements

**Unit I**

Parallel computer models- The state of computing - Multiprocessors and multicomputers-Multisector-SIMD computers -PRAM -VLSI Models.

**Unit II**

Program and Network properties-Conditions of parallelism -Program partitioning and scheduling - program flow mechanisms -system interconnect architectures.

**Unit III**

Processors and memory hierarchy-Advanced processor Technology - Super scalar and vector processors -Linear Pipeline Processors -Nonlinear pipeline Processors.

**Unit IV**

Multiprocessors and Multicomputer-Multiprocessor System interconnects - Message Passing Mechanisms - SIMD Computer Organizations -The Connection Machine CM 5 - Fine and Grain Multicomputer.

**Unit V**

Software for Parallel Programming-Parallel Programming Models - Parallel Languages and Compilers -Dependence Analysis of Data Arrays.

**Text Book(s)**

1. Kai Hwang- “Advanced Computer Architecture “-McGraw-Hill International Edn.- Singapore- 1993  
Unit I (Chapter 1- 1.1-1.3)- Unit II(Chapter 2- 4.1- 4.2)- Unit III(Chapter 6- 6.2- 7.1)- Unit IV(Chapter 7- 7.4- 8 4- 8.5)- Unit V(Chapter 10-10.1- 10.2- 10.3)

**Reference Book(s):**

1. Kai Hwang and Faye A.Briggs- “Computer Architecture and Parallel Processing”- McGraw-Hill International Editions- Singapore- 1985.
2. Michael J.Quinn- “Parallel Computing- Theory and Practice”- McGraw-Hill International Edn.- Singapore- 1994.
3. S S Jadhav-”Advanced Computer Architecture and Computing”- Second Edition- 2009.

Total Number Of Topics : 27

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	5	18.52
2	Regional	5	18.52
3	National	10	37.04
4	Global	7	25.93

\*Local – Green, Regional – Pink, National – Blue, Global - Brown

**Course Code: 18PCS2EC2:3**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - II**

**External Mark: 75**

**Credits: 5**

**Internal Mark: 25**

**Elective Course II (3) -Pervasive Computing**

**Objectives:**

- To understand Pervasive Computing
- To define web applications and WAP fundamentals
- To learn the PDA Characteristics.

## Unit I

Pervasive Computing - Past- Present and Future - Pervasive Computing Market - Business - Application examples - Retail- Airline check-in and booking - Health care - Car information system - Email access via WAP and voice.

## Unit II

Device Technology- Hardware - **Human Machine Interfaces - Biometrics - Operating Systems - Java for Pervasive devices**-Voice Enabling Pervasive Computing- Voice Standards- Speech Applications in Pervasive Computing and security

## Unit III

Device Connectivity- Protocols - Security -**Device Management - Web Application Concepts- WWW architecture - Protocols - Transcoding - Client Authentication via Internet.**

## Unit IV

WAP and Beyond- Components of the WAP architecture - WAP infrastructure - WAP security issues - WML - WAP push - Products -I Mode - Voice Technology- Basics of Speech recognition- Voice Standards-**Speech applications - Speech and Pervasive Computing**

## Unit V

PDA- Device Categories - PDA operation Systems-**Device Characteristics - Software Components - Standards - Mobile Applications - PDA Browsers - Pervasive Web Application architecture- Background - Development of Pervasive Computing web applications - Pervasive application architecture.**

### Text Book(s):

1. JochenBurkhardt- Horst Henn- Stefan Hepper- Thomas Schaech & Klaus Rindtorff- "Pervasive Computing- Technology and Architecture of Mobile Internet Applications"- Pearson Education- 2006.  
Unit I(Chapter 1-2)-Unit II(Chapter 3)-Unit III(Chapter 4-5)-Unit IV(Chapter 6-7 )-  
Unit V(Chapter 8- 10)

### Reference Book(s):

1. Frank Adelstein- Sandeep KS Gupta- Golden Richard III- Loren Schwiebert-"Fundamentals of Mobile and Pervasive Computing"- McGraw Hill- 2006.
2. Martin S.Nicklous and Lothar Merk- "Pervasive Computing: The Mobile World"- Springer- 2003
3. A Genco- S Sorce-" Pervasive Systems and Ubiquitous Computing"- WIT Press- 2010

Total Number Of Topics:55

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	12	21.82
2	Regional	12	21.82
3	National	17	30.91
4	Global	14	25.45

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

## SEMESTER - II

Course Code: 18PCS2CP2

Maximum Mark:100

Hours : 6

External Mark: 75

Credits: 4

Internal Mark: 25

### Core Course Practical II-Distributed Computing Lab

1. Create a table and insert a few records using Disconnected Access.
2. Develop a project to update and delete few records using Disconnected Access.
3. Develop a project to view the records using GridView-DetailsView-FormView Controls.
4. Develop a project to generate a crystal report from an existing database.
5. Design a web page that makes uses of Ad Rotator Control.
6. Design a web page involving Multi View or Wizard Control.
7. Make use of Image Control involving two hot spots in a web page.
8. Design a simple web site that makes use of Master Pages.
9. Establish the security features in a simple web site with five pages.
10. Use state management concepts in a mobile web application.
11. Develop a web service that has an ASP.NET client.
12. Develop a web service to fetch a data from a table and send it across to the client.
13. Experiment with Message Passing Interface Standard (MPI).

Total Number Of Topics:13

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	2	15.38
2	Regional	6	46.15
3	National	2	15.38
4	Global	3	23.08

\*Local – Green, Regional – Pink, National – Blue, Global - Brown

## SEMESTER – III

Course Code: 18PCS3CC7

Maximum Mark:100

Hours : 6

External Mark: 75

Credits: 5

Internal Mark: 25

### Core Course VII: Data Mining and Ware Housing

#### Objectives:

- To understand the basic principles- concepts of data warehousing and data mining
- To develop ability to design various algorithms based on data mining techniques.
- To learn various data mining tools to solve the real time problems.

#### Unit I

Introduction- Data Mining -Data Mining Functionalities - Classification of Data Mining Systems- Data Mining Task Primitives - Integration of a Data Mining System with a Database or Data Warehouse System- Major Issues in Data Mining-Data Preprocessing- Descriptive Data Summarization - Data Cleaning - Data Integration and Transformation - Data Reduction - Data Discretization and Concept Hierarchy Generation.

#### Unit II

Mining Frequent Patterns- Associations and Correlations- Basic Concepts and a Road Map-Efficient and Scalable Frequent Item set Mining Methods - Mining Various Kinds of Association Rules - From Association Mining to Correlation Analysis - ConstraintBased Association Mining.

#### Unit III

Classification and Prediction- Issues Regarding Classification and Prediction - Classification by Decision Tree Induction- Bayesian Classification - Rule-Based Classification - Classification by Backpropagation-Support Vector Machines-Other Classification Methods

#### Unit IV

Cluster Analysis-Cluster Analysis -Types of Data in Cluster Analysis - A Categorization of Major Clustering Methods - Partitioning Methods - Hierarchical Methods - DensityBased Methods - GridBased Methods - Model Based Clustering Methods - Clustering High Dimensional Data - Constraint Based Cluster Analysis - Outlier Analysis.

#### Unit V

Introduction to Data Warehousing -Multidimensional Data Model - Data Warehouse Architecture - Data Warehousing- A multitier Architecture-Data Cube-Data warehouse models-Enterprise warehouse - Data mart and virtual warehouse-Data Warehouse Implementation - From data warehousing to Data Mining - On Line Analytical Processing - On Line Analytical Mining- Data Cube Computation and Data Generalization

### Text Book(s)

1. Han, J-Kamber. M- “Data Mining: Concepts and Techniques”-Morgan Kaufmann Publishers- Second Edition- 2006. Unit I(Chapter 1-2)- Unit II(Chapter 5)- Unit III(Chapter 6)- Unit IV( Chapter 7)- Unit V(Chapter 3-4)

### Reference Book(s):

1. Michael J.A. Berry- Gordon S. Linoff- “Data Mining Techniques”-John Wiley & Sons- 1997.
2. G.K.Gupta-“Introduction to Data Mining with Case Studies”- 2009.
3. Margaret H.Dauham-” Data Mining Introductory and Advanced Topics”- Pearson Education- 2005.

Total Number Of Topics:55

S.No	Category( Local, Regional, National & Global)	No Of Topics	Percentage
1	Local	7	12.73
2	Regional	10	18.18
3	National	9	16.36
4	Global	29	52.73

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

## SEMESTER - III

Course Code: 18PCS3CC8

Hours : 6

Credits: 5

Maximum Mark:100

External Mark: 75

Internal Mark: 25

### Core Course VIII- Compiler Design

#### Objectives:

- To understand the basic concepts and structure of compilers
- To analyze the various parsing techniques
- To learn the basic compiler construction mechanisms

#### Unit I

Introduction - Structure of a Compiler - Compiler writing tools - **Basic constructs of High level programming languages - Data structures**-Parameter transmission. Lexical Analysis - Role of Lexical analyzer- Finite Automata - Regular Expressions to Finite Automata - Minimizing number of states of Deterministic Finite Automaton -Implementation of Lexical analyser in C

#### Unit II

Parsing Techniques - Context free Grammars - Derivations and Parse trees - **Ambiguity - Capabilities of Context free grammar - Top down and Bottom up Parsing - Handles - Shift**

**Reduce parsing - Operator precedence parsing - Recursive Descent parsing - Predictive Parsing.**

**Unit III**

**Automatic Parsing Techniques - LR parser - Canonical Collection of LR(0) items - Construction of SLR parsing tables -LR(1) sets of items construction - Construction of canonical LR parsing tables.**

**UnitIV**

**Syntax Directed Translation - Semantic action - Implementation of syntax directed translators - Intermediate code- Prefix notation- Quadruples- Triples- and Indirect triples -Methods of translation of assignment statements- Boolean expressions and Control statements.**

**UnitV**

**Symbol Tables and Code Generation- Representing information in a symbol table -Data structures for symbol table - Introduction to code optimization - Basic blocks -DAG representation - Error detection and Recovery - Machine dependent Optimizations- Peephole Optimization -Register Allocation and Assignment- Dynamic Programming Code-Generation.**

**Text Book(s):**

1. Alfred V. Aho- Ravi Sethi- Jeffrey D. Ullman- “Compilers:Principles- Techniques- and Tools”- Pearson Education Asia- 2001. Unit I( chapter 1)- Unit II(Chapter 2)- Unit III(Chapter 3-4)- Unit IV(Chapter 5-6-7-8)- Unit V(Chapter 9-10)

**Reference book(s):**

1. Dhamdhare D.M.- “Compiler Construction: Theory and Practice”- McMillan India Ltd.- 2000.
2. Holub Allen- “Compiler Design in C”- Prentice Hall of India- 2003.
3. A APuntambeaker- “Compiler Design”- First Edition- Technical Publications Pune-2009.

Total Number Of Topics:50

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	6	12
2	Regional	13	26
3	National	7	14
4	Global	24	48

\*Local – Green, Regional – Pink, National – Blue, Global - Brown

## SEMESTER - III

Course Code: 18PCS3EC3:1

Maximum Mark:100

Hours : 6

External Mark: 75

Credits: 5

Internal Mark: 25

### Elective Course III (1)-Soft Computing

#### Objectives:

- To comprehend soft computing techniques
- To impart knowledge in Fuzzy Set Theory- Optimization- Neural Networks
- To define working principles of Neuro Fuzzy Modelling and Application of Computational Intelligence

#### Unit I

Fuzzy Set Theory - Introduction to Neuro - Fuzzy and Soft Computing - 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 - Mamdani Fuzzy Models - Surgeon Fuzzy Models - Tsukamoto Fuzzy Models - Input Space Partitioning and Fuzzy Modelling.

#### Unit II

Optimization - Derivative based Optimization - Descent Methods - The Method of Steepest Descent - Classical Newton's Method - Step Size Determination - Derivative Free Optimization - Genetic Algorithms - Simulated Annealing - Random Search - Downhill Simplex Search.

#### Unit III

Neural Networks - Supervised Learning Neural Networks - Perceptrons - Adaline Backpropagation Multilayer perceptrons - Radial Basis Function Networks - Unsupervised Learning and Other Neural Networks - Competitive Learning Networks -Kohonen Self - Organizing Networks - Learning Vector Quantization - Hebbian Learning.

#### Unit IV

Neuro Fuzzy Modeling - Adaptive Neuro - Fuzzy Inference Systems - Architecture - Hybrid Learning Algorithm - Learning Methods that Cross fertilize ANFIS and RBFN - Coactive Neuro Fuzzy Modeling - Framework - Neuron Functions for Adaptive Networks - Neuro Fuzzy Spectrum.

#### Unit V

Application Of Computational Intelligence-Printed Character Recognition - Inverse Kinematics Problems - Automobile Fuel Efficiency Prediction - Soft Computing for Color Recipe Prediction.

Text Book(s)

1. J.S.R. Jang- C.T. Sun and E. Mizutani- “Neuro Fuzzy and Soft Computing”- PHI- Pearson Education- 2004.

### Reference Book(s)

1. Timothy J. Ross- “Fuzzy Logic with Engineering Application”-McGraw Hill- 1977.
2. Davis E. Goldberg- “Genetic Algorithms Search- Optimization and Machine Learning”- Addison Wesley- 1989.
3. S. Rajasekaran and G.A.V. Pai- “Neural Networks- Fuzzy Logic and Genetic Algorithms”- PHI- 2003.
4. Ahmar- Abbas- “Grid Computing - A Practical Guide to technology and Applications”- Charles River media- 2003.

Total Number Of Topics:54

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	11	20.37
2	Regional	24	44.44
3	National	8	14.81
4	Global	11	20.37

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

## SEMESTER - III

**Course Code: 18PCS3EC3:2**

**Maximum Mark:100**

**Hours : 6**

**External Mark: 75**

**Credits: 5**

**Internal Mark: 25**

### Elective Course III (2)-Computer Simulation and Modelling

#### Objectives:

To impart knowledge in real time modeling process and the simulation of any system using the real time mode

#### Unit I

Introduction to Simulation- When Simulation is the Appropriate Tool- When Simulation is not Appropriate- Advantages and Disadvantages of Simulation - Areas of Application- Systems and System Environment- Components of a System Discrete and Continuous Systems- Model of a System- Types of Models- Discrete Event System Simulation -Steps in a simulation study. Simulation Examples- Simulation of Queuing Systems - Simulation of Inventory Systems.

#### Unit II

Simulation Software- History of Simulation Software- Selection of Simulation Software- Simulation in JAVA- Simulation in GPSS- Simulation in SSF- Simulation software - Experimentation and Statistical and analysis tools

### Unit III

Statistical Models in Simulation- Review of Terminology and Concepts- Useful Statistical Models- Discrete Distributions- Continuous Distributions- Poisson process - Queuing models- Characteristics of queuing systems - Markov Chains -Features - Process Examples - Applications

### Unit IV

Random-Number Generation-Properties of Random Numbers-Generation of Pseudo- Random Numbers-Techniques for Generating Random Numbers-Linear congruential Method- Random number streams -Tests for random numbers Frequency tests - Test for Autocorrelation - Random Variate Generation- Inverse Transform Technique-Exponential Distribution-Uniform Distribution- Weibull Distribution.

### Unit V

Input Modeling- Data Collection - Identifying the Distribution with Data- parameter estimation- goodness of fit tests - Verification and Validation of Simulation Models- Model Building- Verification - Validation-Verification of Simulation Models Calibration and Validation of Models.

### Text Book(s):

1. Jerry Banks- John S. Carson- II Barry L. Nelson.-” Discrete-Event System Simulation”- FourthEdition- PHI Edition- 2009.

### Reference Book(s):

1. E.Winsberg-“Science in the age of computer simulation”- Chicago: University Press- 2010.
2. Huma Shaikh- Sapna Mahaldar-” Computer Simulation &Modeling”- Paperback- 2011.
3. Sankar Sengupta-” System Simulation and Modeling”- Pearson-2013

Total Number Of Topics:58

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	12	20.69
2	Regional	21	36.21
3	National	12	20.69
4	Global	13	22.41

\*Local – Green, Regional – Pink, National – Blue, Global - Brown

Course Code: 18PCS3EC3:3

Maximum Mark:100

Hours : 6

SEMESTER - III

External Mark: 75

Credits: 5

Internal Mark: 25

## Elective Course III (3)-Pattern Recognition

Objective:

To impart knowledge in real time Pattern recognition process and algorithms

### Unit I

Basics of Probability - Random Processes and Linear Algebra (recap) Probability - independence of events-Bayerian Decision Theory-Introduction to pattern recognition- Systems- design cycles-learning and adaptation -Bayerian decision theory- minimum error-rate classification - classifiers - discriminant functions - decisions surfaces.

### Unit II

**Maximum - Likelihood and bayerian parameter estimation - Maximum - Likelihood estimation-bayerian estimation-bayerian parameter estimation**-Guarian case and general theory- problems of dimeusability- Hidden marker models.

### Unit III

Nonparameter Techniques - Density estimation - parazen windows-Kn Nearest neighbour- estimation - The nearest neghlaurrede - metris - **nearest neghron - classification - fuzzy classification - approximation by series expansions.**

### Unit IV

**Linear Discriminant functions - Linear discriminant functions and decision surfaces-generadized linear discrminant functions- The two category unicorly separate case-minimizing the perception criterion function- relaxation procedures-nonreperable behaviour- Minimum squared-error procedures- The Ho - Kashyap Procedures- support vexter machines- multicategory generatization.**

### Unit V

**Multilayer Neural Networks - Feed forward operations and classifications- back propagation algorithm- error factors- back propagation as feature & mapping- back propagation-bayer theory and probability- practical techniques for improving back propagation- regularization-complexity adjustment and pruning.**

### Text Book(s):

1. Richard O. Duda- Peter E. Hart and David G. Stork- “Pattern Classification”- 2<sup>nd</sup> Edition- John Wiley- 2000
2. John Hertz- Andres Krogh & Richard G. Palmer- “Introduction to the theory of Neural Computation”- Addison Wesley-1991

### Reference Book(s):

1. M. Narasimha Murthy and V. Susheela Devi- “Pattern Recognition”- Springer 2011
2. S.Theodoridis and K.Koutroumbas-“Pattern Recognition”- 4<sup>th</sup> Edition - Academic Press- 2009.
3. Robert J.Schalkoff- “Pattern Recognition Statistical- Structural and Neural Approaches”- John Wiley & Sons Inc.- New York- 1992

Total Number Of Topics:57

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	11	19.3
2	Regional	12	21.0
3	National	22	38.6
4	Global	12	21.0

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

**Course Code: 18PCS3EC4:1**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - III**

**External Mark: 75**

**Credits: 5**

**Internal Mark: 25**

## **Elective Course IV (1)-Cryptography and Network Security**

### **Objectives:**

- To know the basic mechanisms of cryptography
- To explain the various network security applications
- To discuss Email Security- IP Security- Web Security mechanisms
- To illustrate the malicious software and firewalls

### **Unit I:**

Overview: **Symmetric Ciphers - Classical Encryption Techniques**

### **Unit II**

Symmetric Ciphers: **Block ciphers and the Data Encryption Standards Public-key Encryption and Hash Functions -Public-Key Cryptography and RSA**

### **Unit III**

Network Security Practices: **Authentication applications-Electronic Mail Security**

### **Unit IV**

Network Security Practices: **IP Security-Web Security**

### **Unit V**

System Security: **Intruders-Malicious Software-Firewalls**

### **Text Book(s):**

1. William Stallings-” Cryptography and Network Security-Principles and Practices”- Prentice-Hall- Third Edition- 2003  
Unit I(Chapter 1-2)- Unit II( Chapter 3-9)- Unit III(Chapter 14-15)- Unit IV( Chapter 16- 17)-  
Unit V(Chapter 18-19-20).

### **Reference Book(s):**

1. Johannes A. Buchaman-” Introduction to cryptography”- Springer-Verlag- 2000.
2. AtulKahate-” Cryptography and Network Security”- Third Edition- Tata McGraw Hill. 2013.
3. Ajay Kumar-Dr.S.Bose- ”Cryptography and Network Security”- Pearson- 2017

Total Number Of Topics :13

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	2	15.38
2	Regional	2	15.38
3	National	2	15.38
4	Global	7	53.85

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

**Course Code: 18PCS3EC4:2**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - III**

**External Mark: 75**

**Credits: 5**

**Internal Mark: 25**

### **Elective Course IV (2)-Graphics and Multimedia**

#### **Objectives:**

- To understand computational development of graphics with mathematics
- To provide profound knowledge of display systems- image synthesis- shape modelling of 3D applications

#### **Unit I**

Graphics: 2D Transformations - Translation - Scaling - Rotation - Other Transformation: Reflection - Shearing. Clipping: Window to Viewport Transmission Clipping - Point Clipping - Line Clipping - Text Clipping - GUI and interactive Input methods -Picture Construction Techniques - Virtual Reality Environment

#### **Unit II**

3D Graphics: 3 D Transformation -Visible Surface Detection -**Back Face Detection - Depth Buffer Method - Scan Line Method.**

#### **Unit III**

Introduction to Multimedia : **Components of multimedia** -Overview of multimedia software tools - Multimedia authoring and tools: **multimedia authoring** -Some useful editing and authoring tools - **popular file formats - color models in images -color models in video.**

#### **Unit IV**

Fundamental concepts in video : **Types of video signals - Analog video - digital video - Basics of digital Audio - Digitization of Sounds - MIDI - Quantization and transmission of audio.**

#### **Unit V**

Digital Video and Animation: **Video Capture and Playback Systems - Computer Animation.**  
Computer and Multimedia Networks: **OSI Network Layers - TCP/IP Protocols - Multiplexing**

Technologies: **Basics of Multiplexing - Access Networks - Multimedia Network communications.**  
Applications: **Quality of Multimedia Data Transmission - Multimedia over IP.**

**Text book(s):**

1. Ze-Nian Li- Mark S. Drew- “Fundamentals of Multimedia”-Pearson Education- 2008.
2. Donald Heam and M. Pauline Baker- “Computer Graphics in C Version”- Second Edition. Pearson Education

**Reference Book(s):**

1. Tom McReynold- David Blythe “Advanced Graphics Programming Using OpenGL”- Elsevier- 2010
2. Parag havaldar and General medioni- “Multimedia Systems- Algorithms- Standards and Industry Practices”- Course Technology- Cengage Learning- 2010
3. John F. KoegelBufend- “Multimedia systems”- Pearson Education- Delhi- 2002
4. Kurose and Ross- ‘Computer Networks: A top down Approach’ - Pearson Education- 2002

Total Number Of Topics:38

S.No	Category( Local, Regional, National & Global)	No Of Topics	Percentage
1	Local	22	57.89
2	Regional	4	10.53
3	National	4	10.53
4	Global	8	21.05

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

**SEMESTER – III**

**Course Code: 18PCS3EC4:3**

**Maximum Mark:100**

**Hours : 6**

**External Mark: 75**

**Credits: 5**

**Internal Mark: 25**

**Elective Course IV (3)-Human Computer Interaction**

**Objectives:**

- To know the HCI design basics and design rules.
- To learn the evaluation techniques in HCI
- To illustrate the various user support systems

**Unit I**

**The Interaction Introduction - Models of interaction - Frameworks and HCI Ergonomics - Interaction styles - Elements of the WIMP interface - Interactivity - The context of the interactions. Paradigms:**

Introduction -Paradigms for interaction-User Interface Design- Direct Manipulation-Cognitive framework.

**Unit II**

Interaction- Design basics Introduction - What is design? - User focus - Scenarios - Navigation design - Screen design and layout -Interaction and prototyping. HCL in the software process: Introduction -The software lifecycle - Usability engineering - interactive design and prototyping - Design rationale.

**Unit III**

Design rules Introduction - Principles to support usability - Standards - Guidelines - Golden rules and heuristics - HCI patterns. Implementation Support - Introduction -Elements of windowing systems -Programming the application Using toolkits - User interface management systems.

**Unit IV**

Evaluation techniques what is evaluation - Goals of evaluation - Evaluation through expert analysis - Evaluation through user participation - Choosing an evaluation method. Universal Design: Introduction - Universal design principles - Multimodal interaction - Designing for diversity - summary.

**Unit V**

User support:Introduction- Requirements of user support - Approaches to; user support - Adaptive help systems designing- Designing user support systems.

**Text Book(s):**

1. Alan Dix- Janet Finlay- Gregory D. Abowd and Russell Beale-” Human - Computer Interaction”- Third Edition- “- Pearson Education- 2008. Unit I(Chapter 3-4)- Unit II( Chapter 5 .6)- Unit III( Chapter 7-8)- Unit IV( Chapter 9-10)- Unit V( Chapter 11)

**Reference Book(s):**

1. John C. Carroll-”Human- Computer Interaction in the New Millennium”- Pearson Education” 2002
2. Jenny Preece- Helen Sharp- Yvonne Rogers-” Interaction Design: Beyond Human- Computer Interaction”- Fourth Edition- 2015
3. M.G.Helander-” Handbook of Human Computer Interaction”- 2014

Total Number Of Topics:47

S.No	Category( Local, Regional, National & Global)	No Of Topics	Percentage
1	Local	8	17.0
2	Regional	23	48.94
3	National	8	17.02
4	Global	8	17.02

\*Local – Green, Regional – Pink, National – Blue, Global - Brown

## SEMESTER - III

Course Code: 18PCS3CP3

Maximum Mark:100

Hours : 6

External Mark: 75

Credits: 4

Internal Mark: 25

### Core course XIII - Data Mining Lab

1. Create a dataset and demonstrate any five preprocessing techniques.
2. Create a dataset and perform any three Filter function.
3. Demonstrate the following process in the created dataset
  - a. Replace Missing Values
  - b. Add Expression
4. Demonstrate any three Supervised Technique Classifier function in the built-in dataset.
5. Demonstrate any three Unsupervised Technique Clusterer function in the built-in dataset
6. Demonstrate Association Rule Mining in the Build -in and User defined datasets
7. Create a dataset and demonstrate any three preprocessing techniques using Knowledge Flow
8. Create a dataset and any three Filter function using Knowledge Flow
9. Demonstrate Clustering and Classification function in the built-in dataset Using Knowledge Flow
10. Demonstrate to test the Classifier & Clusterer Function Using Experimenter
11. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm

Total Number Of Topics:11

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	2	18.18
2	Regional	2	18.18
3	National	2	18.18
4	Global	5	45.45

\*Local – Green, Regional – Pink, National – Blue, Global - Brown

## SEMESTER - IV

Course Code: 18PCS4CC9

Maximum Mark:100

Hours : 6

External Mark: 75

Credits: 5

Internal Mark: 25

### Core Course IX- Parallel Computing

#### Objectives:

To introduce algorithm design for parallel computing architectures

#### Unit I

**Introduction to Parallel Computing - Motivating Parallelism - Scope of Parallel Computing - parallel programming platforms** -Implicit parallelism trend in microprocessor architecture - Limitations of memory system performances-Dichotomy of parallel platforms -Physical organization of platforms Communication cost in parallel machines-Routing mechanism for interconnection networks

#### Unit II

Principles of parallel algorithm Design-Preliminaries - Decomposition techniques -**Characteristics of task and interactions**-Mapping techniques for load balancing

#### Unit III

**Methods for containing interaction overhead - Parallel Algorithm models**-one to All Broadcast and All to One Reduction -All to All Broadcast and Reduction

#### Unit IV

Analytical Modelling of Parallel Programs - Sources of overhead in parallel programs - Performance metrics for parallel systems - The effect of Granularity on performances-Scalability of parallel systems -Minimum execution time and minimum cost - optimal execution time - Asymptotic analysis of parallel programs

#### Unit V

Sorting - Issues in sorting on parallel computers -Sorting Networks -Bubble sort and its variables - Quick sort-Bucket and sample sort -Others sorting algorithms- **MESSAGE PASSING PROGRAMMING** -Message Passing Paradigm & Message Passing Interface - Parallel Virtual Machine.

#### Text Book(s):

1. Ananth Grama- Anshul Gupta- George Karypis- Vipin Kumar- "Introduction to Parallel Computing"- Second edition- Pearson Education-2003

#### Reference Book(s):

1. BhroozParhami- "Introduction to Parallel Processing Algorithms and Architecture"- Plenum Series- 2002
2. Zbigniew Czech-" Introduction to Parallel Computing"-2016
3. Peter Pacheco- "An Introduction to Parallel Programming"- 2011

Total Number Of Topics:36

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	7	19.44
2	Regional	15	41.67
3	National	7	19.44
4	Global	7	19.44

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

Course Code: 18PCS4CC10

Maximum Mark:100

Hours : 6

SEMESTER - IV

External Mark: 75

Credits: 5

Internal Mark: 25

## Core Course X -Python Programming

### Objectives:

- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures - lists- tuples- dictionaries.
- To do input/output with files in Python.

### Unit I

#### ALGORITHMIC PROBLEM SOLVING

Introduction to Computers- Characteristics- Basic Organization of a Computer-Algorithm-building blocks of algorithms (instructions/statements- state- control flow- functions)-notation (pseudo code-flow chart- programming language)-algorithmic problem solving-simple strategies for developing algorithms (iteration- recursion).

### Unit II

#### DATA EXPRESSIONS - STATEMENTS

Python interpreter and interactive mode - values and types: int- float-Booleans - strings - lists-variables-expressions and statements- tuple assignment- precedence of operators-comments-modules and functions function definition and use-flow of execution- parameters and arguments

### Unit III

#### CONTROL FLOW FUNCTIONS

Conditionals: Boolean values and operators- conditional (if)- alternative (if else)- chained conditional (if-elif-else)-Iteration:state - while - for - break - continue- pass-Fruitful functions - return values-parameters-scope: local and global- composition - recursion- Strings: string slices – immutability-string functions and methods-string module-Lists as arrays

### Unit IV

#### COMPOUND DATA: LISTS - TUPLES- DICTIONARIES

Lists: list operations- list slices- list methods- list loop- mutability- aliasing- cloning lists- list parameters-Tuples: tuple assignment- tuple as return value.Dictionaries: operations and methods- advanced list processing - list comprehension

**Unit V**

**FILES- MODULES- PACKAGES**

Files and exception: text files- reading and writing files-format operator-command line arguments- errors and exceptions- handling exceptions- Modules- packages

**Text Book(s):**

1. Allen B. Downey- ``Think Python: How to Think Like a Computer Scientist``-Second Edition- Updated for Python 3- Shroff/O'Reilly Publishers- 2016. (<http://greenteapress.com/wp/think-python/>).

**Reference Book(s):**

1. Anita Goel-Ajay Mittal - “Computer Fundamentals and programming in C”-First Edition- Pearson India Publisher-- 2013.
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. The Python Tutorial- <https://docs.python.org/2.7/tutorial/>

Total Number Of Topics:75

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	9	12.13
2	Regional	10	13.33
3	National	15	20
4	Global	41	54.67

\*Local – Green, Regional – Pink, National – Blue, Global - Brown

**Course Code: 18PCS4EC5:1**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - IV**

**External Mark: 75**

**Credits: 4**

**Internal Mark: 25**

**Elective CourseV (1) - Big Data Analytics**

**Objectives:**

- To understand Big data
- To gain the ability to design highly scalable systems.
- To state data management techniques in handling data

## Unit I

Fundamentals of Big Data : The Evolution of Data Management - Understanding the waves of Managing Data - Defining Big Data - Building a Successful Big Data Management Architecture - Examining Big Data Types : Defining Structured Data - Defining Unstructured Data - Looking at Real Time and Non Real Time Requirements - Digging into Big Data Technology Components : Exploring the Big Data Stack - Redundant Physical Infrastructure -Security Infrastructure - Operational Databases - organizing data Services and Tools - Analytical Data Warehouses - Big Data Analytics -Big Data Applications.

## Unit II

**Defining Big Data Analytics** : Using Big Data to get Results - Modifying Business Intelligence Products to Handle Big Data - Studying Big Data Analytics Examples - Big Data Analytics Solutions - Understanding Text Analytics and Big Data : Exploring Unstructured Data - Analysis and Extraction Techniques - Putting Results Together with Structured Data - Putting Big Data to use -Text Analytics Tools for Big Data- Customized Approaches for Analysis of Big Data : Building New Models and Approaches to Support Big Data - Understanding Different Approaches to Big Data Analysis - Characteristics of a Big Data Analysis Framework.

## Unit III

**Operationalizing Big Data**: Making Big Data a Part of Your Operational Process - Integrating Big Data - Incorporating big data into the diagnosis of diseases - Understanding Big Data Workflows - Workload in context to the business problem - Ensuring the Validity-Veracity and Volatility of Big Data - **Security andGovernance for Big Data Environments** : Security in Context with Big Data - Understanding Data Protection Options - The Data Governance Challenge - Putting the Right Organizational Structure in Place - Developing a Well-Governed and Secure Big Data Environment.

## Unit IV

**Appliances and Big Data Warehouses** : Integrating Big Data with the Traditional Data Warehouse - Big Data Analysis and the Data Warehouse - Changing the Role of the Data Warehouse - Changing Deployment Models in the Big Data Era - Examining the Future of Data Warehouses - Examining the Cloud and Big Data- Defining the Cloud in the Context of Big Data - Understanding Cloud Deployment and Delivery Models - The Cloud as an Imperative for Big Data - Making Use of the Cloud for Big Data - Providers in the Big Data Cloud Market.

## Unit V

**MapReduce Fundamentals** : Tracing the Origins of MapReduce - Understanding the map Function - Adding the reduce Function - Putting map and reduce Together - Optimizing MapReduce Tasks - Exploring the World of Hadoop : Explaining Hadoop - Understanding the Hadoop Distributed File System - Hadoop Map Reduce - The Hadoop Foundation and Ecosystem - Building a Big Data Foundation with the Hadoop Ecosystem - Managing Resources and Applications with Hadoop YARN - Storing Big Data with HBase - Mining Big Data with Hive - Interacting with the Hadoop

### Text Book(s):

1. Judith Hurwitz- Alan Nugent-Dr. Fern Halper and Marcia Kaufman-“Big Data” -Wiley Publications- 2014. Unit I(Chapter 1-2& 4)-Unit II(Chapter 12- 13&14 (Text2))-Unit III(Chapter 17&19)-Unit IV(Chapter 11 & 6)-Unit V(Chapter 8- 9&10)

### Reference Book(s):

1. SoumendraMohanty-MadhuJagadeesh and HarshaSrivatsa- “Big Data Imperatives : Enterprise Big Data Warehouse- BI Implementations and Analytics” -Apress Media- Springer Science + Business Media New York- 2013
2. Bart Baesens-” Analytics in a Big Data World: The Essential Guide to Data Science and its Applications”-John Wiley & Sons Publications- 2014

Total Number Of Topics:65

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	11	16.92
2	Regional	5	7.67
3	National	32	49.23
4	Global	17	26.15

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

**Course Code: 18PCS4EC5:2**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - IV**

**External Mark: 75**

**Credits: 4**

**Internal Mark: 25**

### **Elective Course V(2) - MANET**

**Objectives:**

- To understand MANET
- To define principles of distributed systems
- To learn- design- issues and distributed operating system concepts

**Unit I**

Introduction:Introduction to adhoc networks - definition- characteristics features- applications. Characteristics of Wireless channel-Adhoc Mobility Models:-Indoor and outdoor models -Ad hoc Wireless Networks - What is an Ad Hoc Network? - Heterogeneity in Mobile Devices -Wireless Sensor Networks - Traffic Profiles - Types of Ad hoc Mobile Communications - Types of Mobile Host Movements - Challenges Facing Ad hoc Mobile Networks - Ad hoc wireless Internet.

**Unit II**

Ad Hoc Routing Protocols : Introduction - Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks - Classifications of Routing Protocols - Table-Driven Routing Protocols - Destination Sequenced Distance Vector (DSDV)-Wireless Routing Protocol (WRP) - Cluster Switch Gateway Routing (CSGR) - Source- Initiated OnDemand Approaches -Ad hoc OnDemand Distance Vector Routing (AODV)-Dynamic Source Routing (DSR) -Temporally Ordered Routing Algorithm (TORA) - Signal Stability Routing (SSR) -LocationAided Routing (LAR) - PowerAware Routing (PAR) - Zone Routing Protocol (ZRP).

**Unit III**

Multicast routing In Adhoc Networks : Introduction - Issues in Designing a Multicast Routing Protocol - Operation of Multicast Routing Protocols -An Architecture Reference Model for Multicast Routing Protocols -Classifications of Multicast Routing Protocols - TreeBased Multicast Routing Protocols- MeshBased Multicast Routing Protocols - Summary of Tree and Mesh based Protocols -

EnergyEfficient Multicasting - Multicasting with Quality of Service Guarantees - Application - Dependent Multicast Routing - Comparisons of Multicast Routing Protocols

**Unit IV**

End Delivery and Security - Transport layer- Issues in designing- Transport layer classification- adhoc transport protocols -Security issues in adhoc networks- issues and challenges-network security attacks- secure routing protocols.

**Unit V**

Cross Layer Design and Integration of Adhoc for 4g Cross layer Design:Need for cross layer design- cross layer optimization-parameter optimization techniques-Cross layer cautionary perspective- Integration of adhoc with Mobile IP networks

**Text Book(s):**

1. C.Siva Ram Murthy and B.S.Manoj-“Ad hoc Wireless Networks Architectures and protocols”-Second Edition- Pearson Education. 2007.
2. Charles E. Perkins-“Ad hoc Networking”- Addison - Wesley- 2000

**Reference Book(s):**

1. Stefano Basagni- Marco Conti- Silvia Giordano and Ivan stojmenovic-“Mobilead hoc networking”- Wiley-IEEE press- 2004.
2. Mohammad Ilyas-“The handbook of adhoc wireless networks”- CRC press- 2002.
3. T. Camp- J. Boleng- and V. Davies “A Survey of Mobility Models for Ad Hoc Network”- 2002
4. C. K. Toh- “Ad Hoc Mobile Wireless Networks Protocols and Systems”- Prentice Hall- PTR- 2001.

Total Number Of Topics: 59

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	5	8.48
2	Regional	5	8.48
3	National	28	47.46
4	Global	21	35.60

\*Local – Green, Regional – Pink, National – Blue, Global - Brown

**Course Code: 18PCS4EC5:3**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - IV**

**External Mark: 75**

**Credits: 4**

**Internal Mark: 25**

**Elective Course V(3)- Digital Image Processing**

**Objectives:**

- To understand Digital Image Processing concepts

- To define principles of Image Transformations
- To describe Image Data Compression and Image Reconstruction techniques

### Unit I

Steps in Digital Image Processing - Components - Elements of Visual Perception - Image Sensing and Acquisition- Continuous And Discrete Images And Systems:Light- Luminance- Brightness and Contrast Eye- The Monochrome Vision Model-Image Processing Problems and Applications-Vision Camera- Digital Processing System- 2D Sampling Theory- Aliasing-Image Quantization- Lloyd Max Quantizer - Dither Color Images- Linear Systems And Shift Invariance-Fourier Transform-ZTransform- Matrix Theory Results- Block Matrices and Kronecker Products.

### Unit II

Image Transforms : 2D orthogonal and Unitary transforms- 1D and 2D DFT- Cosine- Sine- Walsh- Hadamard-Haar- Slant-Karhunen-loeve- Singular value Decomposition transforms.

### Unit III

Image Enhancement - Point operations - contrast stretching- clipping and thresholding density slicing- Histogram equalization- modification and specification- spatial operations - spatial averaging- low pass- high pass- band pass filtering- direction smoothing- medium filtering- generalized cepstrum and homomorphic filtering- edge enhancement using 2D IIR - FIR filters-color image enhancement.

### Unit IV

Image Restoration :Image observation models- sources of degradation- inverse and Wiener filtering- geometric mean filter-non linear filters- smoothing splines - interpolation-constrained least squares restoration.

### Unit V

Image Data Compression - Image Reconstruction From Projections - Image data rates- pixel coding- predictive techniques transform coding- vector DPCM- Block truncation coding- wavelet transform coding of images-color image coding. Random transform- back projection operator- inverse random transform- back projection algorithm- fan beam and algebraic restoration techniques.

### Text Book(s):

1. Anil K. Jain-"Fundamentals of Digital Image Processing"- PHI- 1995.  
Unit I( Chapter 1-2-3-4)- Unit II(Chapter 5)- Unit III(Chapter 7)-Unit IV(Chapter 8 )-Unit V(Chapter 10-11).
2. Sid Ahmed M.A.-"Image Processing"- McGraw Hill Inc- 1995.

### Reference Book(s):

1. Richard E Woods- Rafael C Gonzalaz.-"Digital Image Processing"-Third Edition-2008.
2. William. K. Pratt-"Digital Image Processing"- Wiley Interscience-Second Edition- 1991.
3. T Veerakumar- S Jayaraman- S Esakkirajan-"Digital Image Processing"- First Edition- 2009

Total Number Of Topics:70

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	10	
2	Regional	10	

3	National	9	
4	Global	41	

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

**Course Code: 18PCS4CP4**

**Maximum Mark:100**

**Hours : 6**

**SEMESTER - IV**

**External Mark: 75**

**Credits: 4**

**Internal Mark: 25**

### **Core Course Practical IV- Python Programming Lab**

1. Write a program to compute the GCD of two numbers.
2. Write a program to find the Exponentiation (power of a number)
3. Write a program to find the maximum of a list of numbers
4. Write a program for Linear search and Binary search
5. Write a program to apply Merge sort
6. Write a program to multiply matrices
7. Write a program to take command line arguments (word count)
8. Write a program to simulate elliptical orbits in Pygame
9. Write a program to simulate bouncing ball in Pygame

Total Number Of Topics:9

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	1	11.11
2	Regional	1	11.11
3	National	1	11.11
4	Global	6	66.66

\*Local – **Green**, Regional – **Pink**, National – **Blue**, Global - **Brown**

**Course Code: 18PCS4PW**

**Hours :6**

**SEMESTER - IV**

**Maximum Mark:100**

**Credits: 4**

## **Project Work**

### **Objectives:**

The student can get the knowledge to prepare the document- to implement tools for the specific problem and learn the industrial need programs for their placement.

<b>S.No</b>	<b>Work Description</b>	<b>Maximum Marks</b>
1	Dissertation	80
2	Viva voce	20
Total		100

**Note: PASSING MINIMUM - 50 MARKS**

### **I Review -December last week**

- Confirmation letter from the company
- Project type & title
- Company profile
- Synopsis
- Contact number &mail\_id of the external guide
- S/w selection

### **II Review - January 3<sup>rd</sup> week**

- Data or System flow diagram
- Documentation of first three chapters
- Database design
- Input design - Forms
- Output design - Reports

### **III Review - February 3<sup>rd</sup> week**

- Complete coding
- Test plan with demo
- Rough documentation of the entire project

### **IV Review - March 1<sup>st</sup> week**

- Corrected rough draft
- Explanation of the entire project
- Execution of Implementation Work

**Note:**

- ✚ Attending all the review is compulsory
- ✚ PPT and necessary Documentation should be brought for each Review
- ✚ Font size in documentation has to be 12- Times New Roman- Space 1.5
- ✚ Document should be neatly aligned and justified
- ✚ No change can be made in the review marks later
- ✚ Internal mark will be submitted at the same day of review to controller section.

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**M.Phil COMPUTER SCIENCE**

**Course Structure and Syllabus**

(For the candidates admitted from the academic year 2018 - 2019 onwards)

**CHOICE BASED CREDIT SYSTEM (CBCS)**



**THANTHAI HANS ROEVER COLLEGE(AUTONOMOUS)**

**(Approved by NAAC, Affiliated to Bharathidasan University)**

**ELAMBALUR, PERAMBALUR – 621 220**



## **VISION:**

- To be a Centre of excellence in education and research in the frontier areas of Computer Science.

## **MISSION:**

- To facilitate quality transformative education in Computer Science
- To promote quality research and innovation in technology for meeting global challenges
- To transform students to competent professionals to cater to the needs of the society.

## **Programme Outcomes (POs):**

Upon completion of the programme, the scholar will be able to

- ✓ Adapt self-learning through reviews of previously acquired knowledge.
- ✓ Implement research by focusing on newer thrust areas of knowledge.
- ✓ Engage in quality and efficient designing, implementing and evaluating of the gathered information.
- ✓ Demonstrate technical and analytical competence with local and global perspective.
- ✓ Have professional integrity with knowledge of appropriate code of ethics and standards displaying social responsibilities.

## **Program Specific Outcomes (PSOs):**

Students will be able to

- Have extensive knowledge in computer science concepts, ability to have an in-depth understanding of high level advanced techniques and extensive knowledge of the computer literature are applicable to the selected research areas.
- Enhance the social, cultural and ethical knowledge of the recent computer technologies and knowledge of research applied in real time problems solving used to develop the society in current and next level emerging technology world.
- Apply and analyze research-based computer knowledge and research methods to provide effective conclusions and decisions making in the critical environments.
- Apply the trending concepts of computer science in research work increase the moral, ethical and social values of the scholar.
- Encourage the theoretical knowledge of teaching learning skills inside the classroom, personal skill development and employment provisions in the relevant field of computer science.

THANTHAI HANS ROEVER COLLEGE (AUTONOMOUS), ELAMBALUR, PERAMBALUR

### **M.Phil. Computer Science (FT) Programme**

(For the candidates admitted from the academic year 2018-2019 onwards)



Semester	Course	Course Code	Title of the Course	Ins. Hours/ Weeks	Credit	Exam Hours	CIA (Max)	ESE (Max)	Total (Max)
I	Core Course – I	18MPCS1CC1	Research Methodology	3*	4	3	25	75	100
	Core Course – II	18MPCS1CC2	Advanced Concepts in Computer Science	3*	4	3	25	75	100
	Core Course – III	18MPCS1CC3	Teaching and Learning Skills (Common Paper)	3*	4	3	25	75	100
	Core Course – IV	18MPCS1CC4	Paper on Topic of Research(The syllabus will be prepared by the Guide and the examination will be conducted by the COE)	3*	4	3	25	75	100
	<b>* One Hour Library hour for each Course</b>								
			Total	<b>12</b>	<b>16</b>	<b>12</b>	<b>100</b>	<b>300</b>	<b>400</b>
II	Project Work	18MPCS2DW	Dissertation and Viva-Voce (Viva Voce 50 marks Dissertation 150 marks)	-	08	-	-	-	200
			Total	-	<b>08</b>	-	-	-	<b>200</b>
			Grand Total	<b>12</b>	<b>24</b>	<b>12</b>	<b>100</b>	<b>300</b>	<b>600</b>

**SEMESTER – I**  
**CORE COURSE 1 – RESEARCH METHODOLOGY**

**Course Code:** 18MPCS1CC1

**Total Marks: 100**

**Hours: 3**

**External Marks: 75**

**Credit: 4**

**Internal Marks: 25**

**Course Objectives:**

- To understand the types of research and thesis writing.
- To learn to use tools related to research in Computer Science.
- To learn to calculate the computing time of algorithms and ideas related to NP-completeness

**Course Outcomes (Cos)**

**CO1:**To develop understanding of the basic framework of research process.

**CO2:**To develop an understanding of various research designs and techniques.

**CO3:**To identify various sources of information for literature review and data collection.

**CO4:**To develop an understanding of the ethical dimensions of conducting applied research.

**CO5:**Appreciate the components of scholarly writing and evaluate its quality.

**UNIT I:**

Overview of Research Methodology- Introduction- Research Ethics - Interpretation and Report Writing-Ethical issues and professional-Quantitative method - Spread sheet and statistical tools-GIS and Remote sensing-Biometric system-Natural language processing-Development of working hypothesis- Meaning of Research - Objectives of Research -Presentation tool-Motivation in Research -Types of Research - Research Approaches - Significance of Research -Research process- Data Collection and Data Preparation-Introduction - Collection of Primary Data - Collection of Secondary Data - Selection of Appropriate Method for Data Collection - Data Preparation Process.

**UNIT II:**

Test of Hypothesis- Introduction- What is Hypothesis? -Basic Concepts Concerning Testing of Hypotheses- Tests of Hypotheses - Hypothesis Testing for Mean- Proportion- Variance – Chi Square Test- Test of Independence of Attributes - Categorized Data- Test of Goodness of Fit -Nonparametric Tests- Introduction- One Sample Test - Two Sample Tests K Samples Tests-Advanced Multivariate Analysis- Introduction- Factor Analysis- Discriminate Analysis-Cluster Analysis.

**UNIT III:**

Algorithmic Research- Introduction-Algorithmic Research Problems- Types of Algorithmic Research Problems-Types of Solution- Procedure Algorithm-Steps of Development of Algorithm-Steps of

**UNIT IV:**

Thesis Writing- Literature Survey - Writing Reviews and Journal Articles -Publication of Papers - Planning a Thesis - General Format - Page and Chapter Format - Footnotes -Tables and Figures - References and Appendices-Report Writing and Presentation- Introduction - Significance of Report Writing - Different Steps in Writing Report - Layout of the Research Report - Types of Reports- Guidelines for Reviewing Draft-Oral Presentation.

**UNIT V:**

Research Tools- Introduction - SPSS - MATLAB - LATEX - NS/2 -Rational Suite - Eclipse IDE.

**Reference Books:**

1. C. R. Kothari, Gaurav Garg, Research Methodology Methods and Techniques, NewAge International publishers, Third Edition, 2014.
2. Research Methodology – R.Panneerselvam, Prentice-Hall of India Private Limited, New Delhi- 110 001, 2005.
3. Richard Johnson, Dean Wichern, Applied Multivariate Statistical Analysis. Prentice Hall (ISBN 0-1312-1973-1).
4. C Chatfield and A J Collins, Introduction to Multivariate Analysis. Chapman and Hall (SF 2 CHA).

Total Number Of Topics:74

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	20	27.0
2	Regional	17	23
3	National	13	17.6
4	Global	39	52.7

## SEMESTER – I

### CORE COURSE II –ADVANCED CONCEPTS IN COMPUTER SCIENCE

Course Code: 18MPCS1CC2

Total Marks: 100

Hours: 3

External Marks: 75

Credit: 4

Internal Marks: 25

#### Course Objectives:

- To understand the basic ideas of Data Science and to analyze big data sets.
- To understand the Cloud Computing as an emerging area of public and scientific use and to learn to apply Cloud Computing in the current social and research contexts.
- To learn and apply the ideas of Virtualization and its various uses

#### Course Outcomes(Cos)

**CO1:**Demonstrate a basic understanding of computer hardware and software.

**CO2:**Demonstrate problem-solving skills.

**CO3:**Apply logical skills to programming in a variety of languages and utilize web technologies.

**CO4:**Present conclusions effectively, orally, and in writing.

**CO5:**Demonstrate basic understanding of network principles.

#### UNIT I:

DATA MINING AND DATA ANALYTICS: Introduction - Data Processing- Cleaning- Concept description- Classification and prediction- Multidimensional analysis - descriptive mining of complex data objects-Data Mining & Data Preprocessing - Mining Frequent Patterns - Classification - Cluster Analysis- Data Mining Trends and Research Frontiers- Self Learning Practice- WEKA / Rapid Miner / DB Miner.

#### UNIT II:

CLOUD COMPUTING: Introduction - Companies Involved in Cloud Computing - Why Cloud Computing - Benefits of Cloud Computing - Cloud Computing Drawbacks - Major Components - Cloud Computing Issues - Cloud Services - Virtualization – Self Learning Practice - VMware/ Cloud Foundry/ Open Stack- Globes Toolkit / Eucalyptus / Open Nebula.

#### UNIT III:

PARALLEL PROCESSING-Introduction - Parallel processing Architecture -Program Issue- Data Dependency Analysis- Shared Memory management- Thread based implementation- Using Parallelism Effectively-Self Learning Practice- CEPBA

**UNIT IV:**

EVOLUTIONARY COMPUTING: Origin- Evolutionary Algorithm-Representation Mutation & Recombination-Fitness - Selection - Population Manage- Popular Evolutionary Algorithm Variants- Parameter Control- Constraint Handling-Evolutionary Robotics Self Learning Practice- MATLAB.

**UNIT V:**

CRYPTOGRAPHY: Basic Principles- Historical Cryptosystems- Theoretical versus Practical Security - Symmetric Encryption – Public Key Encryption - Digital Signature Schemes -Key Management - Public Key Management-Self Learning Practice- Gung / KF Sensor/ Snort/ Net Stumbled - For Term Paper Writing - One Problem is given to the scholar they have to solve it in any one of the tool.

**Reference Books:**

1. Jiawei Han, Micheline Kamber, Jian Pei, "Data Mining: Concepts and Techniques", Third Edition, Elsevier, 2011
2. Ivanka Menken, "A Complete Guide to Cloud Computing", Art of Service, 2008
3. M.Sasikumar, Dinesh Shikhare and P.RaviPrakesh “Introduction To Parallel Processing”,2014.
4. A.E.Eibe and J.E.Smith, “Introduction to Evolutionary Computing” 2015.
5. Keith M. Martin, "Everyday Cryptography: Fundamental Principles and Applications", Oxford University Press, 2012.

Total Number Of Topics:58

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	18	31
2	Regional	22	37.9
3	National	13	22.4
4	Global	19	32.8

**SEMESTER – I**

**CORE COURSE III – TEACHING AND LEARNING SKILLS**

Course Code: 18MPCS1CC3

**Total Marks: 100**

**Hours: 3**

**External Marks: 75**

**Credit: 4**

**Internal Marks: 25**

**Course Objectives :**

- Acquaint different parts of computer system and their functions.
- Understand the operations and use of computers and common Accessories.
- Develop skills of ICT and apply them in teaching learning context and Research

**Course Outcomes (Cos)**

**CO1:**Identify and describe the political, religious, economic, and social uses of art in Italy during the Renaissance.

**CO2:**Identify a range of works of art and artists.

**CO3:**Analyze the role of art and of the artist in Italy at this time and analyze the art of the period according to objective methods.

**CO4:**Link different materials and types of art to the attitudes and values of the period.

**CO5:**Evaluate and defend their response to a range of art historical issues.

**Unit I :** Computer Application Skills-Information and Communication Technology (ICT)- Definition - Meaning - Features - Trends - Integration of ICT in teaching and learning -ICT applications- Using word processors - Spread sheets - Power point slides in the classroom - ICT for Research- On line journals – e books - Courseware - Tutorials - Technical reports - Theses and Dissertations - ICT for Professional Development - Concept of professional development- institutional efforts for competency building- individual learning for professional development using professional networks - OERs - technology for action research etc.

**Unit II :** Communications Skills Communication- Definitions - Elements of Communication- Sender - Message - Channel - Receiver - Feedback and Noise -Types of Communication- Spoken and Written- Non verbal communication - Intrapersonal - interpersonal- Group and Mass communication - Barriers to communication- Mechanical - Physical - Linguistic & Cultural - Skills of communication- Listening - Speaking - Reading and Writing - Methods of developing fluency in oral and written communication - Style - Diction and Vocabulary -Classroom communication and dynamics.

**Unit III :** Pedagogy Instructional Technology- Definition - Objectives and Types - Difference between Teaching and Instruction - Lecture Technique- Steps - Planning of a Lecture - Delivery of a Lecture - Narration in tune with the nature of different disciplines - Lecture with power point presentation - Versatility of Lecture technique - Demonstration- Characteristics - Principles - planning Implementation and Evaluation - Teaching-learning Techniques- Team Teaching - Group discussion - Seminar - Workshop - Symposium and Panel Discussion.

**Unit IV :** E\_ Learning - Technology Integration and Academic Resources in India Concept and types of e\_learning (synchronous and asynchronous instructional delivery and means)-m learning (mobile apps)- blended learning- flipped learning- E\_learning tools (like LMS, software's for word processing , making presentations, online editing, etc.)- subject specific tools for e\_learning- awareness of e\_learning standards- Concept of technology integration in teaching- learning processes- frameworks guiding

technology integration (like TPACK; SAMR)- Technology Integration Matrix- Academic Resources in India- MOOC - NMEICT- NPTEL- e\_pathshala - SWAYAM - SWAYAM Piranha -National academic depository- National Digital Library- e\_Sod Singh- virtual labs- yenta-Talk to a teacher- MOODLE- mobile apps etc.

**Unit V : Skills of Teaching and Technology based assessment Teaching skills-** Definition- Meaning and Nature- Types of Teaching Skills- Skill of Set Induction- Skill of Stimulus Variation- Skill of Explaining- Skill of Probing Questions-Skill of Black Board Writing and Skill of Closure - Integration of Teaching Skills - Evaluation of Teaching Skills- Technology for Assessment: Concept of assessment and paradigm shift in assessment- role of technology in assessment ‘for’ learning- tools for self & peer assessment (recording devices; erubrics, etc.)- online assessment (open source software’s; e portfolio; quiz makers; e rubrics; survey tools)- technology for assessment of collaborative learning like blogs- discussion forums- learning analytics.

### References :

1. Bela Rani Sharma (2007), Curriculum Reforms and Teaching Methods, Sarup and sons, New Delhi
2. Brandon Hall , E-learning, A research note by Namahn, found in: [www.namahn.com/resources/.../note-e-learning.pdf](http://www.namahn.com/resources/.../note-e-learning.pdf), Retrieved on 05/08/2011
3. Don Skinner (2005), Teacher Training, Edinburgh University Press Ltd., Edinburgh
4. Information and Communication Technology in Education: A Curriculum for schools and programmed of Teacher Development, Jonathan Anderson and Tom Van Weert, UNESCO, 2002.
5. Jereb, E., & Šmitek, B. (2006). Applying multimedia instruction in elearning. *Innovations in Education & Teaching International*, 43(1), 15-27.
6. Kumar, K.L. (2008) Educational Technology, New Age International Publishers, New Delhi.
7. Learning Management system : [https://en.wikipedia.org/wiki/Learning\\_management\\_system](https://en.wikipedia.org/wiki/Learning_management_system) , Retrieved on 05/01/2016
8. Mangal, S.K (2002) Essential of Teaching – Learning and Information Technology, Tandon Publications, Ludhiana.
9. Michael, D and William (2000), Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New York.
10. Pandey, S.K (2005) Teaching communication, Commonwealth Publishers, New Delhi.
11. Ram Babu, A abd Dandapani, S (2006), Microteaching (Vol.1 & 2), Neelkamal Publications, Hyderabad.
12. Singh, V.K and Sudarshan K.N. (1996), Computer Education, Discovery Publishing Company, New York.
13. Sharma, R.A., (2006) Fundamentals of Educational Technology, Surya Publications, Meerut
14. Vanaja, M and Rajasekar, S (2006), Computer Education, Neelkamal Publications, Hyderabad.

Total Number Of Topics:117

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	40	34.2
2	Regional	21	17.9
3	National	25	21.4
4	Global	45	38.5

## **SEMESTER – I**

### **CORE COURSE IV – GUIDE PAPER**

**Course Code:** 18MPCS1CC4

**Total Marks : 100**

**Hours: 3**

**External Marks: 75**

**Credit: 4**

**Internal Marks: 25**

**Name of the Supervisor : A.Mahendiran**

**Title of the Course : Cloud Computing and Software Services**

**Course Objectives:**

- Gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now.
- Provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

### **Course Outcomes(Cos):**

**CO1:** Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.

**CO2:** Apply fundamental concepts in cloud infrastructures to understand the tradeoffs in power, efficiency and cost, and then study how to leverage and manage single and multiple datacenters to build and deploy cloud applications that are resilient, elastic and cost-efficient.

**CO3:** Discuss system, network and storage virtualization and outline their role in enabling the cloud computing system model.

**CO4:** Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS.

**CO5:** Analyze various cloud programming models and apply them to solve problems on the cloud.

### **Unit I: Cloud Computing Fundamentals**

Introduction- Layers of Cloud Computing- Types of Cloud Computing- Cloud Computing Versus Cloud Services- Enabling Technologies- Cloud Computing Features- Cloud Computing Platforms- Cloud Computing Challenges-Cloud Types - Cloud Services and Cloud Roles- Infrastructure as a Service- Platform as a Service- Software as a Service- The Amazon Family

### **Unit II: Science Gateways**

Science Gateways-Background and Motivation-Clouds and Software Services-Science Clouds- Public and Private -Eucalyptus – Open Source IAAS - Engineering Challenge- Eucalyptus Architecture-Cloud Computing for Science - Nimbus Goals and Architecture - Science Clouds Applications - Nimbus Helps Meet STAR Production Demands - Building a Cloud Computing Ecosystem with Cinram - Cloud BLAST- Creating a Distributed Cloud Platform -Architecture of an Seas Science Gateway -Dynamic Provisioning of Large-Scale Scientific Datasets - Science Gateways for Data - Cloud Computing and Data.

### **Unit III: Enterprise Knowledge Clouds**

Introduction - Enterprise Knowledge Management- Architecture and Technologies -Enterprise Knowledge Cloud- Real Cases and Applications of Cloud Computing -Cloud Computing- IT as a Service-Cloud Computing Security-Cloud Computing Model Application Methodology-Cloud

## Computing in Development/Test-Cloud Based High Performance Computing Clusters-Use Cases of Cloud Computing

### Unit IV: Large\_Scale Data Processing

Introduction -Map Reduce - Programming Model -Implementation Sketch- Failure Handling Optimizations - Grid Batch - DFS Extension -Grid Batch Operator- Map Reduce Implementation on a Cloud OS -What Is a Cloud OS? - Advantages Offered by a Cloud OS- Challenges Posed by Cloud OS - Advantages of Cloud Map Reduce - Cloud Map Reduce Architecture and Implementation - Architecture

### Unit V: Clustering

Introduction to Clustering Techniques-Points- Spaces and Distances -Clustering Strategies-The Curse of Dimensionality- Hierarchical Clustering -Hierarchical Clustering in a Euclidean Space - Efficiency of Hierarchical Clustering-Alternative Rules for Controlling Hierarchical Clustering – K\_means Algorithms- K\_Means Basics - The Algorithm of Bradley- Fayyad and Reina - The CURE Algorithm- Initialization in CURE - Completion of the CURE Algorithm - Clustering – Non Euclidean Spaces- Clustering for Streams and Parallelism.

### References:

1. Borko Furht , Armando Escalante ,“Hand Book of Cloud Computing “ – Springer
2. Syed A. Ahson , Mohammad Ilyas ,”Cloud Computing and Software Services”- CRC Press.
3. Anand Rajaraman and Jeffrey D. Ullman, “Mining of MassiveDatasets”.

Total Number Of Topics:81

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	10	12.3
2	Regional	14	17.3
3	National	21	25.9
4	Global	40	49.4

**SEMESTER – I**  
**CORE COURSE IV – GUIDE PAPER**

**Course Code:** 18MPCS1CC4

**Total Marks : 100**

**Hours:** 3

**External Marks:** 75

**Credit:** 4

**Internal Marks:** 25

**Name of the Supervisor** : **Dr.S.Sivakumar**

**Title of the Course** : **Data Mining and Knowledge Discovery**

**Course Objectives:**

- To introduce students to basic applications, concepts, and techniques of data mining.
- To develop skills for using recent data mining software to solve practical problems in a variety of disciplines.

## Course Outcomes(Cos):

**CO1:** Understand what Is Data Mining, what kinds of data can be mined, what kinds of patterns can be mined, and what kinds of applications are targeted.

**CO2:** Explain major Issues in data mining.

**CO3:** Apply machine learning, pattern recognition, statistics, visualization, algorithm, database technology and high-performance computing in data mining applications.

**CO4:** Identify what kinds of technologies are used for different application.

**CO5:** Manipulate data preprocessing, data Warehouse and OLAP technology, data cube technology; mining frequent patterns and association, classification, clustering, and outlier detection.

## UNIT1

Data mining- Introduction- Motivation- Important - What kind of data?-functionalities- Patterns-classifications -Data warehouse and OLAP technology for data mining- Introduction-multidimensional data model- Architecture- implementation- Data preprocessing Why?- Data cleaning-Integration & Transformation-Reduction.

## UNIT2

Primitives for data mining- what defines a data mining task?- Concepts description- Characterization and Comparison - what is concept description?- data generalization and summarization-based characterization- efficient implementation- mining class comparisons.

## UNIT3

Classification & Prediction- Classification Algorithm- C4.5- Apriority- SVM- Gadabouts- ken -Naive Bays- CART - Cluster Analysis- what is CA?- Type of data in CA- Hierarchical methods – Density based – Grid based- Model based-Clustering Algorithm- K Means EM(expectation maximization)- Page rank.

## UNIT4

Mining complex types of data- Generalization & multidimensional analysis - Spatial Database- Time series & Temporal - Mining text databases- Multimedia databases - Mining in WWW.

## UNIT5

Data Mining Applications and trends in data mining- data mining applications- other themes on data mining- social impacts of data mining- trends & Research issues in data mining-Data Mining for Business Applications-Domain Driven KDD Methodology.

## Reference Books:

1. Jiawei Han, Micheline Kamber “Data Mining: Concepts and Techniques”
2. “The Top Ten Algorithms in Data Mining” Edited by Xindong Wu, Vipin Kumar
3. Longbing Cao, Philip Yu, Chengqi Zhang, Huaifeng Zhang “Data Mining for Business Applications”

Total Number Of Topics:60

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	11	18.3
2	Regional	14	23.3
3	National	7	11.7
4	Global	26	43.3

**SEMESTER – I**

**CORE COURSE IV – GUIDE PAPER**

**Course Code:** 18MPCS1CC4

**Total Marks : 100**

**Hours: 3**

**External Marks: 75**

**Credit: 4**

**Internal Marks: 25**

**Name of the Supervisor : Dr.V.Arulkumar**

**Title of the Course : Data Mining**

**Course Objectives:**

- To introduce students to basic applications, concepts, and techniques of data mining.
- To develop skills for using recent data mining software to solve practical problems in a variety of disciplines.

## Course Outcomes(Cos)

**CO1:**Analyze data mining problems and reason about the most appropriate methods.

**CO2:**To apply to a given dataset and knowledge extraction need.

**CO3:**Implement basic pre-processing, association mining, classification and clustering algorithms.

**CO4:**Apply and reflect on advanced pre-processing, association mining, classification and clustering algorithms.

**CO5:**Work efficiently in groups and evaluate the algorithms on real-world problems.

### Unit I:

Introduction- Basic Data Mining Tasks- Data Mining Issues- Data Mining Metrics-Data Mining from a Database Perspective.

### Unit II:

Data Mining Techniques- A Statistical Perspective on Data Mining- Similarity Measures - Decision Trees-Neural Networks-Genetic Algorithms.

### Unit III:

Classification- Statistical-Based Algorithms- Distance-Based Algorithms- Decision Tree-Based Algorithms- Neural network-Based Algorithms- Rule Based Algorithms- Combining Techniques.

### Unit IV:

Clustering- Similarity and Distance Measures- Hierarchical Algorithms- Partitioned Algorithms- Clustering Large Databases- Clustering with Categorical Attributes.

### Unit V:

Association Rules- Basic Algorithms- Parallel and Distributed Algorithms- Incremental Rules- Advanced Association Rule Techniques- Measuring the Quality of Rules- Advanced Techniques - Web Mining- Spatial Mining- Temporal Mining.

## Text Books

1. J. Han and M. Kamber. Data Mining: Concepts and Techniques, 2nd Ed. Morgan Kaufman. 2006.

## References

1. M. H. Dunham. Data Mining: Introductory and Advanced Topics. Pearson Education. 2001.

2. I. H. Witten and E. Frank. Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann. 2000.

3. D. Hand, H. Mannila and P. Smyth. Principles of Data Mining. Prentice-Hall. 2001.

Total Number Of Topics:38

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	5	13.2
2	Regional	11	28.9
3	National	4	10.5
4	Global	27	71.1

**SEMESTER – I**  
**CORE COURSE IV – GUIDE PAPER**

**Course Code:** 18MPCS1CC4

**Total Marks : 100**

**Hours: 3**

**External Marks: 75**

**Credit: 4**

**Internal Marks: 25**

**Name of the Supervisor : J.Umarani**

**Title of the Course : Web Mining**

**Course Objectives:**

- To Understand Web Services and implementation model for SOA and Understand the SOA, its Principles and Benefits.
- To Understand paradigms needed for testing Web Services 5. To explore different Test Strategies for SOA-based applications.

### Course Outcomes:

On successful completion of this course students will be able to

**CO1:** Understand the design principles and application of SOAP and REST based web services.

**CO2:** Design collaborating web services according to a specification.

**CO3:** Implement an application that uses multiple web services in a realistic business scenario

**CO4:** Use industry standard open source tools such as Apache Axis2, Tomcat, Derby and Eclipse to build, test, deploy and execute web services and web applications that consume them

**CO5:** Identify and select the appropriate framework components in creation of web service solution

### Unit I

Introduction to data mining - Association Rules and Sequential Patterns- Basic concepts of association rules mining - **Apriori Algorithm** - **Data format for association rule mining** -Mining with multiple minimum support - **Mining Class association Rules**.

### Unit II

Basic Concepts of Information Retrieval -Information Retrieval Models- **Boolean Model-Vector Space Model-Statistical Language Model** - Relevance Feedback - Evaluation Measures - Text and Web Page Pre Processing-**stop word Removal- Stemming- Other Pre Processing Tasks for Text- Web Page Pre Processing- Duplicate Detection**.

### Unit III

Inverted Index and Its Compression- **Inverted Index** - **Search Using an Inverted Index** - **Index Construction** - **Index Compression- Latent Semantic Indexing- Singular Value Decomposition** - **Query and Retrieval** - **An Example- Web Search- Meta\_Search- Combining Multiple Rankings** - **Combination Using Similarity Scores** - **Combination Using Rank Positions-Web Spamming- Content Spamming** - **Link Spamming :Hiding Techniques** - **Combating Spam**.

### Unit IV

Social Network Analysis- **Centrality** - **Prestige** - **Co\_Citation and Bibliographic Coupling** - **PageRank- PageRank Algorithm** - **Strengths** - **Weaknesses of PageRank** - **Timed PageRank** – **HITS- HITS Algorithm** - **Finding Other Eigenvectors** - Relationships with **Co\_Citation and Bibliographic Coupling** - **Strengths and Weaknesses of HITS** - **Community Discovery- Problem Definition** - **Bipartite Core Communities** - **Maximum Flow Communities** - **Email Communities Based on Betweenness** - **Overlapping Communities of Named Entities**.

## Unit - V

### Data Collection and Pre\_Processing-Data Modeling for Web Usage -Discovery and Analysis of Web Usage Patterns

Text Book:

**Web DataMining** - Exploring Hyperlinks,Contents, and Usage Data

*Bing Liu*

ISBN-10 3-540-37881-2 Springer Berlin Heidelberg New York

ISBN-13 978-3-540-37881-5 Springer Berlin Heidelberg New York

Total Number Of Topics:62

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	16	25.8
2	Regional	8	12.9
3	National	15	24.2
4	Global	27	43.5

## SEMESTER – I

### CORE COURSE IV – GUIDE PAPER

**Course Code:** 18MPCS1CC4

**Total Marks : 100**

**Hours: 3**

**External Marks: 75**

**Credit: 4**

**Internal Marks: 25**

**Name of the Supervisor : M.Natarajan**

**Title of the Course : Distributed Database System**

#### Course Objectives

- Make it easy for users to access remote resources
- Share them with other users in a controlled manner

#### Course Outcomes:

On successful completion of the course, students will able to

**CO1:**Clear understanding on several resource management techniques like distributed shared memory and other resources

**CO2:**Knowledge to understand hardware, software and communication in

distributed OS

**CO3:** Understand the different Distributed Systems and the challenges involved in Design of the Distributed Systems.

**CO4:** Able to design and implement algorithms of distributed shared memory and commit protocols

**CO5:** Able to design and implement fault tolerant distributed systems

### Unit I

Introduction -Operating System Definition -Functions of Operating System -Types of Advanced Operating System - Design Approaches - Synchronization Mechanisms - concepts of a Process - Critical Section Problem - Process Deadlock - Models of Deadlock - Conditions for Deadlock - System with single-unit requests- Consumable Resources - Reusable Resources.

### Unit II

Distributed Operating Systems: Introduction- Issues - Communication Primitives - Inherent Limitations - Lamport's Logical Clock- Vector Clock- Global State- Cuts - Termination Detection - Distributed Mutual Exclusion - Non Token Based Algorithms - Lamport's Algorithm - Token Based Algorithms -Distributed Deadlock Detection - Distributed Deadlock Detection Algorithms -Agreement Protocols

### Unit III

Distributed Resource Management : Distributed File Systems - Architecture and Mechanisms - Design Issues and Distributed shared Memory - Architecture Algorithm : Protocols - Design Issues - Distributed Scheduling - Issues - Components - Algorithms- Distributed File System: Introduction - Desirable features - File Models - File Accessing Models -File Sharing Semantics

### Unit IV

Failure Recovery and Fault Tolerance - Concepts - Failure Classifications - Approaches to Recovery - Recovery in Concurrent Systems - Synchronous and Asynchronous Check pointing and Recovery -Check pointing in Distributed Database Systems - Fault Tolerance Issues - Two\_Phase and Non blocking Commit Protocols - Voting Protocols - Dynamic Voting Protocols.

### Unit V

Multiprocessor and Database Operating Systems -Structures -Design Issues -Threads - Process Synchronization - Processor Scheduling - Memory management - Reliability/Fault Tolerance - Database Operating Systems - concepts - Features of Android OS- Ubuntu- Google Chrome OS and Linux operating systems.

### Text Book(s):

1. Mukesh Singhal N.G.Shivaratri, "Advanced Concepts in Operating Systems", McGraw Hill 2000.
2. Distributed Operating System – Andrew S. Tanenbaum, PHI.

### Reference Book(s):

- 1.Abraham Silberschatz, Peter B.Galvin, G.Gagne, "Operating Concepts",

6<sup>th</sup> Edition Addison Wesley publications 2003. 2.Andrew  
 S.Tanenbaum, “Modern Operating Systems”, 2<sup>nd</sup> Edition Addison  
 Wesley 2001.

Total Number Of Topics:69

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	7	10.1
2	Regional	13	18.8
3	National	14	20.3
4	Global	36	52.2

**SEMESTER – I**  
**CORE COURSE IV – GUIDE PAPER**

**Course Code:** 18MPCS1CC4

**Total Marks : 100**

**Hours:** 3

**External Marks:** 75

**Credit:** 4

**Internal Marks:** 25

**Name of the Supervisor :** B.Chitradevi

**Title of the Course :** **Image Processing**

**Course Objects:**

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques& To study image restoration procedures  
Course Outcomes.

**Course Outcomes:**

On successful completion of the course, students will able to

**CO1:**Review the fundamental concepts of a digital image processing system and Analyze images in the frequency domain using various transforms.

**CO2:**Evaluate the techniques for image enhancement and image restoration. Categorize various compression techniques.

**CO3:**Interpret Image compression standards, and Interpret image segmentation and representation techniques.

**CO4:**Gain idea to process various image used in various fields such as weather forecasting,

### Unit I

Image Sensing and Acquisition- Image Sampling and Quantization: relationship between Pixels- Random noise- Gaussian Markov Random Field-  $\sigma$ -field- Linear and Nonlinear Operations- Image processing models- Causal and Semi-causal- Non causal models- Continuous And Discrete Images And Systems :Light Luminance- Brightness and Contrast -The Monochrome Vision Model- Image Processing Problems and Applications-Color Fundamentals- Color Models- Pseudo\_color Image Processing- Full Color Image Processing- Color Transformation- Noise in Color Images.

### Unit II

Spatial Domain- Enhancement in spatial domain- Point processing- Mask processing- Smoothing Spatial Filters- Sharpening Spatial Filters- Combining Spatial Enhancement Methods-Frequency Domain- Image transforms- FFT- DCT- Karhunen-Loeve transform- Hotelling's T2 transform- Wavelet transforms and their properties.-Image filtering in frequency domain.

### Unit III

Edge Detection- Types of edges- threshold- zero crossing- Gradient operators- Roberts- Prewitt and Sobel operators- residual analysis based technique- Canny edge detection- Edge features and their applications.

### Unit IV

Image Compression- Fundamentals- Image Compression Models- Elements of Information Theory- Error Free Compression- Huffman coding- Arithmetic coding- Wavelet transform based coding- Lossy Compression: FFT- DCT- KLT- DPCM- MRFM based compression- Wavelet transform based-Image Compression standards.

### Unit V

Image Segmentation- Detection and Discontinuities- Edge Linking and Boundary Deduction- Threshold- Region-Based Segmentation- Segmentation by Morphological watersheds- The use of motion in segmentation- Image Segmentation based on Color- Morphological Image Processing- Erosion and Dilation- Opening and Closing- Hit\_Or\_Miss Transformation- Basic Morphological Algorithms- Gray\_Scale Morphology.

### Text Book(s):

1. Rafael Gonzalez, Richard E. Woods, "Digital Image Processing", Fourth Edition, PHI/Pearson Education, 2013.
2. A. K. Jain, Fundamentals of Image Processing, Second Ed., PHI, New Delhi, 2015.

**Reference Book(s):**

1. B. Chan Ia, D. Dutta Majumder, “Digital Image Processing and Analysis”, PHI, 2003.  
Nick Elford, “Digital Image Processing a practical introducing using  
2. Java”, Pearson Education, 2004.
3. Todd R. Reed, “Digital Image Sequence Processing, Compression, and Analysis”, CRC Press, 2015.

Total Number Of Topics:73

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	18	24.7
2	Regional	21	27.8
3	National	19	26
4	Global	21	28.8