

2020

# **B.Sc COMPUTER SCIENCE**

## **Course Structure and Syllabus**

(For the candidates admitted from the academic year 2020-2021 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):**

## Undergraduate Programmes

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

- ✓ Acquire knowledge, understand concepts and apply new ideas which enable them to be employable or self employed
- ✓ Demonstrate motivation in advancing to higher learning programmes
- ✓ Engage in socially responsible behavior and have value added education
- ✓ Have exposure to technical proficiency, analytical capability, soft skills and life skills development
- ✓ Develop broad understanding in the basic concepts of Languages/Commerce/Management Studies/Physical Sciences/Computer Sciences/Biological Sciences/Life Sciences.

**Program Specific Outcomes (PSOs):**

- ❖ Provides basic knowledge on core concepts of Computer Science.
- ❖ Ability to solve problems using programming languages and software tools.
- ❖ Capable of analyzing, designing, developing, testing and implementing software systems.
- ❖ Acquire skill in Mathematics, Electronics and Computer Science courses; these empower the analytical mind and critical thinking.
- ❖ Ability to communicate the technical aspects of systems with peers and customers, which possess employability and entrepreneurship skills.

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

**B.Sc. Computer Science Course Structure under CBCS**

(For the candidates admitted from the academic year 2020-2021 onwards)

Semester	Part	Course Code	Title of the Course	Ins. Hours/Weeks	Credit	Exam Hours	CIA (Max)	ESE (Max)	Total (Max)
1	I	20UT1	Tamil-I (Ilakiyam - Kavithai, Sirukathai, Urainadai, IlakkiyaVaralaru)	6	3	3	25	75	100
1	II	20UE1	English-I (Communicative English)	6	3	3	25	75	100
1	III	20UCS1CC1	<b>Programming in C</b>	5	4	3	25	75	100
1	III	20UMA1AC1	Mathematics-I (Numerical Methods and Statistics)	5	3	3	25	75	100
1	III	20UCS1CP1	<b>Programming in C Lab</b>	4	3	3	40	60	100
1	III	20UCS1PE1	Professional English for Physical Science - I(Stream-A)	2	2	3	25	75	100
1	IV	20UVE	Value Education	2	2	3	25	75	100
			Total	<b>30</b>	<b>20</b>	-	-	-	<b>700</b>
2	I	20UT2	Tamil-II (IdaikkalaIlakkiyam, Nadagam, Puthinam, IlakkiyaVaralaru)	6	3	3	25	75	100
2	II	20UE2	English-II (Communicative English)	6	3	3	25	75	100
2	III	20UCS2CC2	<b>Object Oriented Programming using C++</b>	5	5	3	25	75	100
2	III	20UMA2AC2	Mathematics-II (Operation Research)	5	3	3	25	75	100
2	III	20UCS2CP2	<b>Object Oriented Programming using C++ Lab</b>	4	3	3	40	60	100
2	III	20UCS2PE2	Professional English for Physical Science-II(Stream-A)	2	2	3	25	75	100
2	IV	20UES	Environmental Studies	2	2	3	25	75	100
			Total	<b>30</b>	<b>21</b>	-	-	-	<b>700</b>
3	I	20UT3	Tamil-III (KappiyaIlakkiyam, Nadagam, IlakkiyaVaralaru)	6	3	3	25	75	100
3	II	20UE3	English-III Language Through Literature and Communicative Skills 1	6	3	3	25	75	100

3	III	20UCS3CC3	Programming in Java	6	5	3	25	75	100
3	III	20UPH3AC3	Applied Physics-I	4	4	3	25	75	100
3	III	20UCS3CP3	Programming in Java Lab	3	3	3	40	60	100
3	IV	20UPH4AP2	Applied Physics-II(Practical)	3	-	-	-	-	-
3	IV		NME1 Working Principles of Internet	2	2	3	25	75	100
			Total	<b>30</b>	<b>20</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>600</b>
4	I	20UT4	Tamil-IV (PalanIlakkiyam, IlakiyaVaralaru, Podhukatturai)	6	3	3	25	75	100
4	II	20UE4	English-IV	6	3	3	25	75	100
4	III	20UCS4CC4	Relational Database Management Systems	4	4	3	25	75	100
4	III	20UCS4CP4	SQL and PLSQL Lab	3	2	3	40	60	100
4	III	20UPH4AC4	Applied Physics-III	4	3	3	25	75	100
4	III	20UPH4AP2	Applied Physics Lab-II (Practical)	3	3	3	40	60	100
4	IV	20UCS3NME2	NME2(Fundamentals of Information Technology)*	2	2	3	25	75	100
4	IV	20UCS4SBE1	SBE 1-Office Automation	2	2	3	25	75	100
			Total	<b>30</b>	<b>22</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>800</b>
5	III	20UCS5CC5	Operating Systems	6	5	3	25	75	100
5	III	20UCS5CC6	Web Technology	5	5	3	25	75	100
5	III	20UCS5CC7	Computer Networks	5	5	3	25	75	100
5	III	20UCS5CP5	Web Technology Lab	3	3	3	40	60	100
5	III	20UCS5MBE1:1/ 20UCS5MBE1:2/ 20UCS5MBE1:3	Data Structures and Algorithms Microprocessor & Assembly Language Programming/Computer Graphics	5	5	3	25	75	100
5	IV	20UCS5SBE2	SBE 2-Quantitative Aptitude	2	2	3	25	75	100
5	IV	20UCS5SBE3	SBE 3-Android Programming	2	2	3	25	75	100
5	IV	20USSD	Soft Skill Development	2	2	3	25	75	100
			Total	<b>30</b>	<b>29</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>800</b>
6	III	20UCS6CC8	Software Engineering	6	6	3	25	75	100
6	III	20UCS6CC9	Programming in Python	6	6	3	25	75	100

6	III	20UCS6CP6	Python Programming Lab	5	4	3	40	60	100
6	III	20UCS6MBE2:1/ 20UCS6MBE2:2/ 20UCS6MBE2:3	Multimedia Systems/ Open Source Technology/ Linux and Shell Programming	6	5	3	25	75	100
6	III	20UCS6PW/ 20UCS6MBE3:1/ 20UCS6MBE3:2	Mini Project(Students to do it in their respective Colleges)/ Open Source Technology Lab/Shell Programming Lab	6	5	3	40	60	100
6	V	20UGS	Gender Studies	1	1	3	25	75	100
6	V		Extension Activities	-	1	-	-	-	-
			Total	<b>30</b>	<b>28</b>	-	-	-	<b>600</b>
			Grand Total	<b>180</b>	<b>140</b>				<b>4200</b>

**List of Allied Courses:**

**Allied Course I**

Mathematical

**Paper Details:**

Tamil Paper-Part I - 4

English Paper-Part II - 4

Core Course Paper - 9

Core Course Practical - 6

Allied Course Paper - 4

Allied Course Practical- 2

Non-Major Elective - 2

Skill Based Elective - 3

Major Based Elective - 3

Environmental Studies - 1

Value Education - 1

Professional English - 2

Soft Skill Development- 1

Gender Studies - 1

Extension Activities - 1 (Credit Only)

**Allied Course II**

Applied Physics

- 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

i) Basic Tamil I & II for other language students

ii) 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		

**NME Papers offered to Other Department**

20UCS3NME1 - Working Principles of Internet (Theory)

20UCS4NME2 - Fundamentals of Information Technology (Theory)

**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]

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## SEMESTER-I

Course Code: 20UCS1CC1  
Instruction Hours: 5  
Credits: 4

Exam Hours: 3  
Internal Marks: 25  
External Marks: 75

### CORE COURSE-I PROGRAMMING IN C

#### Course Outcomes (CO):

On completion of the course, the student will be able to

CO1: Demonstrate an understanding of computer programming language concepts.

CO2: Able to define data types and use them in simple data processing applications

CO3: Able to use the concept of array of structures. Student must be able to define union and enumeration user defined data types.

CO4: Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.

CO5: Develop confidence for self-education and ability for life-long learning needed for Computer language.

#### UNIT I

C fundamentals - structure of C program - Character set - Identifier and keywords - data types - types of data types - constants - Variables - Declarations - Expressions - Statements - Arithmetic - Unary - Relational and logical - Assignment and Conditional Operators - Library functions.

#### UNIT II

Data input output functions - Simple C programs - Flow of control - if\_ if-else\_ while- do-while\_ for loop - Nested control structures - Switch - break and continue - go to statements - Comma operator.

#### UNIT III

Functions - Definition - proto-types - Passing arguments - Recursions. Storage Classes - Automatic- External - Static - Register Variables - Multi-file programs.

#### UNIT IV

Arrays - Defining and Processing - Passing arrays to functions - Multi-dimension arrays - Arrays and String - Structures - User defined data types - Passing structures to functions - Self-referential structures - Unions - Bit wise operations.

#### UNIT V

Pointers - Declarations - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Files: Creating Processing - Opening and Closing a data file.

#### TEXT BOOK:

1. E. Balagurusamy, "Programming in ANSI C", Fifth Edition, Tata McGraw Hill.

#### REFERENCE BOOKS:

1. B.W. Kernighan and D M. Ritchie, "The C Programming Language", 2nd Edition, PHI, 1988.

2. H. Schildt, "C: The Complete Reference", 4th Edition. TMH Edition, 2000.

3. Gottfried B.S, "Programming with C", Second Edition, TMH Pub. Co. Ltd., New Delhi 1996.

4. Kanetkar Y., “Let us C”, BPB Pub., New Delhi, 1999.

Total Number of Topics Present in the course: 57

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	6	10.5
2.	Regional	0	0.0
3.	National	0	0.0
4.	Global	51	89.5

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

### Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
I	20UCS1CC1	PROGRAMMING IN C					5	4			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓		✓	✓		✓		✓			
CO2	✓	✓	✓			✓	✓	✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓		✓	
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 39, Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
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<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

### **SEMESTER-I**

Course Code: 20UCS1CP1

Instruction Hours: 4

Credits: 3

Exam Hours: 3

Internal Marks: 40

External Marks: 60

### **PART-III**

### **CORE COURSE PRACTICAL -I PROGRAMMING IN C LAB**

#### **Course Outcomes (CO):**

On completion of the course, the student will be able to

CO1:Read, understand and trace the execution of programs written in C language.

CO2:Write the C code for a given algorithm.

CO3:Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-Processor.

CO4:Write programs that perform operations using derived data types.

CO5:Able to develop applications

#### **I Summation of Series**

1. Sin(x)
2. Cos(x)
3. Exp(x) (Comparison with built in functions)

#### **II String Manipulation**

1. Counting the number of vowels - consonants - words - white spaces in a line of text and array of lines.
2. Reverse a string and check for palindrome.

3. Sub string detection, count and removal.
4. Finding and replacing substrings.

### III Recursion

1. nPr, nCr
2. GCD of two numbers
3. Fibonacci sequence
4. Maximum & Minimum

### IV Matrix Manipulation

1. Addition and Subtraction
2. Multiplication
3. Transpose, and trace of a matrix
4. Determinant of a Matrix

### V Sorting and Searching

1. Insertion Sort
2. Bubble Sort
3. Linear Search
4. Binary Search

Total Number of Topics Present in the course: 19

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	4	21.1
2.	Regional	0	0.0
3.	National	0	0.0
4.	Global	15	78.9

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course	Hours	Credits
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I	20UCS1CP1	PROGRAMMING IN C LAB					4	3			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓		✓	✓		✓				✓	
CO2	✓		✓	✓		✓	✓		✓	✓	
CO3	✓	✓	✓	✓	✓	✓	✓		✓	✓	
CO4		✓			✓	✓	✓	✓	✓	✓	
CO5	✓	✓		✓	✓		✓	✓	✓		
Number of matches (✓) = 35, Relationship: High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

## SEMESTER-II

Course Code: 20UCS2CC2  
Instruction Hours: 5  
Credits: 5

Exam Hours: 3  
Internal Marks: 25  
External Marks: 75

### **CORE COURSE-II OBJECT ORIENTED PROGRAMMING USING C++**

#### **Course Outcomes (CO):**

On completion of the course, the student will be able to

CO1:Identify importance of object oriented programming and difference between structured oriented and object oriented programming features.

CO2:Able to make use of objects and classes for developing programs.

CO3:Able to use various object oriented concepts to solve different problems.

CO4:To learn how inheritance and virtual functions implement dynamic binding with polymorphism.

CO5:Understand advanced features of C++ specifically stream I/O, templates and operator overloading

#### **UNIT I**

Principles of Object\_Oriented Programming - Beginning with C++ - Tokens - Expressions and Control Structures - Functions in C++

#### **UNIT II**

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

#### **UNIT III**

Inheritance- Extending Classes - Pointers- Virtual Functions and Polymorphism

#### **UNIT IV**

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

#### **UNIT V**

Standard Template Library - Manipulating Strings - Object Oriented Systems Development

#### **TEXT BOOK**

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

#### **REFERENCE BOOK**

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

Total Number of Topics Present in the course: 21

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	4	19
2.	Regional	0	0.0
3.	National	0	0.0
4.	Global	17	81

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits				
II	20UCS2CC2	OBJECT ORIENTED PROGRAMMING USING C++					5	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓			✓	✓				
CO2	✓	✓					✓			✓		
CO3	✓	✓	✓	✓		✓	✓	✓	✓	✓		
CO4	✓	✓	✓	✓		✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Number of matches (✓) = 38, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50

<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High
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**Prepared by:**

**Checked by:**

**HOD:**

## SEMESTER-II

Course Code: 20UCS2CP2

Instruction Hours: 4

Credits: 3

Exam Hours: 3

Internal Marks: 40

External Marks: 60

### CORE COURSE PRACTICAL -II **OBJECT ORIENTED PROGRAMMING USING C++ LAB**

#### **Course Outcomes(CO):**

On completion of the course, the student will be able to

CO1:To familiarize the students with language environment.

CO2:To implement various concepts related to language.

CO3:Identify importance of object oriented programming and difference between structured oriented and object oriented programming features.

CO4:Able to make use of objects and classes for developing programs.

CO5:Able to use various object oriented concepts to solve different problems.

#### **1. Classes**

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

#### **2. Constructor & Destructor**

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

#### **3. Default & Reference Argument**

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

#### 4. Operator Overloading

- Addition of Two Complex Numbers.
- Matrix Multiplication

#### 5. Inheritance

Prepare Pay Roll of an employee using Inheritance.

#### 6. Pointers

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

#### 7. Files

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

#### 8. Exception Handling

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

Total Number of Topics Present in the course: 8

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	1	12.5
2.	Regional	0	0.0
3.	National	0	0.0
4.	Global	7	87.0

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits				
II	20UCS2CP2	OBJECT ORIENTED PROGRAMMING USING C++ LAB					4	3				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		

<b>CO1</b>	✓	✓				✓		✓		
<b>CO2</b>	✓	✓	✓	✓		✓	✓	✓		
<b>CO3</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>CO4</b>		✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>CO5</b>	✓	✓		✓					✓	✓
Number of matches (✓) = 35, Relationship: High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

### SEMESTER-III

Course Code: 20UCS3CC3  
Instruction Hours: 6

Exam Hours: 3  
Internal Marks: 25

## **CORE COURSE-III PROGRAMMING IN JAVA**

### **Course Outcomes(CO):**

On completion of the course, the student will be able to

- CO1:Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
- CO2:knowledge of the structure and model of the Java programming language.
- CO3:Able to understand the use of Packages and Interface in java.
- CO4:Able to understand the exception handling and develop applets for web applications with I/O streams.
- CO5:Able to design GUI based applications and Event handling

### **UNIT I**

Genesis of Java: Creation of Java - why java is important to internet - The Java Buzz words - An overview of Java Object Oriented Programming. Data types - Variables - Type conversion and casting - Automatic type promotion in Expressions - Strings. Arrays: One Dimensional Array - Multi Dimensional Array - **Operators - Control statements.**

### **UNIT II**

Class Fundamentals - Declaring objects - Assigning object Reference variables - Introducing Methods - Constructors - Garbage collection - Finalize () Method - Stack class. A Closer Look at Methods and classes: Overloading Methods - Argument passing - Nested and Inner classes - String class - Using command line arguments. **Inheritance Basics & Types** - Method overriding - Dynamic Method Dispatch - Using Abstract class - Using final with inheritance.

### **UNIT III**

Packages & Interface - **Exception Handling** - Creating your own Exception subclasses. Multithreaded Programming0  
+ - Main Thread - Creating a Thread - Creating Multiple Threads-Using is Alive () and join () - Thread priorities - Synchronization - **Inter thread Communication.**

### **UNIT IV**

I/O & Applets : I/O Basics Reading console Input - writing console output - The Print Writer class - Reading and Writing Files. The Applet class: - Applet Architecture - Applet Skeleton - Applet Display method - **Requesting Repainting** - **HTML APPLET tag**- Passing Parameters to Applet - Audio Clip Interface. Event Handling Mechanisms - Delegation Event Model - Event classes - Sources of Events - Event Listener Interfaces - **Adapter Classes.**

### **UNIT V**

AWT Classes - Window fundamentals - working with Frame Windows - working with Graphic Using AWT controls: Controls fundamentals - Labels - using Buttons - Applying check Boxes - Check Box group - Choice controls - Using a Text field - Using a Text Area - Understanding Layout Managers (Flow Layout only) - Menu Bars and Menus.

## TEXT BOOK

1. Herbert Schildt, “Java - The Complete Reference”, Ninth Edition, McGraw-Hill Education, 2014

## REFERENCE BOOKS

1. E. Balagurusamy, “Programming with Java”, Tata McGraw-Hill Education India, 2014
2. Sachin Malhotra & Saurabh Choudhary, “Programming in JAVA”, 2nd Ed, Oxford Press
3. Sagayaraj, Denis, Karthik and Gajalakshmi, “JAVA Programming for Core and Advanced Learners”, 2018

Total Number of Topics Present in the course: 74

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	8	10.8
2.	Regional	0	0.0
3.	National	0	0.0
4.	Global	66	89.2

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

## Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
III	20UCS3CC3	PROGRAMMING IN JAVA					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓		✓			✓				✓		
CO2	✓	✓	✓	✓		✓	✓		✓	✓		

<b>CO3</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>CO4</b>	✓	✓	✓	✓	✓		✓	✓	✓	✓
<b>CO5</b>	✓			✓	✓			✓	✓	✓
Number of matches (✓) = 37, Relationship: High										
<b>Mapping</b>	1-29%		30-59%		60-69%		70-89%		90-100%	
<b>Matches</b>	1-14		15-29		30-34		35-44		45-50	
<b>Relationship</b>	Very Poor		Poor		Moderate		High		Very High	

**Prepared by:**

**Checked by:**

**HOD:**

### SEMESTER-III

Course Code: 20UCS3CP3

Instruction Hours: 3

Credits: 3

Exam Hours: 3

Internal Marks: 40

External Marks: 60

### CORE COURSE PRATICAL-III PROGRAMMING IN JAVA LAB

**Course Outcomes(CO):**

On completion of the course, the student will be able to

- To familiarize the students with language environment.
- To implement various concepts related to language.
- Learn the basic concepts& techniques of java.
- Learn the advanced concepts of java.
- Generate an application based upon the concepts of java

1. Define a class called Student with the attributes name, reg\_number and marks obtained in four subjects(m1,m2,m3,m4).Write a suitable constructor and methods to find the total mark obtained by the student and display the details of the student.
2. Write a Java program to find the area of a square, rectangle and triangle by (i) Overloading Constructor (ii) Overloading Method.
3. Write a java program to add two complex numbers. [Use passing object as argument and return object].
4. Define a class called Student\_super with data members name, roll number and age. Write a suitable constructor and a method output () to display the details.
5. Derive another class Student from Student\_super with data members height and weight. Write a constructor and a method output () to display the details which overrides the super class method output().[Apply method Overriding concept].

6. Write a java program to create an interface called Demo, which contains a double type constant, and a method called area () with one double type argument. Implement the interface to find the area of a circle.
7. Write a java program to create a thread using Thread class.
8. Demonstrate Java inheritance using extends keyword.
9. Create an applet with four Checkboxes with labels MARUTI-800, ZEN, ALTO and ESTEEM and a Text area object. The program must display the details of the car while clicking a particular Checkbox.
10. Write a Java program to throw the following exception,
  - 1) Negative Array Size 2) Array Index out of Bounds
11. Write a java program to create a file menu with option New, Save and Close, Edit menu with option cut, copy, and paste.
12. Write a java programming to illustrate Mouse Event Handling

Total Number of Topics Present in the course: 12

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	3	25.0
2.	Regional	0	0.0
3.	National	0	0.0
4.	Global	9	75.0

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

3

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course	Hours	Credits
III	20UCS3CP3	PROGRAMMING IN JAVA LAB	3	3
Course	Programme Outcomes (POs)		Programme Specific Outcomes (PSOs)	

Outcomes (Cos)	PO1	PO2	PO3	PO4	PO5	PS01	PS02	PS03	PS04	PS05
CO1		✓				✓				
CO2	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓		✓				✓	✓	✓	
Number of matches (✓) = 36, Relationship: High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

Course Code: 20UCS3NME1  
Instruction Hours: 2  
Credits: 2

Exam Hours: 3  
Internal Marks: 25  
External Marks: 75

## NON MAJOR ELECTIVE 1- WORKING PRINCIPLES OF INTERNET

### Course Outcomes (COs):

On completion of the course, the student will be able to

- To understand the working principles of internet.
- To understand basic computer network technology.
- Aware about various types of transmission medias.
- To explain the role of protocols in networking.
- To understand network security concepts and services.

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(s):

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

### Reference Book(s):

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	5	55.5
2.	Regional	1	11.1

3.	National	1	11.1
4.	Global	2	22.2

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

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
III	20UCS3NME1	<b>WORKING PRINCIPLES OF INTERNET</b>					2	2				
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓		✓		
CO2	✓	✓		✓		✓	✓		✓			
CO3	✓		✓	✓		✓	✓	✓	✓			
CO4		✓	✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓		✓	✓	✓	✓	✓	✓	✓		
Number of matches (✓) = 35 Relationship: High												

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

Prepared by:

Checked by:

HOD:

## SEMESTER-IV

Course Code: 20UCS4CC4  
Instruction Hours: 4  
Credits: 4

Exam Hours: 3  
Internal Marks: 25  
External Marks: 75

### **CORE COURSE-IV RELATIONAL DATABASE MANAGEMENT SYSTEMS**

#### **Course Outcome(CO):**

On completion of the course, the student will be able to

- Understand database concepts and structures in relational algebra, ER model and relational model.
- To design and build a simple database system with the fundamental tasks of modelling, designing, and implementing a DBMS.
- Understand functional dependency and functional decomposition and apply various normalization techniques.
- Perform PL/SQL programming using concept of cursor management, error handling, Package and triggers.
- Execute various advance SQL queries related to transaction processing and locking using concept of concurrency control.

#### **UNIT - I**

Introduction: Database System Applications-DBMS Vs. File System - View of Data-Data Model Database Languages - Database users and Administrators - Transaction Management - Database System Structure - Application Architecture. Data Models: Basic Concepts - Constraint- Keys- ER Diagram - Weak Entity - Extended ER Features - UML; Relational Model: Structure of Relational Databases - Relational Algebra - Views.

#### **UNIT - II**

SQL: Background-Basic Structure-Set Operation-Aggregate Function-Null Values-Nested Sub Queries - Views - Modification of the Database - Data Definition Language - Embedded SQL - Dynamic SQL.

#### **UNIT-III**

Advance SQL : Integrity and Security- Domain - Constraint - Referential Integrity - assertions - Triggers - Security and Authorization - Authorization in SQL - Encryption and Authentication.

#### **UNIT - IV**

Relational Database Design: First Normal Form - Pitfalls in Relational Database Design-Functional Dependencies (Second Normal Form) - Boyce-Codd Normal Form - Third Normal Form - Fourth Normal Form - Overall Database Design Process.

#### **UNIT-V**

Transaction Management: Transaction concepts - States - Serializability. Lock based concurrency control: Locks - Granting - Two-Phase Locking protocol. Time stamp based protocol: Timestamps - Timestamp ordering protocol - Dead lock handling.

**TEXT BOOK:**

1. A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", 5th Edition McGraw-Hill, 2005. Tamilnadu State Council for Higher Education  
13.

**REFERENCE BOOKS :**

1. Alexix Leon & Mathews Leon, "Essential of DBMS", 2nd reprint, Vijay Nicole Publications, 2009.
2. Alexix Leon & Mathews Leon, "Fundamentals of DBMS", 2nd Edition, Vijay Nicole Publications, 2014.

Total Number of Topics Present in the course: 63

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	6	11.1
2.	Regional	1	1.6
3.	National	4	6.3
4.	Global	52	79.4

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits			
IV	20UCS4CC4	RELATIONAL DATABASE MANAGEMENT SYSTEM					4	4			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓		✓		✓			
CO2	✓	✓				✓	✓	✓	✓		

<b>CO3</b>	✓	✓	✓	✓		✓	✓	✓	✓	
<b>CO4</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>CO5</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches (✓) = 40, Relationship: High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

### SEMESTER-IV

Course Code: 20UCS4CP4  
 Instruction Hours: 3  
 Credits: 2

Exam Hours: 3  
 Internal Marks: 40  
 External Marks: 60

### CORE COURSE PRACTICAL -IV **SQL AND PLSQL LAB**

**Course Outcomes (COs):**

On completion of the course, the student will be able to

- 1) Enhance the knowledge and understanding of database analysis and design.
- 2) Enhance the knowledge of the processes of database development and administration using SQL and PL/SQL.
- 3) Solve Database problems using Oracle 9i SQL and PL/SQL.
- 4) To improve and enhance programming skills and techniques using SQL and PL/SQL.
- 5) Implement the software background using SQL and PL/SQL

**Demonstrate the following SQL commands and can take any back end RDBMS system for implementation purpose.**

1. Data Definition of Base Tables.

2. DDL with Primary key constraints

3. DDL with constraints and verification by insert command

4. Data Manipulation of Base Tables and Views

5. Demonstrate the Query commands

6. Write a PL/SQL code block that will accept an account number from the user and debit an amount of Rs. 2000 from the account if the account has a minimum balance of 500 after the amount is debited. The Process is to fired on the Accounts table.

7. Write a PL/SQL code block to calculate the area of the circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in a table Areas. Areas - radius, area.

8. Write a PL/SQL block of code for reversing a number. (Example: 1234 as 4321).

9. Create a transparent audit system for a table Client master (client no, name, address, Bal\_due). The system must keep track of the records that are being deleted or updated. The functionality being when a record is deleted or modified the original record details and the date of operation are stored in the audit\_client (client\_no, name, bal\_due, operation, userid, Update) table, then the delete or update is allowed to go through.

Total Number of Topics Present in the course: 9

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	2	22.2
2.	Regional	0	0.0
3.	National	0	0.0
4.	Global	7	77.8

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits			
IV	20UCS4CP4	SQL AND PLSQL LAB					3	3			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓		✓	✓				✓			
CO2	✓		✓	✓	✓	✓	✓	✓	✓	✓	
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

<b>CO4</b>	✓	✓	✓	✓	✓	✓	✓		✓	✓
<b>CO5</b>		✓	✓				✓			
Number of matches (✓) = 35, Relationship: High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

#### SEMESTER-IV

Course Code: 20UCS4NME2

Instruction Hours: 2

Credits: 2

Exam Hours: 3

Internal Marks: 25

External Marks: 75

### NON MAJOR ELECTIVE 2 - **FUNDAMENTALS OF INFORMATION TECHNOLOGY**

#### Course Outcomes (COs):

- To understand the basic concepts in Information Technology.
- Acquire the knowledge of computer fundamental components and it's working.
- Learn about the hardware, software, networking components, database and security techniques.
- Understand computer networking applications and it's uses.
- To adapt with emerging technologies used in the global marketplace.

#### Unit I

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

#### Unit II

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

#### Unit III

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

#### Unit IV

Computer Networks - WWW and Internet - Email - Web Design

#### Unit V

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

#### Text Book(s):

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

#### Reference Book(s):

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

Total Number of Topics Present in the course: 25

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	18	72.0
2.	Regional	2	8.0
3.	National	1	4.0
4.	Global	4	16.0

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

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course	Hours	Credits						
IV	20UCS4NME2	FUNDAMENTALS OF INFORMATION TECHNOLOGY	2	2						
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5

CO1	✓	✓	✓	✓	✓	✓		✓		✓
CO2	✓	✓		✓	✓	✓	✓	✓	✓	
CO3	✓	✓	✓	✓		✓		✓	✓	✓
CO4		✓		✓	✓	✓	✓		✓	✓
CO5	✓		✓		✓	✓	✓	✓		✓
Number of matches (✓) = 38, Relationship: High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

## SEMESTER-IV

Course Code: 20UCS4SBE1  
 Instruction Hours: 2  
 Credits: 2

Exam Hours: 3  
 Internal Marks: 25  
 External Marks: 75

### PART-IV- SBE- 1.OFFICE AUTOMATION

**Course Outcomes (COs):**

On completion of the course, the student will be able to

- To understand the office automation work and multimedia concepts.
- To perform documentation using MS Word.
- To perform accounting operations using MS Excel and analyses the data using graphs for decision making.
- To perform presentation for effective teaching.
- Enhance the ability of information management using system.

**UNIT I:**

**Computer Fundamentals:** Computer Introduction-Operating system Fundamentals - Components of a computer system -Input and Output devices - Memory Devices.

UNIT II:

**MS -Word:**Working with documents -Opening and saving files - Editing text documents - Formatting documents -Header and footer -Creating tables -Inserting clip arts -Tools.

UNIT III:

**MS - Excel:**Spreadsheet -Formatting Cells / Worksheet - Working with Formula - Function and Charts - Sorting and Filtering data - Graphs

UNIT IV:

**MS - Power Point:** Introduction to MS Power Point -Slide Layout -Design Slides -Insert Pictures and Graphs - Slide show - Adding multimedia effects.

UNIT V:

**Multimedia:**Introduction to multimedia-Color models -Multimedia presentation -Images- pictures-text - animation - audio - video.

**Text Book(s):**

1. MS-Office and Internet by Alexis Leon.
2. Prabhat K AndleighKiranThakrar, Multimedia systems design, Prentice Hall of India, New Delhi, 2005.

Total Number of Topics Present in the course: 34

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	1	2.9
2.	Regional	4	11.8
3.	National	3	8.8
4.	Global	26	76.5

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course	Hours	Credits
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IV	20UCS4SBE1	OFFICE AUTOMATION					2	2			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓					✓	✓			
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓				✓		✓	✓	
Number of matches (✓) = 40, Relationship: High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

### SEMESTER-V

Course Code: 20UCS5CC5

Instruction Hours: 6

Credits: 5

Exam Hours: 3

Internal Marks: 25

External Marks: 75

### CORE COURSE-V

### PRAT-III OPERATING SYSTEMS

**Course Outcome(CO):**

On completion of the course, the student will be able to

- Acquire some knowledge of the services provided by operating systems.
- Exposure to some details of major OS concepts
- Describe and explain the fundamental components of a computer operating system.
- Define, restate, discuss, and explain the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems
- Describe and extrapolate the interactions among the various components of computing systems.

### UNIT - I

Introduction - History of operating system- Different kinds of operating system - Operating system concepts - System calls-Operating system structure.

#### UNIT - II

Processes and Threads: Processes: Process Concept - Process Scheduling - Operations on Processes - Inter-process Communication - threads - thread model and usage - inter process communication.

#### UNIT - III

Scheduling - Memory Management: Memory Abstraction - Virtual Memory - Page replacement algorithms.

#### UNIT - IV

Deadlocks: Resources- introduction to deadlocks - deadlock detection and recovery - deadlocks avoidance - deadlock prevention. Multiple processor system: multiprocessors - multi computers.

#### UNIT - V

Input / Output: principles of I/O hardware - principles of I/O software. Files systems: Files - directories - files systems implementation - File System Management and Optimization.case study: Linux System

#### TEXT BOOK

1. Andrew S. Tanenbaum, "Modern Operating Systems", 2nd Edition, PHI private Limited, New Delhi, 2008.

#### REFERENCE BOOKS

1. William Stallings, "Operating Systems - Internals & Design Principles", 5th Edition, Prentice - Hall of India private Ltd, New Delhi, 2004.

2. Sridhar Vaidyanathan, "Operating System", 1st Edition, Vijay Nicole Publications, 2014.

Total Number of Topics Present in the course: 30

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	4	13.3
2.	Regional	2	26.7
3.	National	2	13.3
4.	Global	22	46.7

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits			
V	20UCS5CC5	OPERATING SYSTEMS					6	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓			✓		✓	✓			
CO2	✓	✓	✓	✓	✓	✓	✓				
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓		
CO4	✓		✓	✓		✓	✓	✓	✓	✓	
CO5		✓		✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 36, Relationship: High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

**SEMESTER-V**

Course Code: 20UCS5CC6  
Instruction Hours: 5  
Credits: 5

### CORE COURSE-V

Exam Hours: 3  
Internal Marks: 25  
External Marks: 75

## PART-III WEB TECHNOLOGY

### Course Outcome(CO):

On completion of the course, the student will be able to

- To understand the concept of static web designing using HTML
- To understand the concept of dynamic web designing using Java Script and XML
- To understand the concept of server-side web designing using PHP
- To develop the different technologies used in the World Wide Web including XML, Perl, Rails and PHP

### UNIT - I

Structuring Documents for the Web: Introducing HTML and XHTML - Basic Text Formatting- Presentational Elements - Phrase Elements - Lists - Editing Text - Core Elements and Attributes- Attribute Groups. Links and Navigation: Basic Links - Creating Links with the <a> Element- Advanced E- mail Links. Images - Audio - and Video: Adding Images Using the <img> Element - Using Images as Links Image Maps - Choosing the Right Image Format - Adding Flash - Video and Audio to your web pages.

### UNIT - II

Tables: Introducing Tables- Grouping Section of a Table - Nested Tables - Accessing Tables. Forms: Introducing Forms - Form Controls - Sending Form Data to the Server. Frames: Introducing Frameset - <frame> Element - Creating Links Between Frames - Setting a Default Target Frame Using <base> Element - Nested Framesets - Inline or Floating Frames with <iframe>

### UNIT - III

Cascading Style Sheets: Introducing CSS - Where you can Add CSS Rules. CSS Properties: Controlling Text - Text Formatting - Text Pseudo Classes - Selectors - Lengths - Introducing the Box Model. More Cascading Style Sheets: Links - Lists - Tables - Outlines - The focus and activate Pseudo classes Generated Content - Miscellaneous Properties - Additional Rules - Positioning and Layout wit - Page Layout CSS - Design Issues.

### UNIT - IV

Java Script: How to Add Script to Your Pages - Variables and Data Types - Statements and Operators - Control Structures - Conditional Statements - Loop Statements - Functions - Message box - Dialog Boxes -Alert Boxes - Confirm Boxes - Prompt Boxes.

### UNIT - V

Working with JavaScript: Practical Tips for Writing Scripts - JavaScript Objects: Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Events :Event Handlers - Forms - Validations - Form Enhancements - and JavaScript Libraries.

### TEXT BOOKS:

1. Jon Duckett, Beginning HTML, XHTML, CSS and Java script, Wiley Publishing

## REFERENCES BOOKS :

1. Chris Bates, “Web Programming”, Wiley Publishing 3d Edition.
2. M. Srinivasan, “Web Technology: Theory and Practice”, Pearson Publication

Total Number of Topics Present in the course: 73

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	8	11.0
2.	Regional	14	19.2
3.	National	37	50.7
4.	Global	14	19.2

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

## Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
V	20UCS5CC6	WEB TECHNOLOGY					5	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓		✓		✓			
CO2	✓	✓				✓	✓	✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓	✓		
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40, Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50

<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High
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**Prepared by:**

**Checked by:**

**HOD:**

### **SEMESTER-V**

Course Code: 20UCS5CC7  
 Instruction Hours: 5  
 Credits: 5

Exam Hours: 3  
 Internal Marks: 25  
 External Marks: 75

### **CORE COURSE-V**

### **PRAT-III COMPUTER NETWORKS**

#### **Course Outcomes (CO):**

On completion of the course, the student will be able to

- To make students to understand basic computer network technology and aware about various types of cables used in guided media like coaxial cable, optical fiber cable, twisted pair cables and its categories.
- To study transmission media and realization.
- To explain the role of protocols in networking and to analyze the services and features of the protocol stack.
- Able to understand network layer techniques for designing subnets and super nets and analyze packet flow on basis of routing protocols.
- To understand design issues in Network Security and to understand security threats, security services

#### **UNIT - I**

Introduction - Network Hardware - Software - Reference Models - OSI and TCP/IP Models - Example Networks: Internet - ATM - Ethernet and Wireless LANs - Physical Layer - Theoretical Basis for Data Communication - Guided Transmission Media

#### **UNIT - II**

Wireless Transmission - Communication Satellites - Telephone System: Structure - Local Loop-Trunks and Multiplexing and Switching. Data Link Layer: Design Issues - Error Detection and Correction.

### UNIT - III

Elementary Data Link Protocols - Sliding Window Protocols - Data Link Layer in the Internet - Medium Access Layer - Channel Allocation Problem - Multiple Access Protocols - Bluetooth.

### UNIT - IV

Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms - IP Protocol - IP Addresses - Internet Control Protocols.

### UNIT - V

Transport Layer - Services - Connection Management - Addressing - Establishing and Releasing a Connection - Simple Transport Protocol - Internet Transport Protocols (ITP) - Network Security: Cryptography.

### TEXT BOOK:

1. A. S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2008.

### REFERENCE BOOKS:

1. B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition, 2007.

2. F.Halsall, "Data Communications, Computer Networks and Open Systems", Pearson Education, 2008.

3. D. Bertsekas and R. Gallager, "Data Networks", 2nd Edition, PHI, 2008.

4. Lamarca, "Communication Networks", Tata McGraw- Hill, 2002

Total Number of Topics Present in the course: 41

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	3	7.3
2.	Regional	2	4.9
3.	National	4	9.8
4.	Global	32	78.0

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course	Hours	Credits
V	20UCS5CC7	COMPUTER NETWORKS	5	5

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		✓			✓		✓		✓	
CO2	✓	✓	✓			✓	✓			✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO5	✓		✓	✓	✓	✓		✓	✓	✓
Number of matches (✓) = 37, Relationship: High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

## SEMESTER-V

Course Code: 20UCS5CP5  
 Instruction Hours: 3  
 Credits: 3

Exam Hours: 3  
 Internal Marks: 40  
 External Marks: 60

### PART-III

#### CORE COURSE PRACTICAL –V **WEB TECHNOLOGY LAB**

**Course Outcomes (CO):**

On completion of the course, the student will be able to

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Style Sheets.

- Build dynamic web pages using JavaScript (Client side programming).
- Create XML documents and Schemas.

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.

2. Write a HTML program to develop a static Registration Form.

3. Write a HTML program to develop a static Login Page.

4. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the textboxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textboxes has been left empty, popup an alert indicating which textbox has been left empty.

5. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.

6. Create a page with dynamic effects. Write the code to include layers and basic animation.

7. Write a JavaScript code to find the sum of N natural Numbers. (Use userdefined function)

8. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.

9. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade. 8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.

10. Create a form consists of a two Multiple choice lists and one single choice list (a)The first multiple choice list, displays the Major dishes available (b)The second multiple choice list, displays the Starters available. (c)The single choice list, displays the Soft drinks available.

11. Create a web page using two image files, which switch between one another as the mouse pointer moves over the image. Use the on Mouse Over and on Mouse Out event handlers.

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits			
V	20UCS5CP5	WEB TECHNOLOGY LAB					3	3			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓		✓		✓			
CO2	✓	✓				✓	✓	✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓	✓		
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40, Relationship: High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

## SEMESTER-V

Course Code: 20UCS5MBE1:1  
Instruction Hours: 5  
Credits: 5

Exam Hours: 3  
Internal Marks: 25  
External Marks: 75

### PART - III DATA STRUCTURES AND ALGORITHMS

#### Course Outcomes (CO):

On completion of the course, the student will be able to

- Describe how arrays, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms
- Compare alternative implementations of data structures with respect to performance
- Compare and contrast the benefits of dynamic and static data structures implementations
- Discuss the computational efficiency of the principal algorithms for sorting, searching, and merging
- Efficient approach of solving problems by model of computations

#### UNIT I

Introduction of algorithms - analyzing algorithms - Arrays: Representation of Arrays- Implementation of Stacks and queues - Application of Stack: Evaluation of Expression - Infix to postfix Conversion - Multiple stacks and Queues - Sparse Matrices.

#### UNIT II

Linked list: Singly Linked list - Linked stacks and queues - polynomial addition - polynomial multiplication- More on linked Lists - Doubly linked List and Dynamic Storage Management - Garbage collection and compaction

#### UNIT III

Trees: Basic Terminology - Binary Trees - Binary Tree representations - Binary trees - Traversal - More on Binary Trees - BFS-DFS-Threaded Binary trees - counting Binary trees. Graphs: Terminology and Representations - Traversals - connected components and spanning Trees -Single Source Shortest path problem.

#### UNIT IV

Symbol Tables - Static Tree Tables - Dynamic Tree Tables - Hash Tables: Hashing Functions - overflow Handling. External sorting - Storage Devices - sorting with Disks: K-way merging - sorting with tapes.

#### UNIT V

Pseudo code conventions - Internal sorting - Insertion sort - Quick sort - 2 way Merge sort - Heap sort - shell sort - sorting on keys. Files- Queries and sequential organizations - Index Techniques - File organization .

**TEXT BOOKS**

1. Ellis Horowitz, Sartaj Shani, Data Structures, Galgotia publication.

**REFERENCE BOOKS**

1. Data structures Using C Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, Kindersley (India) Pvt. Ltd.,
2. Data structure and Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, Pearson Education Pvt. Ltd.,

Total Number of Topics Present in the course: 52

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	3	5.8
2.	Regional	2	3.8
3.	National	3	5.8
4.	Global	44	84.6

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits				
V	20UCS5MBE1:1	DATA STRUCTURE AND ALGORITHMS					5	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓		✓		✓		✓					
CO2	✓		✓	✓	✓	✓	✓		✓			
CO3	✓	✓		✓	✓	✓	✓	✓	✓	✓		
CO4	✓	✓	✓	✓		✓		✓	✓	✓		
CO5		✓	✓	✓		✓		✓	✓	✓		

Number of matches (✓) = 35, Relationship: High

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

## SEMESTER-V

Course Code: 20UCS5MBE1:2

Instruction Hours: 5

Credits: 5

Exam Hours: 3

Internal Marks: 25

External Marks: 75

### PART - III

## MICROPROCESSOR & ASSEMBLY LANGUAGE PROGRAMMING

### Course Outcomes(CO):

On completion of the course, the student will be able to

- Describe the general architecture of a microcomputer system and architecture & organization of 8085 & 8086 Microprocessor and understand the difference between 8085 and advanced microprocessor.
- Discuss and write code using the seven basic programming modes in assembly language.
- Understand and realize the Interfacing of memory & various I/O devices with 8085 microprocessor Understand and classify the instruction set of 8085 microprocessor and distinguish the use of different instructions and apply it in assembly language programming.
- Understand the architecture and operation of Programmable Interface Devices and
- realize the programming & interfacing of it with 8085 microprocessor

### UNIT - I

Architecture and Operation: Introduction to 8085 - Microprocessor organization/ architecture & its operation Microprocessor based system - memory interfacing - basic interfacing concepts and interfacing I/O devices

### UNIT - II

Programming the 8085: Programming model - instruction classification - Instruction format - addressing modes - writing assembly level programs-overview of instruction set - timing diagrams data transfer - Arithmetic - Logic branch operations.

### UNIT - III

Programming techniques- Looping Counting and Indexing - 16 bit arithmetic operations - logic operations Compare and rotate operations. Counters and Time delays - Generation of pulse waveforms. Stacks and subroutines- conditional CALL and RETURN instructions. Advanced subroutine concepts. BCD to Binary and Binary to BCD conversions - BCD to 7 segment conversion - Binary to ASCII and ASCII to Binary code conversion - BCD addition and subtraction - multiplication and division.

### UNIT - IV

Memory Interface: Memory and I/O mapping and interfacing concepts. Interrupts: 8085 vectored interrupts -Restart as Software instructions - additional I/O concepts and processes.

### UNIT - V

Interfacing of peripherals (I/Os) and applications: Interfacing Keyboard (linear and matrix) and 7 segment display including multiplexes - 8279 programmable keyboard /display interface - 8255 PPI - 8259 PIC - DMA and 8257 DMA controller - Serial communication using 8251 - D to A converters and interfacing - RS232 serial Page 31 of 38 communication standards.

**TEXT BOOKS:**

1. R.S.Gaonkar - Microprocessor Architecture, Programming and Application with 8085. Penram Int., 3rd Edn.

**REFERENCES BOOKS:**

1. Kenneth L.Short - Microprocessor and Programmed Logic ‘, PHI, 2nd Edn.
2. Aditya P. Mathur- Introduction to Microprocessors, 3RD Edn. TMH
3. Douglas V.Hall- Microprocessors and digital systems, McGraw Hill
4. Antonakos: Introduction to Intel family of Microprocessors Pearson Education

Total Number of Topics Present in the course: 44

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	5	11.4
2.	Regional	3	6.8
3.	National	3	6.8
4.	Global	33	75.0

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits				
V	20UCS5MB1:2	MICROPROCESSOR & ASSEMBLY LANGUAGE PROGRAMMING					5	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓		✓			✓			✓			
CO2	✓	✓	✓		✓	✓	✓	✓	✓	✓		

<b>CO3</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>CO4</b>	✓	✓		✓	✓		✓	✓	✓	✓
<b>CO5</b>		✓		✓		✓		✓		✓
Number of matches (✓) = 37, Relationship: High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

### SEMESTER-V

Course Code: 20UCS5MBE1:3  
 Instruction Hours: 5  
 Credits: 5

Exam Hours: 3  
 Internal Marks: 25  
 External Marks: 75

### PART - III

## COMPUTER GRAPHICS

### Course Outcomes(CO):

On completion of the course, the student will be able to

- Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
- Use of geometric transformations on graphics objects and their application in composite form.
- Extract scene with different clipping methods and its transformation to graphics display device.
- Explore projections and visible surface detection techniques for display of 3D scene on 2D screen

### UNIT - I

Overview of graphics Systems: Video Display Device - Refresh Cathode-Ray tubes Raster - Scan Displays Random - Scan Displays - Color CRT Monitors - Direct view Storage tubes Flat - Panel Displays Three - Dimensional Viewing Devices - Stereoscopic and Virtual - Reality Systems.

### UNIT - II

Raster - Scan Systems Video Controller - Random - Scan Systems Video Controller - Random-Scan Systems - Input device - Keyboard- Mouse - Trackball - Space ball and Joysticks - Data Glove - Digitizers Image Scanners - Touch Panels - Light pens. Voice Systems - Hard-Copy Devices - Line Drawing Algorithms-DDA Algorithms - Circle generating Algorithm Properties of Ellipses.

### UNIT - III

Two Dimensional Geometric Transformation: Basic Transformations - Translation - Rotation - Scaling - Matrix Representations and Homogeneous Coordinates - Other Transformations Reflections Two Dimensional Viewing : Windows to view point coordinate Transformations - Clipping Operations - Point Clipping - Line Clipping - Curve Clipping - Text Clipping - Exterior Clipping.

### UNIT - IV

Three Dimensional Concepts: Three Dimensional Display method - Parallel projection - Depth cueing visible line and surface - Three Dimensional Geometric and modelling Transformations: Translation - Rotation - Scaling - Composite Transformations. Three Dimensional Viewing: Viewing pipeline - Viewing Coordinates - Projections - Parallel Projections - Perspective Projections.

### UNIT - V

Visible Surface Detection Methods : Classification Visible Surface Detection Algorithms - Back Face Detection - Depth - Buffer Method - A-Buffer Method - Scan line method - Depth sorting method - BSP tree method - Area Subdivision Method.

### TEXT BOOK

1. Donald Hearn and M. Pauline Baker , "Computer Graphics", 2nd Edition, 1996

### REFERENCE BOOK

1. John f. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, Kurt Akeley, "Computer Graphics Principles and Practice" 3rd Edition, Pearson Education,2014.

Total Number of Topics Present in the course: 73

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
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1.	Local	4	5.5
2.	Regional	4	5.5
3.	National	5	6.8
4.	Global	60	82.2

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits				
V	20UCS5MBE1:3	COMPUTER GRAPHICS					5	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓			✓		✓				
CO2	✓	✓		✓		✓	✓	✓	✓			
CO3	✓	✓	✓	✓		✓	✓	✓	✓			
CO4	✓	✓	✓	✓	✓	✓		✓	✓			
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Number of matches (✓) = 38, Relationship: High												

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

**SEMESTER-V**

Course Code: 20UCS5SBE2  
Instruction Hours: 2  
Credits: 2

Exam Hours: 3  
Internal Marks: 25  
External Marks: 75

## PART-IV

### SBE 2- QUANTITATIVE APTITUDE

#### Course Outcomes(CO):

On completion of the course, the student will be able to

- Understand the basic concepts of quantitative ability
- Understand the basic concepts of logical reasoning skills
- Acquire satisfactory competency in use of verbal reasoning
- Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
- Compete in various competitive exams like TNPSC, UPSC, GPSC, CAT, CMAT, GRE, GATE, etc.

#### UNIT I

Numbers - HCF and LCM of numbers - Decimal fractions - Simplification - Square roots and cube roots - Average - problems on Numbers.

#### UNIT II

Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion - partnership - Chain rule.

#### UNIT III

Time and work - pipes and cisterns - Time and Distance - problems on trains - Boats and streams - simple interest - compound interest - Logarithms - Area - Volume and surface area - races and Games of skill.

#### UNIT IV

Permutation and combination - probability - True Discount - Bankers Discount - Height and Distances - Odd man out & Series.

#### UNIT V

Calendar - Clocks - stocks and shares - Data representation - Tabulation - Bar Graphs - Pie charts - Line graphs.

#### TEXT BOOK:

1. “Quantitative Aptitude”, R.S. AGGARWAL., S. Chand & Company Ltd.,

Total Number of Topics Present in the course: 38

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	3	7.9
2.	Regional	4	10.5
3.	National	3	7.9
4.	Global	28	73.7

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits			
V	20UCS5SBE2	QUANTITATIVE APITUDE					2	2			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓			✓		✓					
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓		✓	✓	✓	✓	
CO5		✓			✓	✓		✓			
Number of matches (✓) = 35, Relationship: High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

Prepared by:

Checked by:

HOD:

## SEMESTER-V

Course Code: 20UCS5SBE3  
Instruction Hours: 2  
Credits: 2

Exam Hours: 3  
Internal Marks: 25  
External Marks: 75

### PART-IV

#### SBE 3 - ANDROID PROGRAMMING

##### Course Outcomes(CO):

On completion of the course, the student will be able to

- Understand the basic concepts of Android programming
- Install and configure Android application development tools.
- Design and develop user Interfaces for the Android platform.
- Save state information across important operating system events.
- Apply Java programming concepts to Android application development.

##### UNIT I

Introduction - History about Android operating system - Android program structure - User interface - Building blocks of User interface - Android Layout types - Layout attributes - Toasts - Activity.

##### UNIT II

Dialogs - Intent - types of intent - Explicit and Implicit intent - Intent data transfer from one activity to another - Android switch button.

##### UNIT III

Android life cycle: Android Activity life cycle - menus - menu Activity - Synchronous Task - RecyclerView view - Broadcast receiver and Notification.

##### UNIT IV

Shared preferences - sqlite Database - Alarm manager - alarm Types - Android services.

##### UNIT V

Testing Activity - Publishing App - steps of Publishing App.

##### TEXT BOOK

1."Android For Beginners " Pratiyash Guleria, BPB publications.

##### REFERENCE BOOKS

1. "Android programming for Beginners " - By John Horton, Packt
2. "Android system programming " By Roger Ye, Packt

Total Number of Topics Present in the course: 32

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	3	9.4
2.	Regional	2	6.3
3.	National	1	3.1
4.	Global	26	81.3

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits			
V	20UCS5SBE3	ANDROID PROGRAMMING					2	2			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓		✓		✓			
CO2	✓	✓				✓	✓	✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓	✓		
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40, Relationship: High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

## **SEMESTER-VI**

Course Code: 20UCS6CC8

Instruction Hours: 6

Credits: 6

Exam Hours: 3

Internal Marks: 25

External Marks: 75

### **PART- III SOFTWARE ENGINEERING**

#### **Course Outcomes(CO):**

On completion of the course, the student will be able to

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public Needs,
- An ability to communicate effectively with a range of audiences to the software products.
- An ability to recognize ethical and professional responsibilities in engineering based on the software testing.
- To understand how to manage the software reliability and quality.

#### **UNIT - I**

Introduction - Software Engineering Discipline - Evolution and Impact - Programs Vs Software Products. Software Life Cycle Models: Use of a Life Cycle Models - Classical Waterfall Model - Iterative Waterfall Model - Prototyping Model - Evolutionary Model - Spiral Model. Software Project Management: Responsibilities of a Software Project Manager - Project Planning - Metrics for Project Size Estimation - Project Estimation Techniques -Risk Management.

#### **UNIT - II**

Requirements Analysis and Specification: Requirements Gathering and Analysis -Software Requirements Specification (SRS) - Formal System Development Techniques. Software Design: Characteristics of a Good Software Design - Cohesion and Coupling -Neat Arrangement - Software Design Approaches.

#### **UNIT - III**

Function-Oriented Software Design: Overview of SA/SD Methodology - Structured Analysis - Data Flow Diagrams (DFDs).Object Modeling Using UML: Overview of Object-Oriented Concepts - UML Diagrams - Use Case Model - Class Diagrams - Interaction Diagrams - Activity Diagrams - State Chart Diagram.

#### **UNIT - IV**

User Interface Design: Characteristics of a Good User Interface - Basic Concepts - Types of User Interfaces - Component-Based GUI Development; Coding and Testing: Coding - Testing - UNIT Testing - Black-Box Testing - White-Box Testing - Debugging -Integration Testing - System Testing.

#### **UNIT - V**

Software Reliability and Quality Management: Software Reliability - Statistical Testing -Software Quality - **Software Quality Management System** - ISO 9000.Computer Aided Software Engineering: CASE Environment - CASE support in Software Life Cycle - Characteristics of CASE Tools - Architecture of a CASE Environment. Software Maintenance: Characteristics of Software Maintenance - Software Reverse Engineering - **Software Maintenance Process Models** - **Estimation of Maintenance Cost**. Software Reuse: Issues in any Reuse Program - Reuse Approach.

**TEXT BOOK:**

1. Rajib Mall, "Fundamentals of Software Engineering", 3rd Edition, Prentice Hall of India Private Limited, 2008.

**REFERENCE BOOKS:**

1. Rajib Mall, "Fundamentals of Software Engineering", 4thEdition, Prentice Hall of India Private Limited, 2014.
2. Richard Fairley, "Software Engineering Concepts", TMGH Publications, 2004.

Total Number of Topics Present in the course: 71

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	61	85.9
2.	Regional	2	2.8
3.	National	3	4.2
4.	Global	5	7.0

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course	Hours	Credits
VI	20UCS6CC8	SOFTWARE ENGINEERING	6	6
Course	Programme Outcomes (POs)		Programme Specific Outcomes (PSOs)	

Outcomes (Cos)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		✓			✓		✓			✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓	✓	✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓				✓	✓		✓		✓
Number of matches (✓) = 37, Relationship: High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

## SEMESTER-VI

Course Code: 20UCS6CC9

Instruction Hours: 6

Credits: 6

Exam Hours: 3

Internal Marks: 25

External Marks: 75

### PART- III Programming in Python

#### Course Outcomes(CO):

On completion of the course, the student will be able to

- Understand why Python is a useful scripting language for developers.
- Understand the basic programming language concepts in the Python.
- Demonstrate the use of functions, lists, tuples and dictionaries and write control statements in Python.
- Understand the design of object-oriented programs with Python classes.
- Identify the tools support for Python program development environment.

#### UNIT-I

Introduction to Python - Why Python - Installing in various Operating Systems - Executing Python Programs - Basic Programming concepts - Variables, expressions and statements - Input/ Output - Operators.

#### UNIT-II

Conditions - Functions - Arguments - Return values - Iteration - Loops - Strings -Data Structures - Lists - Dictionaries - Tuples - Sequences - Exception Handling.

#### UNIT-III

File Handling - Modules - Regular Expressions - Text handling - Object Oriented Programming - Classes - Objects - Inheritance - Overloading - Polymorphism Interacting with Databases -

Introduction to MySQL - interacting with MySQL - Building a address book with add/edit/delete/search features.

#### UNIT-IV

Introduction to Graphics programming - Introduction to GTK - PyGTK - Developing GUI applications using pyGTK - Scientific Programming using NumPy / SciPy - Image Processing - Processing multimedia files -Network Programming, Web services using SOAP, Introduction to Graphics programming - PyGame

#### UNIT-V

Introduction to Version Control Systems - Subversion/Git, Writing Unit Tests, Creating Documentation, Contributing to Open Source Projects

#### TEXT BOOK

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist",1st Edition 2012, O'Reilly. REFERENCE BOOKS 1. Jeff McNeil ,"Python 2.6 Text Processing: Beginners Guide", 2010 ,Packet Publications
2. Mark Pilgrim ,"Dive Into Python " , 2nd edition 2009, Apress

Total Number of Topics Present in the course: 54

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	8	14.8
2.	Regional	4	7.4
3.	National	4	7.4
4.	Global	38	70.4

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits			
VI	20UCS6CC9	PROGRAMMING IN PYTHON					6	6			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓		✓		✓			
CO2	✓	✓				✓	✓	✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓	✓		
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40, Relationship: High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

## SEMESTER-VI

Course Code: 20UCS6CP6  
Instruction Hours: 5  
Credits: 4

Exam Hours: 3  
Internal Marks: 40  
External Marks: 60

### Part-III

## CORE COURSE PRACTICAL -VI PYTHON PROGRAMMING LAB

### Course Outcomes(CO):

On completion of the course, the student will be able to

- Write, Test and Debug Python Programs
- Implement Conditionals and Loops for Python Programs
- Use functions and represent Compound data using Lists, Tuples and Dictionaries
- Read and write data from & to files in Python

1. Create a simple calculator to do all the arithmetic operations
2. Write a program to use control flow tools like if.
3. Write a program to use for loop
4. Data structures use list as stack use list as queue tuple, sequence
5. Create new module for mathematical operations and use in your program
6. Write a program to read and write files, create and delete directories
7. Write a program with exception handling
8. Write a program using classes
9. Connect with MySQL and create address book
10. Write a program using string handling and regular expressions
11. Program to parse apache log file
12. Create a GUI program using pygtk

Total Number of Topics Present in the course: 12

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	1	8.3
2.	Regional	2	16.7
3.	National	1	8.3
4.	Global	8	66.7

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

### Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
VI	20UCS6CP6	PYTHON PROGRAMMING LAB					5	4			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓		✓		✓			
CO2	✓	✓				✓	✓		✓		
CO3	✓	✓	✓	✓			✓	✓			
CO4	✓	✓	✓	✓	✓	✓	✓		✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 36, Relationship: High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

## **SEMESTER-VI**

Course Code: 20UCS6MBE2:1  
Instruction Hours: 6  
Credits: 5

Exam Hours: 3  
Internal Marks: 25  
External Marks: 75

### **PART- III - MULTIMEDIA SYSTEMS**

#### **Course Outcomes(CO):**

On completion of the course, the student will be able to

- Describe the types of media and define multimedia system.
- Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video).
- Use and apply tools for image processing, video, sound and animation.
- Apply methodology to develop a multimedia system.
- Apply acquired knowledge in the field of multimedia in practice and independently continue to expand knowledge in this field.

#### **UNIT I**

Multimedia Definition - Use Of Multimedia - Delivering Multimedia - Text: About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext.

#### **UNIT II**

Images: Plan Approach - Organize Tools - Configure Computer Workspace - Making Still Images - Color - Image File Formats. Sound: The Power of Sound - Digital Audio - Midi Audio - Midi vs. Digital Audio - Multimedia System Sounds - Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.

#### **UNIT III**

Animation: The Power of Motion - Principles of Animation - Animation by Computer - Making Animations that Work. Video: Using Video - Working with Video and Displays - Digital Video Containers - Obtaining Video Clips - Shooting and Editing Video.

#### **UNIT IV**

Making Multimedia: The Stage of Multimedia Project - The Intangible Needs - The Hardware Needs - The Software Needs - An Authoring Systems Needs- Multimedia Production Team.

#### **UNIT V**

Planning and Costing: The Process of Making Multimedia - Scheduling - Estimating - RFPs and Bid Proposals. Designing and Producing - Content and Talent: Acquiring Content - Ownership of Content Created for Project - Acquiring Talent.

#### **TEXT BOOK:**

1. Tay Vaughan, "Multimedia: Making It Work", 8th Edition, Osborne/McGraw-Hill, 2001.

#### **REFERENCE BOOK:**

1. Ralf Steinmetz & Klara Nahrstedt "Multimedia Computing, Communication & Applications", Pearson Education, 2012.

Total Number of Topics Present in the course: 50

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	4	8.0
2.	Regional	3	6.0
3.	National	5	10.0
4.	Global	38	76.0

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits				
VI	20UCS6MBE2:1	MULTIMEDIA SYSTEMS					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓		✓		✓				
CO2	✓	✓				✓	✓	✓	✓			
CO3		✓	✓	✓			✓	✓	✓			
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
CO5	✓		✓	✓	✓	✓	✓	✓	✓	✓		
Number of matches (✓) = 37, Relationship: High												

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

## **SEMESTER-VI**

Course Code: 20UCS6MBE2:2

Instruction Hours: 6

Credits: 5

Exam Hours: 3

Internal Marks: 25

External Marks: 75

### **PART III - OPEN SOURCE TECHNOLOGY -**

**Course Outcomes(CO):**

On completion of the course, the student will be able to

- Write PHP scripts to handle HTML forms.

- Write regular expressions including modifiers, operators, and meta characters.
- Create PHP programs that use various PHP library functions, and that manipulate files and directories.
- Analyze and solve various database tasks using the PHP language.
- Analyze and solve common Web application tasks by writing PHP programs

## UNIT I

Introduction : Open Source - Free Software - Free Software vs. Open Source software - Public Domain Software - FOSS does not mean no cost. History : BSD - The Free Software Foundation and the GNU Project.

## UNIT II

Open Source History - Initiatives - Principle and methodologies. Philosophy : Software Freedom - Open Source Development Model Licences and Patents: What Is A License - Important FOSS Licenses (Apache,BSD,GPL, LGPL) - copyrights and copyleft - Patents Economics of FOSS : Zero Marginal Cost - Income-generation opportunities - Problems with traditional commercial software - Internationalization

## UNIT III

Community Building: Importance of Communities in Open Source Movement-JBoss Community-Starting and Maintaining an Open Source Project - Open Source Hardware

## UNIT IV

Apache HTTP Server and its flavors- WAMP server (Windows, Apache, MySQL, PHP)- Apache, MySQL, PHP, JAVA as development platform.

## UNIT V

Open source vs. closed source Open source government - Open source ethics. Social and Financial impacts of open source technology - Shared software - Shared source.

## TEXT BOOKS

1. Sumitabha Das “Unix Concepts and Applications, Tata McGraw Hill Education 006
2. The Official Ubuntu Book, 8th Edition
3. Kailash Vadera, Bhavyesh Gandhi, “Open Source Technology”, University Science press, ker

## REFERENCE BOOKS

1. Paul Kavanagh, “Open Source Software: Implementation and Management”, Elsevier Digital Press
2. The Linux Documentation Project : <http://www.tldp.org>
3. Docker Project Home : <http://www.docker.com>

Total Number of Topics Present in the course: 37

S.No	Category (local/regional/global)	No. of Topics covered	Percentage

1.	Local	6	16.2
2.	Regional	5	13.5
3.	National	3	8.1
4.	Global	23	62.2

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits				
VI	20UCS6MBE2:2	OPEN SOURCE TECHNOLOGY					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓		✓		✓				
CO2	✓	✓				✓	✓	✓	✓			
CO3	✓	✓	✓	✓		✓	✓	✓	✓			
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Number of matches (✓) = 40, Relationship: High												

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

## SEMESTER-VI

Course Code: 20UCS6MBE2:3  
Instruction Hours: 6  
Credits: 5

Exam Hours: 3  
Internal Marks: 25  
External Marks: 75

### PART- III LINUX & SHELL PROGRAMMING

#### Course Outcomes(CO):

On completion of the course, the student will be able to

- To simulate the file commands
- To write shell program for handling files
- To write programs for familiarizing control statements
- To write programs for handling strings.

#### UNIT I

Introduction to Linux: operating system and Linux - History of Linux and Unix - Linux overview - Linux Distributions - Vi editors.

#### UNIT II

Shell - comparison of Shells - working in the shell - Learning Basic Commands - Compiler and interpreter differences - various directories - Drilling deep into process management - job control and Automation.

#### UNIT III

Text processing - Text filtering Tools - working with commands. Logical operators. - local variables and its scope - working with arrays.

#### UNIT IV

Tricks with shell scripting - interactive shell scripts - The here document and << operator - sort command - WC command - file handling - Debugging.

#### UNIT V

Automating Decision - Making in scripts - Automating repetitive tasks - working with Functions.

#### TEXT BOOK

1. The Complete Reference LINUX - Richard L. Petersen, McGraw Hill,
2. LINUX shell scripting by Ganesh Naik, Packt Publishing Ltd.,

Total Number of Topics Present in the course: 32

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	4	12.5
2.	Regional	4	12.5
3.	National	4	12.5
4.	Global	20	62.5

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

### Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
VI	20UCS6MBE2:3	LINUX & SHELL PROGRAMMIN6					5	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓		✓		✓				
CO2	✓	✓				✓	✓	✓	✓			
CO3		✓	✓	✓		✓	✓	✓	✓			
CO4	✓	✓	✓	✓	✓	✓	✓		✓	✓		
CO5	✓		✓	✓	✓	✓	✓	✓	✓	✓		
Number of matches (✓) = 37, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50

<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High
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**Prepared by:**

**Checked by:**

**HOD:**

## **SEMESTER-VI**

Course Code: 20UCS6PW  
Instruction Hours: 6  
Credits: 5

Exam Hours: 3  
Internal Marks: 25  
External Marks: 75

### **PART- III -MINI PROJECT**

#### **Course Outcomes(CO):**

On completion of the course, the student will be able to

- Identify the requirements for the real world problems.

- Conduct a survey of several available literatures in the preferred field of study.
  - Study and enhance software/ hardware skills
  - Demonstrate and build the project successfully by hardware requirements, coding, emulating and testing.
  - To report and present the findings of the study conducted in the preferred domain
  - To report and present the findings of the study conducted in the preferred domain
- 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.

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

VI	20UCS6PW	PROJECT WORK					6	5		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓		✓		✓		
CO2	✓	✓				✓	✓	✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches (✓) = 40, Relationship: High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

## SEMESTER-VI

Course Code: 20UCS6MBE3 :1  
Instruction Hours: 6  
Credits: 5

Exam Hours: 3  
Internal Marks: 25  
External Marks: 75

### **PART- III - OPEN SOURCE TECHNOLOGY LAB**

#### **Course Outcomes(CO):**

On completion of the course, the student will be able to

- Understand the installation of various packages in open source operating systems
- Create simple GUI applications using PHP function to develop program.
- Understand various versions of control system
- Understand the kernel configuration and virtual environment
- Implement various applications using build systems

1. Create a simple HTML form and accept the user name and display the name through PHP echo statement.

2. Write a PHP script to redirect a user to a different page.

3. Write a PHP function to test whether a number is greater than 30, 20 or 10 using ternary operator.

4. Create a PHP script which display the capital and country name from the given array. Sort the list by the name of the country

5. Write a PHP script to calculate and display average temperature, five lowest and highest temperatures.

6. Create a script using a for loop to add all the integers between 0 and 30 and display the total.

7. Write a PHP script using nested for loop that creates a chess board.

8. Write a PHP function that checks if a string is all lower case.

9. Write a PHP script to calculate the difference between two dates.

10. Write a PHP script to display time in a specified time zone.

Total Number of Topics Present in the course: 10

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	1	10.0
2.	Regional	3	30.0
3.	National	1	10.0
4.	Global	5	50.0

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

**Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:**

Semester	Code	Title of the Course					Hours	Credits			
VI	20UCS6MBE3:1	OPEN SOURCE TECHNOLOGY LAB					6	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓			
CO2	✓	✓				✓	✓	✓	✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓	✓		
CO4	✓	✓	✓	✓			✓		✓	✓	
CO5			✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 37, Relationship: High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50

<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High
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**Prepared by:**

**Checked by:**

**HOD:**

## SEMESTER-VI

Course Code: 20UCS6MBE3 :2  
 Instruction Hours: 6  
 Credits: 5

Exam Hours: 3  
 Internal Marks: 25  
 External Marks: 75

### PART- III - SHELL PROGRAMMING LAB

#### Course Outcomes(CO):

On completion of the course, the student will be able to

- Possess good knowledge in script writing
- Process the text in the Linux environment
- Solve the practical issues in Linux shell scripting
- To understand the concept of file handling
- Able to write scripts with functions.

1. Write a shell script to stimulate the file commands: rm, cp, cat, mv, cmp, wc, split, diff.
2. Write a shell script to show the following system configuration:
  - a. currently logged user and his log name.
  - b. current shell, home directory, Operating System type, current Path setting, current working directory.
  - c. show currently logged number of users, show all available shells
  - d. show CPU information like processor type, speed
3. Write a Shell Script to implement the following: pipes, Redirection and tee commands.
4. Write a shell script for displaying current date, user name, file listing and directories by getting user choice.

5. Write a shell script to implement the filter commands.
6. Write a shell script to remove the files which has file size as zero bytes.
7. Write a shell script to find the sum of the individual digits of a given number.
8. Write a shell script to find the greatest among the given set of numbers using command line arguments.
9. Write a shell script for palindrome checking.
10. Write a shell script to print the multiplication table of the given argument using for-loop.

Total Number of Topics Present in the course: 10

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	2	20.0
2.	Regional	1	10.0
3.	National	2	20.0
4.	Global	5	50.0

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

### Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
VI	20UCS6MBE3:2	SHELL PROGRAMMING LAB					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		

<b>CO1</b>	✓	✓	✓	✓		✓		✓		
<b>CO2</b>	✓	✓				✓	✓	✓	✓	
<b>CO3</b>	✓	✓	✓	✓		✓	✓	✓	✓	
<b>CO4</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>CO5</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches (✓) = 40, Relationship: High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**Prepared by:**

**Checked by:**

**HOD:**

**2020**

# **M.Sc COMPUTER SCIENCE**

## **Course Structure and Syllabus**

(For the candidates admitted from the academic year 2021-2022 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 postgraduate will be able to

1. Gain advanced knowledge resulting in entrepreneurship; innovation and newer opportunities for being employable in public and private sectors, research and development organizations
2. Apply enhanced new techniques and adopt new technologies needed in the respective disciplines
3. Appreciate the diversity of behavior in professional practice and act in accordance with the core values of chosen profession
4. Demonstrate the knowledge, values and skills to be critical consumer of research practice and possess investigative skills to evaluate the practice
5. Engage in lifelong learning process, have the ability to communicate the findings of Physical Sciences with the current knowledge

### **Programme Specific Outcomes(PSOs)**

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

1. Basic fundamental knowledge in Mathematical problem solving and to identify, analyze, design, optimize and implement system solutions using appropriate algorithms of varying complexity.
2. Ability to demonstrate understanding of the working principles of the hardware and software aspects and development methodologies of the software systems
3. Communicate computer science concepts, designs, and solutions effectively and professionally
4. Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems
5. Basic knowledge for solving real-life and R&D problems with an orientation to lifelong learning

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

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

(For the candidates admitted from the academic year 2020-2021 onwards)

Semester	Course Code	Title of the Course	Ins. Hours/ Weeks	Credit	ExamHours	CIA (Max)	ESE (Max)	Total (Max)
1	20PCS1CC1	Design & Analysis of Algorithms	6	4	3	25	75	100
1	20PCS1CC2	Advanced Web Technologies	6	4	3	25	75	100
1	20PCS1CC3	Advanced Database Management System	6	4	3	25	75	100
1	20PCS1CC4	Compiler Design	6	4	3	25	75	100
1	20PCS1CP1	Advanced Web Technologies Lab	6	4	3	40	60	100
<b>Total</b>			<b>30</b>	<b>20</b>	-	-	-	<b>500</b>
2	20PCS2CC5	Distributed Operating System	6	5	3	25	75	100
2	20PCS2CC6	Advanced Java Programming	6	5	3	25	75	100
2	20PCS2EC1:1 20PCS2EC1:2 20PCS2EC1:3	Advanced Computer Network Cloud Computing Web Services	6	5	3	25	75	100
2	20PCS2EC2:1 20PCS2EC2:2 20PCS2EC2:3	Object Oriented System Development Mobile Computing Wireless Networks	6	5	3	25	75	100
2	20PCS2CP2	Advanced JavaLab	6	4	3	40	60	100
<b>Total</b>			<b>30</b>	<b>24</b>	-	-	-	<b>500</b>
3	20PCS3CC7	Cryptography and Network Security	6	5	3	25	75	100
3	20PCS3CC8	Digital Image Processing	6	5	3	25	75	100
3	20PCS3EC3:1 20PCS3EC3:2 20PCS3EC3:3	Theory of computation Optimization Techniques Embedded Systems	6	5	3	25	75	100
3	20PCS3EC4:1 20PCS3EC4:2 20PCS3EC4:3	WAP & XML Statistical Computing Software Project Management	6	5	3	25	75	100
3	20PCS3CP3	Image processing 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	20PCS4CC9	Internet of Things	6	5	3	25	75	100
4	20PCS4CC10	Machine Learning	6	5	3	25	75	100
4	20PCS4EC5:1	Data Mining	6	4	3	25	75	100
	20PCS4EC5:2	Soft Computing						
	20PCS4EC5:3	Data Science and Big Data Analytics						
4	20PCS4CP4	Machine LearningLab	6	4	3	40	60	100
4	20PCS4PW	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>

### List of Elective Courses

Elective	Course Code	Title of the Course
Elective -1	20PCS2EC1:1	1. Advanced Computer Network
	20PCS2EC1:2	2. Cloud Computing
	20PCS2EC1:3	3. Web Services
Elective -2	20PCS2EC2:1	1. Object Oriented System Development
	20PCS2EC2:2	2. Mobile Computing
	20PCS2EC2:3	3. Wireless Networks
Elective - 3	20PCS3EC3:1	1. Theory of computation
	20PCS3EC3:2	2. Optimization Techniques
	20PCS3EC3:3	3. Embedded Systems
Elective – 4	20PCS32EC4:1	1. WAP & XML
	20PCS3EC4:2	2. Statistical Computing
	20PCS3EC4:3	3. Software Project Management
Elective -5	20PCS4EC5:1	1. Data Mining
	20PCS4EC5:2	2. Soft Computing
	20PCS4EC5:3	3. Data Science and Big Data Analytics

**Note:**

Project : 100 Marks

Dissertation : 80 Marks

Viva Voce : 20 Marks

Core Papers - 10

Core Practical - 4

Elective Papers - 5

Project - 1

1.TheoryInternal25 marksExternal75 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.

## SEMESTER - I

Course Code: 20PCS1CC1

Exam Hours: 3

Instruction Hours:6

Internal Marks: 25

Credits: 4

External Marks: 75

### CORE COURSE 1- DESIGN AND ANALYSIS OF ALGORITHMS

#### Course Objectives:

- To analyze the asymptotic performance of algorithms.
- To demonstrate a familiarity with major algorithms and data structures and to synthesize efficient algorithms in common engineering design situations.

#### Course Outcomes:

On successful completion of the course, students will be able to

**CO1:** It gives stepwise procedure to solve problems

**CO2:** The problems can be broken down into small pieces for program development.

**CO3:** Efficient approach of solving problems by a model of computations

**CO4:** It gives the knowledge of programming skill

**CO5:** Impact the knowledge of to design and find solution for real time

Problems in lifelong learning

#### Unit I

Introduction -Algorithm Definition- Algorithm Specification-Performance Analysis-Asymptotic Notations-Elementary Data Structures - Stacks - Queues- Trees - Dictionaries - Priority Queues- Sets and Disjoint Set Union - Graphs

#### Unit II

Divide and Conquer-The General Method- Defective Chessboard-Binary Search - Finding the Maximum and Minimum - Merge Sort-Quick Sort - Selection - Strassen's Matrix Multiplication.

#### Unit III

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

#### Unit IV

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

#### Unit V

**Backtracking-The General Method-The 8\_Queens Problem -Sumof Subsets - Graph Coloring-HamiltonianCycles-KnapsackProblem Branch and Bound:Least Cost searched - 0/1 Knapsack Problem.**

Total Number Of Topics: 57

S.No.,	Category(Local,Regional,National & Global)	No.Of Topics	Percentage
1.	Local	10	21.05
2.	Regional	13	22.81
3.	National	10	17.54
4.	Global	24	42.11

**Text Book(s):**

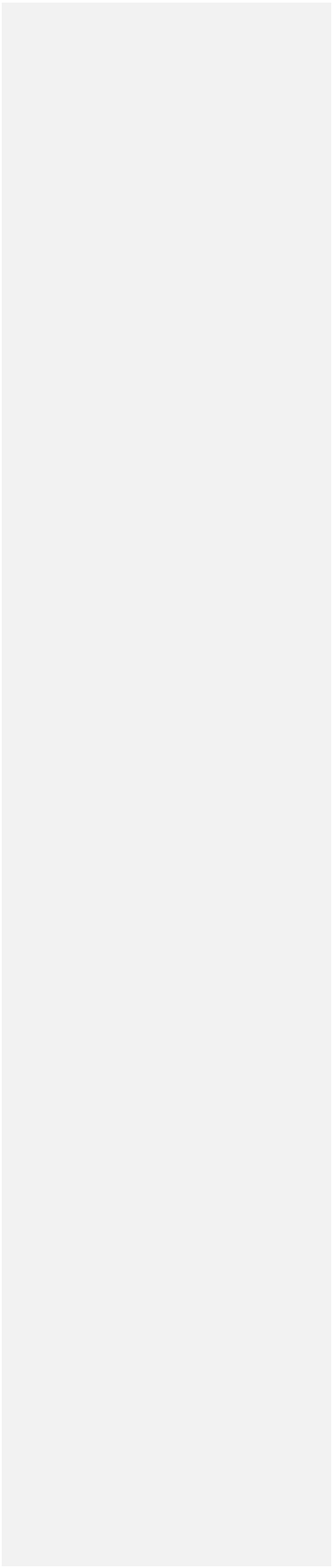
1. Ellis Horowitz, SatrajSahni and SanguthevarRajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint2009.

**Reference Book(s):**

1. Data Structures Using C - Langsam, Augenstein, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcroft, Ullman ,LPE
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem-TMH.
4. Carlos A.CoelloCoello, Gary B.Lamont, David A.VanVeldhuizen, “Evolutionary Algorithms for Solving Multi-Objective Problems”, Springer 2<sup>nd</sup>Edition,2007.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
I	20PC1CC1	Design and Analysis of Algorithms					6	4			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40, Relationship: High											



<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - I

Course Code: 20PCS1CC2

Instruction Hours:6

Credits: 4

Exam Hours: 3

Internal Marks: 25

External Marks: 75

### CORE COURSE 2 - ADVANCED WEB TECHNOLOGIES

#### COURSE OBJECTIVES:

- To provide fundamental concept of Internet, JavaScript, XML, JSP, ASP with a view to developing professional software development skills.
- To make familiar with client server architecture.

#### Course Outcomes:

On successful completion of the course, students will able to

**CO1:**Design a web page with Web form fundamentals and web control classes

**CO2:**Recognize the importance of various web development tools and methods of web services

**CO3:** Efficient approach of solving problems by web development controls

**CO4:** Provides the knowledge of programming skill and enables the skills of entrepreneurship development

**CO5:** Impact the knowledge of to design web sites for real time requirements in lifelong learning

#### Unit I

**OVERVIEW OF ASP.NET** - The .NET framework - Learning the .NET languages Data types- Declaring variables- Scope and Accessibility- Variable operations- Object Based manipulation- Conditional Structures- Loop Structures - Functions and Subroutines- Types Objects and Namespaces - The Basics about Classes- Value types and Reference types -Advanced class programming- Understanding name spaces and assemblies Setting up ASP.NET and IIS

#### Unit II

**Developing ASP.NET Applications** - ASP.NET Applications- ASP.NET applications- Code behind- The Global.asax application file- Understanding ASP.NET Classes- ASP.NET Configuration. Web Form fundamentals- A simple page applet- Improving the currency converter- HTML control classes- The page class - Accessing HTML server controls. Web controls - Web Control Classes - Auto Post Back and Web Control events- Accessing web controls. Using Visual Studio .NET- Starting a Visual Studio.NET Project- Web form Designer- Writing code- Visual studio.NET debugging and Validation and Rich Controls - Validation- A simple Validation example- Understanding regular expressions- A validated customer form. State management- Tracing Logging- Error Handling

### Unit III

**Working with Data** - Overview of ADO.NET - ADO.NET and data management- Characteristics of ADO.NET- ADO.NET object model - ADO.NET data access -SQL basics- Select - Update- Insert- Delete statements- Accessing data- Creating a connection- Using acommand with a DataReader - Accessing Disconnected data - Selecting multiple tables- Updating Disconnected data. Data binding- Single value Data Binding- Repeated value data binding- Data binding with data bases - Data list- Data grid - Repeater - Files- Streams and Email - UsingXML

### Unit IV

**Web Services** - Web services Architecture - Internet programming then and now, WSDL,SOAP - Communicating with a web service - Web service discovery and UDDI. Creating Web services- Web service basics- The StockQuote web service - Documenting the web service- Testing the web service- Web service Data types- ASP.NET intrinsic objects- Usingwebservices-Consuming a web service- Using the proxy class - An example with Terra Service.

### Unit

**Advanced ASP.NET** :Component Based Programming,Creating a simple component - Properties and state, Database components and Using COM components. Custom controls- User Controls - Deriving Custom controls -Caching and Performance Tuning- Designing and scalability , Profiling , Catching- Output catching - Data catching - Implementing security- Determining security requirements- TheASP.NET security model- Forms authentication- Windows authentication.

### TextBook(s)-

1 Mathew Mac Donald- “ASP.NET Complete Reference”- TMH 2005

### Reference Book(s)-

1. Crouch Matt J- “ASP.NET and VB.NET WebProgramming”-Addison Wesley2002.
2. J.Liberty-D.Hurwitz- “Programming ASP.NET”- Third Edition- O'REILLY- 2006.

Total Number Of Topics: 94

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	22	23.4
2.	Regional	21	22.34
3.	National	34	36.2
4.	Global	17	18.09

3.

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
I	20PC1CC2	Advanced Web Technologies					6	4			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓		✓	✓	✓	✓		✓	✓	
CO2		✓	✓	✓	✓	✓			✓	✓	
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓		
CO4	✓		✓			✓		✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Number of matches (✓) = 39- Relationship-High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - I

Course Code- 20PCS1CC3

Instruction Hours-6

Credits-4

Exam Hours- 3

Internal Marks- 25

External Marks- 75

### CORE COURSE 3 - ADVANCED DATABASE MANAGEMENT SYSTEMS

#### COURSE OBJECTIVES-

- Understand Relational Model
- Get knowledge about SQL as well as NoSql & Understand transaction management

#### Course Outcomes-

On successful completion of the course- students will able to

**CO1-**Demonstrate an understanding of the elementary & advanced features of DBMS & RDBMS

**CO2-**Attain a good practical understanding of the SQL

**CO3-**Develop clear concepts about Relational Model

**CO4-**Examine techniques pertaining to Database design practices

**CO5-**Execute various advanced SQL queries related to Transaction Processing & Locking using concept of concurrency control

#### Unit I

Relational and parallel Database Design- Basics- Entity Types- Relationship Types- ER Model-ER\_to\_Relational Mapping algorithm-Normalization- Functional Dependency: 1NF- 2NF- 3NF- BCNF-4NF - 5NF - Architecture-I/O Parallelism- Interquery Parallelism- Intraquery Parallelism- Intraoperation Parallelism- Interoperation Parallelism.

#### Unit II

Distributed and Object based Databases- Architecture- Distributed data storage- Distributed transactions-Commit protocols- Concurrency control-Query Processing Complex Data Types-Structured Types and Inheritance- Table Inheritance- array and Multiset-Object Identity and Reference Types- Object Oriented versus ObjectRelational.

#### Unit III

Spatial Database-Spatial Database Characteristics-SpatialDataModel- Spatial Database Queries-Techniques of Spatial Database Query-Logic based Databases-Introduction- Overview- Propositional Calculus- Predicate Calculus- Deductive Database Systems- Recursive QueryProcessing.

#### Unit IV

XMLDatabases-XMLHierarchicaldatamodel-XMLDocuments-DTD- XML Schema- XML Querying- XHTML- Illustrative Experiments.

## Unit V

Temporal Databases-Introduction- Intervals-Packing and Unpacking Relations- Generalizing the relational Operators- Database Design-Integrity Constraints-Multimedia Databases and Multimedia Sources-Multimedia Database Queries- Multimedia Database Applications.

Total Number Of Topics: 63

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	10	15.87
2.	Regional	7	11.11
3.	National	9	14.29
4.	Global	37	58.73

### Text Book(s)-

1. Abraham Silberschatz- Henry F Korth- S Sudarshan- “Database System Concepts”- 6th edition - McGraw-Hill International Edition -2011
2. C.J.Date-A.Kannan-S.Swamynathan- “An Introduction to Database Systems”- 8<sup>th</sup>Edition- Pearson Education Reprint2016.

### Reference Book(s)-

1. RamezElmasri-Shamkant B Navathe- “Fundamental of Database Systems”- Pearson- 7th edition 2016.
2. Thomas Connolly- Carolyn Begg.- “Database Systems a practical approach to Design- Implementation and Management “- Pearson Education-2014.

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits				
I	20PC1CC3	AdvancedDatabase Management Systems					6	4				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓		✓	✓	✓	✓		✓	✓	✓		

<b>CO2</b>	✓			✓	✓	✓	✓		✓	✓
<b>CO3</b>	✓	✓		✓	✓	✓	✓	✓		
<b>CO4</b>	✓	✓	✓		✓	✓	✓	✓	✓	✓
<b>CO5</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40- Relationship- High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - I

Course Code- 20PCS1CC4

Instruction Hours- 6

Credits- 4

Exam Hours- 3

Internal Marks- 25

External Marks- 75

### CORE COURSE 4 - COMPILER DESIGN

#### Course Objectives-

- Define the design and intrinsic functioning of compilers
- Identify the purpose and functions of phases of the compiler
- Describe the contents and data structures for symbol table with errors

#### Course Outcomes-

On successful completion of the course- students will be able to

**CO1-** Understand the major phases of compilation and to understand the knowledge of Lextool & YAAC tool

**CO2-** Develop the parsers and experiment the knowledge of different parsers design without automated tools

**CO3-** Construct the intermediate code representations and generation

**CO4-** Apply for various optimization techniques for dataflow analysis

**CO5-** Use the knowledge of patterns- tokens & regular expressions for solving a problem in the field of data mining

#### Unit I

**Lexical analysis** - Language Processors- The Structure of a Compiler-Parameter passing mechanism - Symbol table -Representing information in a symbol table -Data structures for symbol table-The role of the lexical analyzer- Input buffering - Specification of tokens - Recognition of tokens-Finite automata-Regular expressions to automata.

#### Unit II

**Syntax Analysis** - The role of the parser - Context free grammars - Writing a grammar - Top down Parsing - Bottom up Parsing - LR parsers- LALR parsers.

#### Unit III

**Semantic Analysis** - Inherited and Synthesized attributes -Dependency graphs - Ordering the evaluation of attributes -S attributed definitions -L attributed definitions-Applications of Syntax Directed translation - Syntax Directed translations schemes - Storage organization - Stack allocation of space.

#### Unit IV

**Intermediate Code Generation** - Variants of Syntax trees - Three Address code - Types and Declarations - Translation of Expressions-Type checking - Control flow - Back patching - Switch Statements - Procedure calls.

## Unit V

**Code Generation -Code Optimization** - Issues in the design -code generator - The target language -Address in the Target Code - Basic Block - Flow graphs-Optimization of Basic Blocks-DAG representation - A simple code generator - PeepholeOptimization.

Total Number Of Topics: 54

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	10	18.52
2.	Regional	10	18.52
3.	National	10	18.52
4.	Global	24	42.59

### Text Book(s)-

1. Alfred V. Aho- Monica S.Lam- Ravi Sethi and Jeffrey Ullman-“Compilers- Principles- Techniques and Tools”- Second Edition- Pearson Education Asia- 2009

### Reference Book(s)-

1. A.V. Aho- Ravi Sethi- J.D. Ullman-Compilers-Principles-Techniques and Tools- Addison- Wesley-2003.
2. Fischer Leblanc- Crafting Compiler- Benjamin Cummings- Menlo Park-1988.
3. KennathC.Louden- Compiler ConstructionPrinciplesandPractice- Vikas publishing House-2004.
4. AllenI.Holub-CompilerDesigninC-PrenticeHalloffIndia-2001.
5. S.GodfreyWinster-S.Aruna Devi-R.Sujatha- “Compiler Design”-yesdee Publishers- Third Reprint2019.

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
I	20PC1CC4	Compiler Design					6	4			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓		✓	✓	✓		✓		✓	
CO2	✓	✓	✓	✓	✓	✓	✓			✓	
CO3	✓	✓	✓	✓		✓		✓		✓	

<b>CO4</b>		✓	✓		✓	✓	✓	✓	✓	✓
<b>CO5</b>	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 38- Relationship- High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

### SEMESTER - I

Course Code- 20PCS1CP1

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 40

Credits- 4

External Marks- 60

#### CORE PRACTICAL 1- ADVANCEDWEB TECHNOLOGIES LAB

#### Course Outcomes-

Onsuccessful completion of this course- Students will be able to-

- CO1**-Develop to build a complete web application using .NET Framework
- CO2**-Create interactive web pages using web controls
- CO3**-Able to connect with databases using ADO.NET and ASP.NET
- CO4**-Develop a simple web application using servicer side PHP programming and database connectivityusing MYSQL
- CO5**-Able to create a complete web application with all the required modules

1. Create a welcome Cookie (Hit for a page) and display different image and text content each time when the user hit the page
2. List a table of content and navigate within the pages.
3. Demonstrate Request and Response object using HTML Form.
4. Database Connection to display all the values in the table in a webpage using ADO.NET.
5. Query textbox and Displaying records & Display records by using database

6. Write LINQ queries to access the database.
7. Write a program to get the information from the user and display it in a message box.
8. Write a program to receive user feedback using Form and stored it in a database.
9. Create a web service using ASP.NET
10. Write a component based programming using advanced ASP.NET

Total Number Of Topics: 10

11.

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	1	10
2.	Regional	1	10
3.	National	5	50
4.	Global	3	30

12.

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
I	20PCS1CP1	Advanced Web Technologies Lab					6	4			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓		✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓		✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40- Relationship-High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High



## SEMESTER - II

Course Code- 20PCS2CC5

Instruction Hours- 6

Credits- 5

Exam Hours- 3

Internal Marks- 25

External Marks- 75

### CORE COURSE 6 -DISTRIBUTED OPERATING 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 -Agreement Protocols

#### Unit III

Distributed Resource Management - Distributed File Systems-Architecture-Mechanisms-Design Issues-Distributed shared Memory- Architecture - Algorithm - Protocols-Design Issues - Distributed Scheduling-Issues-Components Algorithms

#### 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 Nonblocking Commit Protocols - Voting Protocols - Dynamic Voting Protocols.

**Unit V**

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

**Text Book(s)-**

1. MukeshSinghalN.G.Shivaratri- “Advanced Concepts in Operating Systems”- McGraw Hill2000.
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 publications2003.
2. Andrew S.Tanenbaum- “Modern Operating Systems”- 2<sup>nd</sup>Edition Addison Wesley2001

Total Number Of Topics: 64

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	14	21.88
2.	Regional	10	15.63
3.	National	10	15.63
4.	Global	30	46.88

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits				
II	20PC2CC5	Distributed Operating System					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓		✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		

<b>CO3</b>	✓	✓		✓		✓	✓	✓		
<b>CO4</b>	✓		✓		✓	✓	✓	✓	✓	✓
<b>CO5</b>	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 38- Relationship- High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - II

Course Code- 20PCS2CC6

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 5

External Marks- 75

### CORE COURSE 6- ADVANCED JAVA PROGRAMMING

#### Course Objectives

- Students can able to develops programming ability of students to create dynamic webapplications using server side technology with Java Database Connectivity.
- Students can learn networking and remote method invocation using Java API.

#### Course Outcomes-

On successful completion of the course- students will able to

**CO1-** Knowledge of the structure and model of the Java programming language

**CO2-** Use the Java programming language for various programming technologies

**CO3-** Develop software in the Java programming language

**CO4-** Evaluate user requirements for software functionality required to decide whether the Javaprogramming language can meet user requirements

**CO5-** Propose the use of certain technologies by implementing them in the Java programminglanguage to solve the given problem

#### Unit I

Design Patterns:Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern- Prototype Pattern- Singleton Pattern- Adapter Pattern- Proxy Pattern-Decorator Pattern- Command Pattern- Template Pattern- Mediator Pattern

#### Unit II

Applet Fundamentals:Applet Class - Applet lifecycle- Steps forDeveloping Applet Programs- Passing Values through Parameters- Graphics in Applets- GUI Application-DialogBoxes- CreatingWindows - Layout Managers - AWT Component classes-Swing component classes- Borders-Event handling with AWT components - AWT Graphics classes - File Choosers - Color Choosers

#### Unit III

JDBC:Introduction-JDBCArchitecture-JDBCClassesandInterfaces - Database Access with MySQL -Steps in Developing JDBC application - Creating aNewDatabaseandTablewithJDBC- Working with Database Metadata- Java NetworkingBasicsofNetworking - Networking in Java- Socket ProgramusingTCP/IP-SocketProgramusingUDP-URLandInetaddressclasses.

#### Unit IV

Servlet - Advantages over Applets - Servlet Alternatives-ServletStrengths - Servlet Architecture - Servlet Life Cycle - GenericServlet-Http Servlet - First Servlet - Invoking Servlet - Passing Parameters to Servlets - Retrieving Parameters -Server Side Include - Cookies- JSP Engines - Working with JSP - JSP andServlet-AnatomyofaJSPPage-DatabaseConnectivity-usingServletsandJSP.

#### Unit V

Collection Framework-Array List class - Linked List class-Array List vs. Linked List - List Iterator interface - HashSetclass-LinkedHashSetclass-TreeSetclass Priority Queue class - Mapinterface-HashMapclass-LinkedHash -Map class -Tree Map class - Comparable interface - Comparator interface-Comparable vs.Comparator

Total Number Of Topics: 74

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	19	25.68
2.	Regional	31	41.89
3.	National	10	13.5
4.	Global	17	22.97

#### Text Book(s)-

1. Bert Bates-KarthySierra- Eric Freeman- Elisabeth Robson-“Head First Design Patterns”- O’REILLY Media Publishers.(1<sup>st</sup>& 5<sup>th</sup>Unit).
2. Herbert Schildt- “Java- A Beginner Guide”- Oracle Pres-Seventh Edition. (2<sup>nd</sup>and 3<sup>rd</sup>Unit).
3. Murach’s- “Java Servlets and JSP”- 2<sup>nd</sup>Edition- Mike Murach& Associates Publishers; 3<sup>rd</sup> Edition. (4<sup>th</sup>Unit).

#### Reference Book(s)-

1. Paul Deitel and Harvey Deitel- “Java- How to Program”- Prentice Hall Publishers; 9<sup>th</sup>Edition.
2. Jan Graba- “An Introduction to Network Programming with Java- Java 7 Compatible”- 3<sup>rd</sup> Edition-Springer.

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course	Hours	Credits
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II	20PC2CC6	Advanced Java Programming				6	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓		✓			✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40- Relationship-High										

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - II

Course Code- 20PCS2EC1-1

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 5

External Marks- 75

### ELECTIVE COURSE 1 (1)- ADVANCED COMPUTERNETWORKS

#### Course Objectives-

- Prepares students to develop implement and manage computer networking systems within an organization. Ability to implement best practices solutions for network implementation.
- Prepares students to Conduct performance balancing; redundancy checks- on a local area (LAN) and wide area (WAN) network.

#### Course Outcomes-

On successful completion of this course students will be able to

**CO1-** Basic understanding of computer networks and concepts of the OSI reference model-TCP-IP reference model

**CO2-** Impact the knowledge for use protocols- network interfaces and design/performance issues in local area networks and wide area networks

**CO3-** Understand the wireless networking concepts- and be familiar with contemporary Issues in networking technologies

**CO4**-To be familiar with network tools and network programming

**CO5**-Develop current research problems and research methods in advance computer networks

### **Unit I**

Introduction-Network Hardware - Software - Reference Models-OSI and TCP/IP models -Example networks- Internet-3G Mobile phone networks-Wireless LANs - RFID and sensor networks - Physical layer-Theoretical basis for data communication-guided transmission media

### **Unit II**

Wireless transmission: Communication Satellites-Digital modulation and multiplexing - Telephones network structure -local loop-trunks and multiplexing-switching Data link layer-Design issues-error detection and correction.

### **Unit III**

Elementary data link protocols - sliding window protocols-Example Data Link protocols-Packet over SONET- ADSL Medium Access Layer and Channel Allocation Problem -Multiple Access Protocols.

### **Unit IV**

Network layer : design issues - Routing algorithms :Congestion control algorithms - Quality of Service - Network layer of Internet-IP protocol-IP Address-Internet Control Protocol

### **Unit V**

Transport layer : transport service- Elements of transport protocol : Addressing-Establishing & Releasing a connection-Error control-flow control- multiplexing and crash recovery - Internet Transport Protocol TCP-Network Security-Cryptography.

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

1. S.Tanenbaum- 2011- Computer Networks-Fifth Edition-Pearson Education-Inc.

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

1. B. Forouzan- 1998- Introduction to Data Communications in Networking- Tata McGraw Hill-New Delhi.
2. F.Halsall-1995-Data Communications-Computer Networks and Open Systems- Addison Wesley.
3. D. Bertsekas and R. Gallager- 1992- Data Networks-Prentice hall of India-New Delhi.
4. Lamarca- 2002- Communication Networks- Tata McGraw Hill-New Delhi
5. Teresa C.Piliouras- "Network Design Management and Technical Perspectives- Second Edition"- Auerbach Publishers-2015

**Website- E-learning resources**

1) <http://peasonhighered.com/tanenbaum>

Total Number Of Topics: 43

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	10	23.26
2.	Regional	5	11.63
3.	National	5	11.63
4.	Global	23	53.49

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits				
II	20PCS2EC1-1	Advanced Computer Networks					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓			✓	✓		✓	✓	✓		
CO2	✓		✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓		✓		✓	✓	✓				
CO4	✓	✓	✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 38- Relationship-High												

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High



## SEMESTER - II

Course Code- 20PCS2EC1-2  
Instruction Hours- 6  
Credits- 5

Exam Hours- 3  
Internal Marks- 25  
External Marks- 75

### ELECTIVE COURSE 1 (2) -CLOUD COMPUTING

#### 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-

On successful completion of this course students will be able to

**CO1:** Articulate the main concepts- key technologies- strengths- and

limitations of cloud computing and the possible applications for state-of-the-art cloud computing

**CO2:** Ability to explain the core issues of cloud computing such as security- privacy and interoperability

**CO3:** Choose the appropriate technologies- algorithms- and approaches for the related issues and identify problems- and explain- analyze- and evaluate various cloud computing solutions

**CO4:** Provide the appropriate cloud computing solutions and recommendations according to the applications used

**CO5:** Attempt to generate new ideas and innovations in cloud computing and collaboratively research and write a research paper- and present the research online.

#### Unit I

##### COMPUTING BASICS

Cloud computing definition - Characteristics - Benefit - Challenges- Distributed Systems- Virtualization- Service oriented computing- Utility oriented computing- Building Cloud Computing environments- computing platforms technologies - Cloud Models - Cloud Service Examples - Cloud Based Services and Applications - Cloud concepts and Technologies.

#### Unit II

##### VIRTUALIZATION CLOUD SERVICES AND PLATFORMS

Virtualization- Virtualization Characteristics- taxonomy- types- Pros and Cons- Examples

Architecture- Reference model- types of clouds- Compute Service - Storage Services - Cloud Database Services - Application Services - Content Delivery Services - Analytics Services - Deployment And Management Service - Identity And Access Management Services - Open Source Private Cloud Software.

### Unit III

#### CLOUD APPLICATION DESIGN AND DEVELOPMENT

Design consideration- Reference Architecture for Cloud Application - Cloud Application Design Methodologies - Data Storage Approaches- Development in Python-Design Approaches -Application- Image Processing - Document Storage-MapReduce-SocialMediaAnalytics.

### Unit IV

#### PYTHON FOR CLOUD

Introduction-InstallingPython-Datatypes&DataStructures- Control Flow-Functions-Modules-Packages-FileHandling- Date/Time Operations - Classes- Python for Cloud-AmazonWeb Services -Google Cloud Platform - Windows Azure -Map Reduce-PackagesofInterest-DesigningaRESTfulWebAPI.

### Unit V

#### BIG DATA ANALYTICS MULTIMEDIA CLOUD & CLOUD SECURITY

Big Data Analytics- Clustering Big data - Classification of Big Data - Recommendation systems. Multimedia Cloud- Case Study- Live Video Stream App - Streaming Protocols - Case Study- Video Transcoding App-Cloud Security- CSA Cloud Security Architecture - Authentication- Authorization - Identity and Access management - Data Security - Key Management- Auditing- Cloud for Industry-Healthcare & Education.

#### Text Book(s)-

1. Buyya-Vecciola and Selvi- Mastering Cloud Computing- Foundations and Applications Programming- Tata McGraw Hill- 2013.
2. ArshdeepBahga- Vijay Madiseti- “Cloud Computing-A Hands-OnApproach”Universitiespress(India)Pvt.limited2016.

#### Reference Book(s)-

1. Rittinghouse and Ransome- Cloud Computing- Implementation- Management- and Security- CRC Press-2016.
2. Michael Miller “Cloud Computing Web based application that change the way you work and collaborate online”.Pearsonedition-2008.
3. Kris Jamsa- Cloud Computing- SaaS- PaaS- IaaS- Virtualization- Business
4. Models- Mobile-Security and More- Jones & Bartlett Learning- 2012.

Total Number Of Topics: 78

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	10	12.82
2.	Regional	6	7.70
3.	National	14	17.95
4.	Global	50	61.54

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits				
12.82II	20PCS2EC1-2	Cloud Computing					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓		✓	✓		✓	✓	✓	✓		
CO2	✓		✓	✓	✓	✓			✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4			✓	✓	✓	✓	✓	✓	✓	✓		
CO5	✓	✓		✓	✓		✓	✓	✓			
Number of matches (✓) = 37- Relationship-High												

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - II

Course Code- 20PCS2EC1-3

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 5

External Marks- 75

### ELECTIVE COURSE 1 (3) -WEBSERVICES

#### 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 webservices.
- 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

Overview of Distributed Computing, Introduction to web services - Industry standards, Technologies and concepts underlying web services - their support to web services - Applications that consume webservices.

#### Unit II

XML - its choice for web services - network protocols to back end databases- technologies -SOAP, WSDL-exchange of information between applications in distributed environment - locating remote web services - its access and usage. UDDI specification - an introduction

#### Unit III

A brief outline of web services - conversation - static and interactive aspects of system interface and its implementation, work flow - orchestration and refinement, transactions, security issues- the common attacks - security attacks facilitated within web services quality of services- Architecting of systems to meet users

requirement with respect to latency, performance, reliability, QOS metrics, Mobile and wireless services - energy consumption, network bandwidth utilization, portals and services management.

**Unit IV**

Building realworld enterprise applications using web services-sample source codes to develop web services - steps necessary to build and deploy web services and client applications to meet customer s requirement - Easier development, customization, maintenance, transactional requirements, seamless porting to multiple devices and platforms.

**Unit V**

Deployment of Web services and applications onto Tomcat application server and axis SOAP server (both are free wares)-Web services platform as a set of enabling technologies for XML based distributed computing.

**Text Book(s)-**

1. Sandeep Chatterjee- James Webber- “Developing Enterprise Web Services- An Architects Guide-PrenticeHall-Nov2003.
2. Heather Williamson- “XML- The Complete Reference “-Tata McGraw-Hill Education India.

**Reference Book(s)-**

1. Martin Kalin- “Java Web Services- Up and Running”- O’Reilly Publishers.

Total Number Of Topics:26

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	14	53.85
2.	Regional	4	15.38
3.	National	3	11.54
4.	Global	5	19.23

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course	Hours	Credits
<b>II</b>	<b>20PCS2EC1-3</b>	<b>Web Services</b>	<b>6</b>	<b>5</b>
<b>Course</b>	<b>Programme Outcomes (POs)</b>		<b>Programme Specific Outcomes (PSOs)</b>	

Outcomes (Cos)	PO1	PO2	PO 3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓				✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches (✓) = 39- Relationship-High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - II

Course Code- 20PCS2EC2-1

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 5

External Marks- 75

### ELECTIVE COURSE 2 (1) - OBJECT ORIENTED SYSTEMS DEVELOPMENT

#### Course Objects-

- To learn and understand various O-O concepts along with their applicability contexts.
- To learn software development life cycle for Object-Oriented solutions for Real-World Problems & To learn O-O design solutions for the recurring problems

#### Course Outcomes-

On successful completion of this course students will be able to

- CO1-** Show how the object-oriented approach differs from the traditional approach to systems analysis and design
- CO2-** Analyze- design- document the requirements through use case driven approach
- CO3-** Explain the importance of modeling and how the Unified Modeling Language (UML) represents an object-oriented system using a number of modeling views
- CO4-** Recognize the difference between various object relationships- inheritance- association and aggregation
- CO5-** Show the role and function of test cases- testing strategies and test plans in developing object-oriented software

#### Unit I

**Fundamentals of OOSD :** Overview of Object Oriented Systems Development- Two orthogonal view of the software - OOSD methodology - Why an object orientation. Object basics- Object Oriented Philosophy- Objects - Attributes- Object respond to messages - Encapsulation - information hiding - class hierarchy - Polymorphism - Object relationship and associations. OOSD lifecycle- Software development process - OOSD Use case Driven Approach - Reusability.

#### Unit II

**Methodology : Modeling and UML - Object Oriented Methodologies-** Rumbaugh et al.'s object modeling technique- The Booch methodology - The Jacobson et al methodology- Patterns- Frameworks- The Unified approach - Unified Modeling Language- Static and dynamic models- Why modeling- UML diagrams- UML class diagram- Use case diagram - UML dynamic modeling- packages and model organization.

#### Unit III

**Object Oriented Analysis -Object Oriented Analysis process- Business Object Analysis - Use case driven object oriented analysis - Business process modeling - Use-Case model -**

Developing effective documentation - Classification- Classifications theory- Approaches for identifying classes - Noun phrase approach-Common class patterns approach - Use Case Driven approach - Classes-Responsibilities and Collaborators -Namingclasses - Identifying object relationships- attributes- methods. -Association-SuperSub class relationship - Aggregation - Class responsibility - Object responsibility

#### **Unit IV**

**Object Oriented Design** -Object Oriented Design Process and Design Axioms - OOD process- OOD axioms - Corollaries - Design patterns. Designing classes- Designing classes-Class visibility - Refining attributes - Designing methods and protocols-Packages and managing classes. Access layer- Object Store and persistence -DBMS-Logical and physical Database Organization and access control - Distributed Databases and Client Server Computing -- Multidatabase Systems - Designing Access layer classes. View Layer- Designing view layer classes - Macro level process - Micro level process-The purposeofviewlayerinterface- Prototypingtheuserinterface.

#### **Unit V**

**Software Quality** - Software Quality Assurance-Quality assurance tests-Testing strategies - Impact of Object Orientation on Testing - Test Cases- Test Plan - Continuous testing. System Usability and Measuring User satisfaction- Usability Testing - User satisfactiontest-A tool for analyzing user satisfaction.System Usability and Measuring User satisfaction- Introduction – UsabilityTesting.

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

1. Ali Bahrami- “Object Oriented Systems Development using UML”- McGraw-Hill- 2008

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

1. Booch Grady- Rumbaugh James- Jacobson Ivar- “The Unified modelingLanguage- UserGuide-PearsonEducation-2006
2. Brahma Dathan-Sarnath Ramnath- “Object Oriented Analysis- Design and Implementation”- Universities Press-2010.
3. Mahesh P.Matha- “Object-Oriented Analysis and Design Using UML”- PHI Learning Private Limited-2012.
4. RachitaMisra-Chhabi Rani Panigrahi-Bijayalaxmi Panda- “Principles of Software Engineering and System Design”-Yesdee Publishing2019.

Total Number Of Topics: 91

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	50	54.95
2.	Regional	10	10.99
3.	National	10	10.99
4.	Global	21	23.08

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
II	20PCS2EC2-1	Object Oriented System Development					6	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓		✓		✓	✓	✓	✓		✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓		✓			
CO4	✓	✓			✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 37- Relationship-High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - II

Course Code- 20PCS2EC2-2

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 5

External Marks- 75

### ELECTIVE COURSE 2 (2) - MOBILE COMPUTING

#### Course Objects-

- To learn the basics of mobile telecommunication system
- To be familiar with the network layer protocols and Ad-Hoc networks & To know the basis of transport and application layer protocols

#### Course Outcomes-

On successful completion of this course students will be able to

- CO1- Ability to explain the principles and theories of mobile computing technologies.
- CO2- Describe infrastructures and technologies of mobile computing technologies
- CO3- Impact the knowledge to develop applications in different domains that mobile computing offers to the public- employees- and businesses
- CO4- Understand the Mobile Ad hoc networks and its routing
- CO5- Describe the possible future of mobile computing technologies- securities and applications

#### Unit I

**Basics of mobile-** Mobile device profiles-Middleware and gateways-Wireless Internet - Smart clients - Three tier Architecture - Design considerations -**Mobile computing-Mobility - Location based services**

#### Unit II

**Mobile computing through Internet-** Mobile enabled Applications - Developing Mobile GUIs - VUIs and Mobile Applications - Characteristics and benefits -Multichannel and Multi modal user interfaces -**Synchronization - replication of Mobile Data** - SMS architecture – GPRS- Mobile Computing-Mobile through Telephony.

#### Unit III

Mobile Application Development-**Android wifi -GPS - Camera Movement or orientation** - event based programming-iOS/windows CE - Blackberry - windows phone-M Commerce -structure-pros&cons - **Mobile payment system - J2ME**

#### Unit IV

**ADHOC Wireless Network -Ad Hoc Wireless Network -MAC protocol-Routing protocols** - Transport Layer Protocol - QoS Energy Management -**application design -workflow-**

composing applications - Dynamic linking -Intents and Services-Communication via the web.

**Unit V**

**Security and Hacking- Password security - Network security - web security- Database security - Wireless Sensor Network -Architecture and Design-Medium Access Control - Routing - Transport Layer - Energy model.**

**Text Book(s)-**

1. Jochen Schiller- Mobile Communications- SecondEdition-2012.
2. William Stallings-”Wireless Communications & Networks”- Pearson Education-2009.

**Reference Book(s)-**

1. C.Siva Ram Murthy- B.S. Manoj- ”Ad Hoc Wireless Networks - Architectures and Protocols”- 2ndEdition-PearsonEducation. 2004
2. Ashok K Talukder- Roopa R Yavagal- “Mobile Computing”- Tata McGraw Hill-2005.
3. Jochen Burkhardt Dr.Horst Henn- Klaus RintdoffThomas Schack- “Pervasive Computing”- Pearson-2009.
4. Fei Hu -Xiaojun Cao-“ Wireless Sensor Networks Principles and Practice “ CRC Press-2010.

Total Number Of Topics:62

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	10	16.13
2.	Regional	10	16.13
3.	National	22	35.5
4.	Global	20	32.26

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits				
<b>II</b>	<b>20PCS2EC2-2</b>	<b>Mobile Computing</b>					<b>6</b>	<b>5</b>				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
<b>CO1</b>	✓	✓		✓	✓	✓		✓	✓	✓		

CO2		✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓		✓	✓	
CO4			✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓			✓		✓	✓	✓	
Number of matches (✓) = 36- Relationship- High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - II

Course Code- 20PCS2EC2-3

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 5

External Marks- 75

### ELECTIVE COURSE 3 (3) - WIRELESS NETWORKS

#### Course Objectives-

- To help students understand how wireless systems work and how mobility is supported
- Make the student to study networking protocols are designed for a variety of network architectures such as cellular- wireless local area networks- and IP infrastructures

#### Course Outcomes-

On successful completion of the course- the Students will be able to

**CO1-** To Conversant with the latest 3G/4G and WiMAX networks and its architecture.

**CO2-** Analyze security- energy efficiency- mobility- scalability- and their unique

characteristics in wireless networks

**CO3-** Understand the transmission of voice and data through various networks.

**CO4-** To design and implement wireless network environment for any Application using latest wireless protocols and standards

**CO5-** To implement different type of applications for smart phones and mobile devices with latest network strategies

### Unit I

**WIRELESS LAN:**Introduction-WLAN Technologies - Infrared- UHF Narrowband- Spread Spectrum -IEEE802.11- System Architecture - Protocol Architecture -Physical Layer , MAC Layer, 802.11b, 802.11a - Hyper LAN: WATM, BRAN, HiperLAN2. Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Manager Protocol,Security -IEEE802.16. WIMAX: Physical Layer, MAC- Spectrum Allocation For WIMAX

### Unit II

**MOBILE NETWORK LAYER** -Introduction-Mobile IP:IP Packet Delivery, Agent Discovery- Tunneling and Encapsulation - IPV6- Network Layer In The Internet- Mobile IP Session Initiation Protocol.Mobile Ad-Hoc Network: Routing - Destination Sequence Distance Vector-Dynamic Source Routing.

### Unit III

**MOBILE TRANSPORT LAYER** -TCP Enhancements For Wireless Protocols.Traditional TCP: Congestion Control, Fast Retransmit/Fast Recovery-Implications Of Mobility - Classical TCP Improvements:Indirect TCP - Snooping TCP - Mobile TCP-Time Out Freezing- Selective Retransmission -Transaction Oriented TCP-TCP Over 3G Wireless Networks.

### Unit IV

**WIRELESS WIDE AREA NETWORK** -Overview Of UTRAN Terrestrial Radio Access Network. UTRAN Core Network Architecture: 3G\_MSC, 3G\_SGSN, 3G\_GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP - High Speed Downlink Packet Access(HSDPA) - LTE Network Architecture And Protocol.

### Unit V

**4G NETWORKS** -Introduction-4G Vision - 4G Features And Challenges - Applications Of 4G.4G Technologies: Multicarrier Modulation, Smart Antenna Techniques, OFDM-MIMO Systems,Adaptive Modulation and Coding With Time Slot Scheduler, Cognitive Radio.

Introduction to 5G Use Cases - Evolving LTE to 5G Capability - 5G NR - 5G core network (5GCN) - 5G Standardization

### Text Book(s)-

1. Jochen Schiller-"Mobile Communications"- Second Edition- Pearson Education 2012 (UnitI-II-III)
2. Vijay Garg- "Wireless Communications AndNetworking"- First Edition- Elsevier

2014 (UnitIV-V)

**Reference Book(s)-**

1. Erik Dahlman- Stefan Parkvall- Johan SkoldandPer Beming- “3G Evolution HSPA and LTE For Mobile Broadband”- Second Edition- Academic Press-2008.
2. Anurag Kumar-D.Manjunath- Joy Kuri- “Wireless Networking”- First Edition- Elsevier2011.
3. Simon Haykin- Michael Moher- David Koilpillai-Modern Wireless Communications”- First Edition- Pearson Education 2013.
4. David G. Messerschmitt- “Understanding Networked Applications”- Elsevier-2010.

Total Number Of Topics: 48

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	4	8.33
2.	Regional	4	8.33
3.	National	22	45.8
4.	Global	18	37.5

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits				
II	20PCS2EC2-3	Wireless Networks					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓		✓	✓	✓		✓	✓	✓		
CO2	✓		✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (□) =39- Relationship-High												

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - II

Course Code- 20PCS2CP2

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 40

Credits- 4

External Marks- 60

### CORE PRACTICAL 2-ADVANCED JAVA LAB

#### Course Objectives-

- Design/Develop Program.
- Develop appropriate data model and database scheme & Create and test prototypes.

#### Course Outcomes-

On successful completion of the course- students will be able to

- CO1-** Provides knowledge of Internet Programming- using Java Applets
- CO2-** Ability to use a full set of GUI widgets and other components- including windows- menus- buttons-checkboxes- text fields- scrollbars and scrolling lists- using AWT and Swings
- CO3-** Develop the applications using Java Data Base Connectivity (JDBC)
- CO4-** Impact the knowledge for creation of dynamic web pages- using Servlets and JSP.
- CO5-** Understand the frameworks; this gives the opportunity to reuse the codes for quick development

1. Write java program to create and display singly linked list
2. Write a java program to developing Applet Program with Passing Values through Parameters
3. Write a java program to create a button and click on the button - the application terminates using swing
4. Write a java program to generate mouse move events using swing
5. Write a java program to update customer information using JDBC with MYSQL connection
6. Write a java program to generate simple plain text using servlet
7. Write a java program to display the cookie id using servlet
8. Write a java program to create JSP page for basic arithmetic functions
9. Write a JSP Program to validate username and password
10. Write a java program for using TCPsocket client/server communication

Total Number Of Topics: 10

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	1	10
2.	Regional	5	50
3.	National	2	20
4.	Global	2	20

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
<b>II</b>	<b>20PCS2CP2</b>	<b>Advanced Java Lab</b>					<b>6</b>	<b>4</b>			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
<b>CO1</b>	✓	✓	✓	✓	✓	✓		✓	✓	✓	
<b>CO2</b>		✓	✓	✓	✓	✓	✓		✓	✓	
<b>CO3</b>	✓	✓	✓	✓		✓	✓	✓			
<b>CO4</b>	✓		✓		✓	✓	✓	✓	✓	✓	
<b>CO5</b>	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (□) = 40 Relationship-High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - III

Course Code- 20PCS3CC7

Instruction Hours- 6

Credits- 5

Exam Hours- 3

Internal Marks- 25

External Marks- 75

### CORE COURSE 7 - CRYPTOGRAPHY AND NETWORKSECURITY

#### Course Objectives-

- To introduce the student to the areas of cryptography and cryptanalysis.
- This course develops a basic understanding of the algorithms used to protect users online and to understand some of the design choices behind these algorithms.

#### Course Outcomes-

On successful completion of the course- students will be able to

- CO1-** Understand the fundamentals of networks security- security architecture- threats and vulnerabilities
- CO2-** Apply the different cryptographic operations of symmetric and public key cryptographic algorithms
- CO3-** Apply the various Authentication schemes to simulate different applications.
- CO4-** Understand various Security practices and System security standards
- CO5-** Be able to digitally sign emails and files

#### Unit I

**Introduction :** Security trends - Legal Ethical and Professional Aspects of Security- Need for Security at Multiple levels-Security Policies-Model of network security - Security attacks-services and mechanisms - OSI security architecture - Classical encryption techniques- substitution techniques- transposition techniques- steganography-Foundations of modern cryptography-perfect security-Information theory - product cryptosystem - cryptanalysis.

#### Unit II

**Symmetric Encryption and Message Confidentiality:** Symmetric Encryption Principles- Symmetric Block Encryption Algorithms- Stream Ciphers and RC4-Chipper Block Modes of Operation- Location of Encryption Devices- Key Distribution- Public\_key Cryptography and Message Authentication- Approaches to Message Authentication- Secure Hash Functions and HMAC-Public\_Key Cryptography Principles-Public\_Key Cryptography Algorithms- Digital Signatures- Key Management.

#### Unit III

**Authentication Applications:** Kerberos- x.509 Authentication Service-Public\_Key Infrastructure- Electronic Mail Security-Pretty Good Privacy (PGP)- S/MIME.

#### Unit IV

**IP Security:**IP Security Over view-IP Security Architecture- Authentication Header- Encapsulating Security Payload-Combining Security Associations. Web Security-Web SecurityConsiderations-Secure Socket Layer(SSL) and Transport Layer Security(TLS)-Secure Electronic Transaction(SET).Network Management Security- Basic Concepts of SNMP- SNMPv1 Community Facility-SNMPv3.

#### **Unit V**

**Intruder:**Intrusion Detection-Password Management -Malicious Software-Virus and Related Threats- Virus Countermeasures-Distributed Denial of Service Attacks. Firewalls-Firewall Design Principles- Trusted Systems-Common Criteria for Information Technology Security Evaluation.

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

1. Behrouz A. Ferouzan- "Cryptography & Network Security"- Tata Mc Graw Hill- 2007- Reprint2015.
2. Stallings William- "Cryptography and Network Security- Principles and Practice2017.
3. William Stallings- "Network Security Essentials Applications and Standards"Third Edition- Pearson Education-2008

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

1. Man Young Rhee- "Internet Security- Cryptographic Principles"- "Algorithms and Protocols"- Wiley Publications-2003.
2. Charles Pfleeger- "Security In Computing"- 4th Edition- Prentice Hall Of India-2006.
3. Ulysess Black- "Internet Security Protocols"- Pearson Education Asia-2000.
4. Charlie Kaufman And Radia Perlman- Mike Speciner- "Network Security- Second Edition- Private Communication In Public World"- PHI2002.
5. Bruce Schneier And Neils Ferguson- "Practical Cryptography"- First Edition- Wiley Dreamtech India Pvt Ltd-2003.
6. Douglas R Simson "Cryptography - Theory And Practice"- First Edition- CRC Press-1995.
7. [Http://Nptel.Ac.In/](http://Nptel.Ac.In/).

Total Number Of Topics: 58

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	11	18.97
2.	Regional	6	10.34
3.	National	15	25.86
4.	Global	26	44.8

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits				
III	20PCS3CC7	Cryptography and Network Security					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2	✓	✓		✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓			✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓		✓	✓		
Number of matches (✓) = 40- Relationship-High												

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - III

Course Code- 20PCS3CC8

Instruction Hours- 6

Credits- 5

Exam Hours- 3

Internal Marks- 25

External Marks- 75

### CORE COURSE 8 - DIGITAL 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 be 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-Diagnosis of various disease using image such as tumor- cancer etc.
- CO5-** Understand the rapid advances in Machine vision..

#### Unit I

**Fundamentals:** Image Sensing and Acquisition- Image Sampling and Quantization- relationship between Pixels- Random noise- Gaussian Markov Random Field- $\sigma$ \_field- Linear and Non\_linear Operations- Image processing models- Causal-Semi\_causal- Non\_causal models.

**Color Models-** 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- Hotlink's  $T^2$  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 Sable 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-Huff\_man 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.
2. Nick Elford- “Digital Image Processing a practical introducing using Java”- Pearson Education-2004.
3. Todd R.Reed- “Digital Image Sequence Processing- Compression- and Analysis”- CRC Press-2015.
4. L.Prasad-S.S.Iyengar- “Wavelet Analysis with Applications to Image Processing”- CRC Press-2015.

Total Number Of Topics: 58

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	10	17.24
2.	Regional	28	48.28
3.	National	9	15.52
4.	Global	11	18.97

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
III	20PCS3CC8	Digital Image Processing					6	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2			✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓				✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 38- Relationship-High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - III

Course Code- 20PCS3EC3-1

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 5

External Marks- 75

### ELECTIVE COURSE 3 (1) - THEORY OF COMPUTATION

#### Course Objects-

- Demonstrate advanced knowledge of formal computation and its relationship to languages. Distinguish different computing languages and classify their respective types.
- Recognise and comprehend formal reasoning about languages. Show a competent understanding of the basic concepts of complexity theory.

#### Course Outcomes-

On successful completion of the course- students will be able to

- CO1-**Analyze and design finite automata- pushdown automata- Turing machines- formal languages- and grammars.
- CO2-** Demonstrate their understanding of key notions- such as algorithm- computability- decidability- and complexity through problem solving.
- CO3-** Understanding the basic results of the Theory of Computation- state and explain the relevance of the Church-Turing thesis.
- CO4-** Recognize and comprehend formal reasoning about languages
- CO5-** Able to subdivide problem space based on input subdivision using constraints

#### Unit I

Introduction to formal proof - Additional forms of proof- Inductive proofs - Finite Automata (FA) - Deterministic Finite Automata (DFA) - Non-deterministic Finite Automata (NFA) - Finite Automata with Epsilon transitions.

#### Unit II

Regular Expression - FA and Regular Expressions - Proving languages not to be regular- Closure properties of regular languages- Equivalence and minimization of Automata.

#### Unit III

Context-Free Grammar (CFG) - Parse Trees- Ambiguity in grammars and languages- Definition of the Pushdown automata - Languages of a Pushdown Automata- Equivalence of Pushdown automata - CFG- Deterministic Pushdown Automata.

#### Unit IV

Normal forms for CFG - Pumping Lemma for CFL - Closure Properties of CFL- Turing

Machines - Programming Techniques for TM. A language that is not Recursively Enumerable (RE)

### Unit V

An undecidable problem RE-Undecidable problems about Turing Machine -Post's Correspondence Problem-The classes P and NP

#### Text Book(s)-

1. Peter Linz- "An Introduction to Formal Languages and Automata"- Third Edition - Narosa-2005
2. J.E. Hopcroft- R. Motwani and J.D. Ullman- "Introduction to Automata Theory- Languages and Computations"- second Edition- Pearson Education-2007.

#### Reference Book(s)-

1. H.R. Lewis and C.H. Papadimitriou- "Elements of the theory of Computation"- Second Edition- Pearson Education-2003.
2. Thomas A. Sudkamp- "An Introduction to the Theory of Computer Science-Languages and Machines"- Third Edition- Pearson Education-2007.
3. Raymond Greenlaw and H. James Hoover- "Fundamentals of Theory of Computation- Principles and Practice"- Morgan Kaufmann Publishers-1998.
4. Michael Sipser- "Introduction of the Theory and Computation"- Thomson Brooks/Cole-1997.
5. J. Martin- "Introduction to Languages and the Theory of computation"- Third Edition- Tata Mc Graw Hill-2007.

Total Number Of Topics: 30

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	6	20
2.	Regional	12	40
3.	National	5	16.63
4.	Global	4	13.33

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
III	20PCS3EC3-1	Theory of Computation					6	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓		✓	✓	✓		✓	✓	✓	
CO2	✓	✓		✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓		✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 38- Relationship-High											

## SEMESTER - III

Course Code- 20PCS2EC3-2

Instruction Hours- 6

Credits- 5

Exam Hours- 3

Internal Marks- 25

External Marks- 75

### ELECTIVE COURSE 3 (2) - OPTIMIZATION TECHNIQUES

#### Course Objectives-

- Operation research models using optimization techniques based upon the fundamentals of mathematics.
- The problem formulation by using linear- dynamic programming- game theory and queuing models

#### Course Outcomes-

On successful completion of the course- students will be able to

**CO1-**Solve optimization problems using classical optimization techniques

**CO2-** Solve simple non-linear multivariable optimization problems

**CO3-**Describe clearly a problem- identify its parts and analyze the individual functions. Feasibility study for solving an optimization problem

**CO4-**Evaluate and measure the performance of an algorithm- Discovery- study and solve optimization problems.

**CO5-**Understand optimization techniques using algorithms- and Investigate- study- develop- organize and promote innovative solutions for various applications.

#### Unit I

Linear Programming Problem (LPP)- Formulations and graphical solution of (2 variables) canonical and standard forms of linear programming problem- Simplex method- two phase simplex method

#### Unit II

Duality in LPP- dual problem to primal- primal to dual problem and duality simplex method- Revised simplex method- revised simplex algorithm- revised simplex method versus simplex method

#### Unit III

Transportation Model- North West corner Method- Least cost method and Vogel's approximation method. Determining Net evaluation- Degeneracy in TP- Assignment Model- Hungarian assignment model - Travelling sales man problem

#### Unit IV

Replacement Problem- Replacement policy for equipment that deteriorate gradually- Replacement of item that fail suddenly- Individual and group replacement Problems in mortality and staffing.

#### Unit V

Project Scheduling PERT/CPM Networks- Fulkerson's Rule- Measure Of Activity PERT Computation - CPM Computation and Resource Scheduling.

#### Text Book(s)-

1. Kanti Swarup- P.K. Gupta & Manmohan- Operation Research 1996.
2. S. Kalavathy- Operations Research - Second Edition - Vikas Publishing House Pvt. Ltd.-
3. S. Godfrey Winster- S. Aruna Devi- R. Sujatha- "Compiler Design"- Yesdee Publishing.

#### Reference Book(s)-

1. D. Shanthi- N. Uma Maheswari- S. Jeyanthi- "Theory of Computation"- Yesdee Publishing.
2. John W. Chinneck- "Feasibility and Infeasibility in Optimization- Algorithms and Computational Methods"- Springer- 2015.

Total Number Of Topics: 25

S.No.,	Category (Local, Regional, National & Global)	No. Of Topics	Percentage
1.	Local	4	16
2.	Regional	4	16
3.	National	12	48
4.	Global	5	20

Relationship Matrix for Course Outcomes- Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits				
III	20PCS3EC3-2	Optimization Techniques					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓		✓	✓	✓	✓	✓	✓	✓		

<b>CO2</b>	✓	✓	✓	✓	✓	✓	✓		✓	✓
<b>CO3</b>	✓	✓	✓	✓		✓	✓	✓		✓
<b>CO4</b>	✓	✓	✓		✓	✓	✓	✓	✓	✓
<b>CO5</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches (✓) = 35- Relationship- High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - III

Course Code- 20PCS3EC3-3

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 5

External Marks- 75

### ELECTIVE COURSE 3 (3)-EMBEDDED SYSTEMS

#### Course Objectives-

- To introduce the Building Blocks of Embedded System
- To introduce Basics of Real time operating system and example tutorials to discuss on one real time operating system tool

#### Course Outcomes-

On Successful completion of the course- students willable to

**CO1**-Describe the differences between the general computing system and the embedded system- also recognize the classification of embedded systems.

**CO2**-Be familiar with working on a team to create and apply embedded systems-

**CO3**-Become aware of interrupts- hyper threading and software optimization.

**CO4**-Design real time embedded systems using the concepts of RTOS.

**CO5**-interpret application specifications and make practical recommendations on resource selection for embedded systems

#### Unit I

Introduction to Embedded system - Embedded system vs General computing systems - History - Classification - Major Application Areas - Purpose of Embedded systems - Smart running shoes- The innovative bonding of lifestyle with embedded technology. Characteristics and Quality Attributes of Embedded systems - Characteristics- Operational and nonoperational quality attributes - application specific embedded system - domain specific automotive

Comment [MK1]:

#### Unit II

Elements of an Embedded system - core of the embedded system- General purpose and domain specific processors-ASICs- PLDs- COTS - Memory - Sensors and Actuators - Communication Interface- Onboard and External Communication Interfaces - Embedded Firmware - Reset circuit-Brown\_out protection circuit- Oscillator unit- Real time clock- Watchdog timer PCB and Passive Components

#### Unit III

Embedded Systems - Washing machine- Application specific - Automotive-Domain specific Hardware Software Co\_Design - Computational Models - Embedded Firmware Design Approaches - Embedded Firmware Development Languages - Integration and testing of Embedded Hardware and firmware.

#### Unit IV

RTOS based Embedded System Design-Operating System Basics - Types of operating Systems - Tasks process and Threads - Multiprocessing and Multitasking - Task Scheduling- Task Communication - Task Synchronization - Device Drivers - choosing an RTOS.

#### Unit V

Components in embedded system development environment - Files generated during compilation- simulators- emulators and debugging - Objectives of Embedded product - Development Life Cycle - Different Phases of EDLC - EDLC Approaches - Trends in Embedded Industry - Case Study-Digital Clock.

#### Text Book(s)-

1. K. V. Shibu- "Introduction to embedded systems"- TMH education Pvt. Ltd. 2009.

#### Reference Book(s)-

1. Raj Kamal- "Embedded Systems- Architecture- Programming and Design"- TMH. Second Edition 2009
2. Frank Vahid- Tony Givargis- "Embedded System Design"- John Wiley. Third Edition 2006
3. Cliff Young-Faraboschi Paolo- and Joseph A. Fisher- "Embedded Computing- A VLIW Approach to Architecture- Compilers and Tools"- Morgan Kaufmann Publishers- An imprint of Elsevier- 2005.
4. David E. Simon- "An Embedded Software Primer" Pearson Education-1999

Total Number Of Topics: 58

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	11	18.97
2.	Regional	9	15.52
3.	National	25	43.1
4.	Global	13	22.41

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course	Hours	Credits
III	20PCS3EC3-3	Embedded Systems	6	5
Course	Programme Outcomes (POs)		Programme Specific Outcomes (PSOs)	

Outcomes (Cos)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓		✓		✓	✓	✓
CO2	✓	✓		✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4			✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓		✓	✓		✓	✓	✓	
Number of matches (✓) = 37- Relationship-High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

### SEMESTER - III

Course Code- 20PCS3EC4-1

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 5

External Marks- 75

#### ELECTIVE COURSE 4 (1) - WAP andXML

##### Course Objectives-

- To understand the concept of WAP& To learn about the functionality of WAP gateways.
- To acquire knowledge and skills for creating WML &To understand the concept of style sheet in Document Display.

##### Course Outcomes-

On Successful completion of the course- students willable to

**CO1-** Apply XML concepts to develop Webapplication.

**CO2-** Develop SOA application using XML and WebServices.

**CO3-** Extract information from the web sites using XMLprogramming

**CO4-** Explain the basic concepts of wireless network and wireless generations.

**CO5-** Indentify and select the appropriate framework components in creation of web service solution

##### UnitI

Overview of WAP- WAP and the wireless world - WAP application architecture - WAP internal structure - WAP versus the Web - WAP1.2-WTA and push features and Setting up WAP- Available software products-WAPresources-TheDevelopmentToolkits.

## Unit II

WAP gateways- Definition -Functionality of a WAP gateway - The Web model versus the WAP model -Positioning of a WAP gateway in the network and Selecting a WAP gateway Basic WML- Extensible markup language-WML structure - A basic WML card - Text formatting - navigation - Advanced display features.

## Unit III

Interacting with the user- Making a selection- Events -Variables-Input and parameter passing WML Script- Need for WML script -Lexical Structure - Variables and literals and Operators - Automatic data type conversion - Control Constructs Functions -Using the standard libraries-programs-DealingwithErrors.

## Unit IV

XML- Introduction XML-An Eagle's Eye view of XML-XML Definition- List of an XML Document - Related Technologies- An introduction to XML Applications - XML Applications - XML for XML - First XML DocumentsStructuringData-ExaminingtheDataXMLizingthedataThe advantages of the XML format -Preparing a style sheet for DocumentDisplay.

## Unit V

Attributes- Empty Tags and XSL-Attributes -AttributesVersusElements- Empty TagsXSL-Well formed XML documents -Foreign Languages and Non Roman Text -Non Roman Scripts on the Web Scripts-Character sets-FontsandGlyphs-Legacycharactersets-TheUnicodeCharacterSet-ProceduretoWriteXMLUnicode.

## Text Book(s)-

1. Charles Arehart and Others. "Professional WAP with WML- WML script- ASP- JSP- XML- XSLT- WTA Push and Voice XML" Shroff Publishers and Distributors Pvt. Ltd2000.( For Unit I- II-III)
2. Eliotte Rusty Harlod "XML TM Bible"- Books India (P) Ltd- 2000(For Unit IV &V)

## Reference Book(s)-

1. HeatherWilliamson-"XML-TheCompleteReference"-Tata McGraw-Hill EducationIndia.

Total Number Of Topics: 58

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	22	37.93
2.	Regional	10	17.24
3.	National	12	20.69
4.	Global	14	24.14

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
III	20PCS3EC4-1	WAP and XML					6	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓		✓	✓	✓	✓		✓	✓		
CO2	✓	✓	✓	✓	✓		✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4			✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓			✓	✓	✓		
Number of matches (✓) = 36- Relationship-High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - III

Course Code- 20PCS3EC4-2  
Instruction Hours- 6  
Credits- 5

Exam Hours- 3  
Internal Marks- 25  
External Marks- 75

### ELECTIVE COURSE 4 (2) - STATISTICAL COMPUTING

#### Course Objectives-

- This course will review and expand upon core topics in probability and statistics through the study
- Practice of data analysis and graphical interpretation

#### Course Outcomes-

On successful completion of the course the students will be able to

- CO1-** Design and implement Monte Carlo methods to evaluate integrals and perform simulations.
- CO2-** Design and conduct appropriate resampling methods to estimate sampling variance for statistical estimates.
- CO3-** Data analytics from a database formed from the real world problem
- CO4-** Predict the exact reason for the real time issues
- CO5-** Be life-long learners who are able to independently expand their mathematical or statistical expertise when needed- or for interest's sake.

#### Unit I

**Correlation** - Definition of Correlation- Scatter Diagram- Kari Pearson's Coefficient of Linear Correlation- Coefficient of Correlation and Probable Error of r- Coefficient of Determination -Merits and Limitations of Coefficient of Correlation-Spearman's Rank Correlation

#### Unit II

**Regression Analysis** - Regression -Correlation(Intro)-Difference between Correlation - Regression Analysis-Linear Regression Equations -Least Square Method- Regression Lines- Properties of Regression Coefficients- Standard Error of Estimate.

#### Unit III

**Probability Distribution** - mathematical Expectation- Random Variable- Defined Probability Distribution a Random Variable-Expectation of Random Variable- Properties of Expected Value and Variance.

#### UnitIV

**Sampling and Sampling Distributions** - Data Collection- Sampling and Non\_Sampling Errors-Principles of Sampling- Merits and Limitations of Sampling-Methods of Sampling- Parameter and Statistic- Sampling Distribution of a Statistic- Examples of Sampling Distributions- Standard Normal-Student's  $t$ -Chi Square ( $\chi^2$ )-F Distributions.

#### UnitV

**Statistical Inference Estimation - Testing of Hypothesis** - Statistical Inference- Estimation- Point and interval- Confidence interval using normal- $t$  and  $\chi^2$  Distributions- Testing of Hypothesis- Significance of a mean - Using  $t$  Distribution.

#### Text Book(s)-

1. K.L.Sehgal- "Quantitative Techniques and Statistics"-First Edition- Himalaya Publishing House-2011.

#### Reference Book(s)-

1. N. P. Bali- P. N. Gupta- C. P. Gandhi- "A Textbook of Quantitative Techniques"- First Edition- Laxmi Publications-2008.
2. U. K. Srivastava- G. V. Shenoy- S. C. Sharma- "Quantitative Techniques for Managerial Decisions"- Second Edition- New Age International Publishers-2005.
3. David Makinson- "Sets- Logic and Maths for Computing"- Springer-2011.
4. Christopher Chatfield- "Statistics for Technology- A Course in Applied Statistics- Third Edition"- CRC Press-2015.

Total Number Of Topics: 46

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	8	17.39
2.	Regional	8	17.39
3.	National	8	17.39
4.	Global	22	47.83

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course	Hours	Credits
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III	20PCS3EC4-2	Statistical Computing					6	5		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓		✓		✓	✓			✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓		✓	✓	✓	✓	✓		✓
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	✓
Number of matches (✓) = 40- Relationship-High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

### SEMESTER - III

Course Code- 20PCS3EC4-3

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 5

External Marks- 75

### ELECTIVE COURSE 4 (3)-SOFTWARE PROJECT MANAGEMENT

#### Course Objectives-

- To managing software development projects.
- To know how to successfully plan and implement a software project management activity- and to complete a specific project in time with the available budget

#### Course Outcomes-

On successful completion of the course the students will be able to

**CO1-** Analyze the scope- cost- timing- and quality of the project- at all times focused on project success as defined by project stakeholders.

**CO2-** Align the project to the organization's strategic plans and business justification throughout its lifecycle.

**CO3-** Identify project goals- constraints- deliverables- performance criteria- control

needs- and resource requirements in consultation with stakeholders.

**CO4-** Implement project management knowledge- processes- lifecycle and the embodied concepts- tools and techniques in order to achieve projects success.

**CO5-** Apply project management concepts through working in a group as team leader or active team member on an IT project.

## Unit I

**Project Management Framework-Introduction- Project - Project management - Relationship among Project- Program and Portfolio management - Project and operations management- Role of project manager - Project management body of knowledge - Enterprise Environmental factors. Project life cycle and Organization- Overview of project life cycle - Projects vs Operational Work - Stakeholders - Organizational influences on project management. The Standard for Project Management of a Project- Project management processes for a project- Common project management process interactions -Projects management process groups - Initiating process group - planning process group - Executing process group - Monitoring and controlling process group - Closing process group.**

## Unit II

Choosing Methodologies and Technologies - Software Processes and Process Models - Choice of Process Models - The Waterfall Model- Prototyping - other ways of categorizing prototype - **Agile Methods** - Extreme Programming Selecting the Most Appropriate Process Model- Need of Agile -Iterative vs Incremental-Agile Manifesto and Mindset - Lean Scrum and Kanban methods-uncertainty Risk and lifecycle selection-Scrum Elements overview-5 levels of planning- Scrum Process overview-Agile Team roles and responsibilities- Epic feature User Stories-PBI-The Sprint.

## Unit III

**The Project Management Knowledge Areas-Project integration management- Develop project charter - Develop project management plan - Direct and manage project execution - Monitor and control project work - Perform integrated change control - Close project or phase. Project scope management- Collect requirements - Define Scope - Create WBS - Verify Scope - Control Scope. Project team management- Define activities - Sequence activities - Estimate activity resources - Estimate Activity Durations - Develop Schedule - Control Schedule.**

## Unit IV

Project cost management- Estimate costs - Determine budget - Control costs. Project Quality Management-Plan quality - perform quality assurance - Perform quality control. Project Human Resource Management- Develop human resource plan - Acquire project team - Develop project team- Manage project team. Project Communications Management- Identify stakeholders - Plan communications - Distribute information - Manage stakeholder expectations - report performance.

## Unit V

Project Risk Management- Plan risk management - Identify risks - Perform qualitative risk analysis - Perform quantitative risk analysis - plan risk responses - Monitor and control risks. Project Procurement Management- Plan - Conduct - Administer - Close procurements.

**Text Book(s)-**

1. "A guide to the Project management Body of Knowledge (PMBOK Guide)" Fourth Edition- Project Management Institute- Pennsylvania-2008
2. BOB Huges- Mike Cotterell-Rajib Mall "Software Project Management"- McGraw Hill- FifthEdition-2011.
3. Emerson- "Agile Handbook"-Philosophy

**Reference Book(s)-**

1. Futrell- "Quality Software Project Management"- Pearson EducationIndia.
2. Royce- "Software Project Management"- Pearson EducationIndia.
3. C.Ravindranath Pandian- "Applied Software Risk Management-A Guide for Software Project Managers"- Auerbach Publications- 2015.
4. Benjamin A. Lieberman- "The Art of Software Modeling"- Auerbach Publications- 2010.
5. Adapt projects in response to issues that arise internally and externally.

Total Number Of Topics: 90

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	9	10
2.	Regional	15	16.67
3.	National	15	16.67
4.	Global	51	56.67

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course	Hours	Credits
III	20PCS3EC4-3	Software Project Management	6	5
Course	Programme Outcomes (POs)		Programme Specific Outcomes (PSOs)	

Outcomes (Cos)	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓		✓		✓
CO2		✓		✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓		✓	✓		✓	✓	✓	✓
Number of matches (✓) = 38- Relationship-High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

### SEMESTER - III

Course Code-

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 40

Credits- 4

External Marks-60

### CORE PRACTICAL 3-IMAGEPROCESSING-LAB

#### Course Objects-

- Provide the student with the fundamentals of digital image processing.
- Give the students a taste of the applications of the theories taught in the subject. This will be achieved through the project and some selected lab sessions.

### Course Outcomes-

On successful completion of the course the students will be able to

- CO1-** Understand the need for image transforms different types of image transforms and their properties.
- CO2-** Develop any image processing application and understand the rapid advances in Machine vision.
- CO3-** Learn different techniques employed for the enhancement of images and feature extraction techniques
- CO4-** Learn different causes for image degradation and overview of image restoration techniques.
- CO5-** Understand the need for image compression and to learn the spatial and frequency domain techniques of image compression.

1. Create a program to display grayscale image using read and write operation.
2. Create a vision program to find histogram value and display histogram of a grayscale and color image.
3. Create a vision program for Nonlinear Filtering technique using edge detection
4. Create a vision program to determine the edge detection of an image using different operators.
5. Create a program to discretize an image using Fourier transformation.
6. Create a program to eliminate the high frequency components of an image.
7. Create a color image and perform read and write operation.
8. Obtain the R- B- G color values and resolved color values from a color box by choosing any color.
9. Create a program performs discrete wavelet transform on image.
10. Create a program for segmentation of an image using watershed transforms.

Total Number Of Topics: 10

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

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
III	20PCS3CP3	Image Processing Lab					6	4			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2	✓	✓		✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓		✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Number of matches (✓) = 40- Relationship-High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

#### SEMESTER - IV

Course Code- 20PCS4CC9

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 5

External Marks- 75

#### CORE COURSE 9- INTERNET OF THINGS

##### Course Objectives-

- Students will be explored to the interconnection and integration of the physical world and the cyber space.

- They are also able to design & develop IOT Devices.

### Course Outcomes-

On successful completion of the course the students will be able to

- CO1-** Gain the basic knowledge about IoT and able to use IoT related products in real life.
- CO2-** It helps to rely less on physical resources and started to do their work smarter.
- CO3-** Understand the concepts of Internet of Things. Analyze basic protocols in wireless sensor network
- CO4-** Design IoT applications in different domain and analyze their performance
- CO5-** Implement basic IoT applications on embedded platform

### Unit I

**INTRODUCTION To IoT-** Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels and Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF YANG- IoT Platforms Design Methodology.

### Unit II

**IoT ARCHITECTURE-** M2M high level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model- IoT reference architecture

### Unit III

**IoT PROTOCOLS-** Protocol Standardization for IoT- Efforts M2M and WSN Protocols- SCADA and RFID Protocols- Unified Data Standards - Protocols - IEEE 802.15.4 - BACNet Protocol - Modbus- Zigbee Architecture- Network layer- 6LoWPAN- CoAP Security

### Unit IV

**WEB OF THINGS-** Web of Things versus Internet of Things - Two Pillars of the Web - Architecture Standardization for WoT- Platform Middleware for WoT- Unified Multi-tier WoT Architecture - WoT Portals - Business Intelligence. Cloud of Things- Grid/SOA - Cloud Computing - Cloud Middleware - Cloud Standards - Cloud Providers and Systems - Mobile Cloud Computing - The Cloud of Things Architecture.

### Unit V

**APPLICATIONS-** The Role of the Internet of Things for Increased Autonomy - Agility in Collaborative Production Environments - Resource Management in the Internet of Things- Clustering- Synchronization - Software Agents Applications - Smart Grid - Electrical Vehicle Charging

### Text Book(s)-

1. Arshdeep Bahga- Vijay Madiseti- "Internet of Things - A hands- on approach"-

Universities Press-2015.

2. Dieter Uckelmann- Mark Harrison-Michahelles- Florian (Eds)- “Architecting the Internet of Things”- Springer-2011.
3. Jan Ho` ller-VlasiosTsiatsis- Catherine Mulligan- Stamatis -Karnouskos- Stefan Avesand. David Boyle- "From Machine-to- Machine to the Internet of Things - Introduction to a New Age of Intelligence"- Elsevier-2014.

**Reference Book(s)-**

1. Networks- Crowds- and Markets- Reasoning About a Highly Connected World - David Easley and Jon Kleinberg- Cambridge University Press -2010.
2. Olivier Hersent- David Boswarthick- Omar Elloumi- “The InternetofThings- KeyapplicationsandProtocols”-Wiley-2012.

Total Number Of Topics: 56

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	7	12.5
2.	Regional	30	53.57
3.	National	6	10.71
4.	Global	13	23.21

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
IV	20PCS4CC9	Internet of Things					6	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2	✓			✓	✓	✓	✓	✓	✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓		✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Number of matches (✓) = 40- Relationship-High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - IV

Course Code- 20PCS4CC10

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 5

External Marks- 75

### CORE COURSE 10- MACHINE LEARNING

#### Course Objectives-

- To understand the basic theory underlying machine learning.
- To apply the algorithms to a real-world problem-optimize the models learned and report on the expected accuracy that can be achieved by applying the models

#### Course Outcomes-

On successful completion of the course the students will be able to

- CO1-** Have a good understanding of the fundamental issues and challenges of machine learning- data- model selection- model complexity-etc.
- CO2-** Identify machine learning techniques suitable for a given problem
- CO3-** Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
- CO4-** Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and unsupervised learning.
- CO5-** Design and implement various machine learning algorithms in a range of real-world applications

#### Unit I

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

#### Unit II

NEURAL NETWORKS -GENETIC ALGORITHMS- NeuralNetworkRepresentation - Problems-Perceptions-Multilayer Networks - BackPropagationAlgorithms-AdvancedTopics-GeneticAlgorithms- Hypothesis Space Search-Genetic Programming - Models of Evaluation and Learning.

#### Unit III

BAYESIAN - COMPUTATIONAL LEARNING-Bayes Theorem -Concept Learning-Maximum

Likelihood - Minimum Description Length Principle - Bayes Optimal Classifier - Gibbs Algorithm - Naive Bayes Classifier - Bayesian Belief Network - EM Algorithm-Probability Learning-Sample Complexity - Finite and Infinite Hypothesis Spaces-Mistake Bound Model.

**Unit IV**

INSTANT BASED LEARNING-K Nearest Neighbor Learning-Locally weighted Regression - Radial Basis Functions -Case Based Learning.

**Unit V**

ADVANCED LEARNING-Learning Sets of Rules-Sequential Covering Algorithm-Learning Rule Set-First Order Rules - Sets of First Order Rules - Induction on Inverted Deduction - Inverting Resolution - Analytical Learning - Perfect Domain Theories - Explanation Base Learning -FOCL Algorithm - Reinforcement Learning-Task Q Learning - Temporal Difference Learning

**Text Book(s)-**

1. Tom M.Mitchell-Machine Learning- McGraw-Hill Education (India) Private Limited- 2013

**Reference Book(s)-**

1. Ethem Alpaydin-Introduction to Machine Learning (Adaptive Computation and Machine Learning)- The MIT Press 2004.
2. Stephen Marsland- Machine Learning- An Algorithmic Perspective- CRC Press-2009.
3. Michael Affenzeller- Stephan Winkler- Stefan Wagner- Andreas Beham- “Genetic Algorithms and Genetic Programming”- CRC Press Taylor and Francis Group.

Total Number Of Topics: 56

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	9	16.07
2.	Regional	10	17.86
3.	National	6	10.71
4.	Global	31	55.36

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course	Hours	Credits
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<b>IV</b>	<b>20PCS4CC10</b>	<b>Machine Learning</b>				<b>6</b>	<b>5</b>			
<b>Course Outcomes (Cos)</b>	<b>Programme Outcomes (POs)</b>					<b>Programme Specific Outcomes (PSOs)</b>				
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	✓	✓			✓	✓		✓	✓	✓
<b>CO2</b>	✓	✓	✓	✓	✓	✓	✓		✓	✓
<b>CO3</b>	✓		✓	✓			✓	✓		
<b>CO4</b>	✓	✓	✓		✓	✓	✓	✓	✓	✓
<b>CO5</b>	✓	✓	✓	✓	✓		✓	✓	✓	✓
Number of matches (✓) = 40- Relationship-High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

## SEMESTER - IV

Course Code- 20PCS4EC5-1

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 4

External Marks- 75

### ELECTIVE COURSE 5(1) - 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-

On successful completion of the course the students will be able to

**CO1-**Understand Data Warehouse fundamentals- Data Mining Principles

**CO2-** Identify appropriate data mining algorithms to solve real world problems

**CO3-** Compare and evaluate different data mining techniques like classification- prediction-clustering and association rule mining

**CO4-** Describe complex data types with respect to spatial and web mining.

**CO5-**Benefit the user experiences towards research and innovation. Integration.

#### Unit I

**Data Mining And Data Preprocessing**-Data Mining - Motivation - Definition-Data Mining on Kind of Data -Functionalities-Classification-Data Mining Task Primitives-Major Issues in Data Mining - Data Preprocessing-Definition - Data Clearing-Integration and Transformation - DataReduction.

#### Unit II

**Data Warehousing**- Multidimensional Data Model -Data Warehouse Architecture-Data Warehouse Implementation -From dataWarehousing to Data Mining-On Line Analytical Processing - On Line AnalyticalMining.

#### Unit III

**Frequent Patterns Associations And Classification**- The Apriori Algorithm - Definition of Classificationand Prediction-Classification by Decision Tree Induction - Bayesian Classification-Rule Based Classification - Classification by Back Propagation - Lazy Learners - KNearest Neighbor - Other ClassificationMethods.

#### Unit IV

**Cluster Analysis**-Definition-Types of data in Cluster Analysis- Categorization of major Clustering Techniques - Partitioning Methods - Hierarchical Clustering-BIRCH - ROCK - Grid Based Methods - ModelBasedClusteringMethodsOutlierAnalysis.

#### Unit V

Spatial- Multimedia-Text And Web Data- Spatial Data Mining -Multimedia Data Mining - Text Mining - Mining the World Wide Web -Data Mining Applications - Trends in DataMining.

**Text Book(s)-**

1. Jiawei Han and Micheline Kamber- “Data Mining- Concepts and Techniques (The Morgan Kaufmann Series in Data Management Systems) 3rd Edition- July 6-2011.
2. Ian H. Witten-Eibe Frank-Mark A. Hall- “Data Mining-Practical Machine Learning Tools and Techniques”- Elsevier; Third edition-2014.

**Reference Book(s)-**

1. Margret H. Dunham- “Data Mining- Introductory andAdvanced Topics”- PearsonEducation-2003.
2. M. Awad-Latifur Khan- Bhavani Thuraisingham-LeiWang-“Design and Implementation of Data Mining Tools”- CRC Press- Taylor & Francis Group-2015.
3. Pang-Ning Tan- Michael Steinbach- Vipin Kumar- “Introductionto Data Mining- Instructor’s Solution Manual”- Pearson Education- First Edition-2016.
4. Mohammed J.Zaki- Wagner Meira JR- “Data Mining and Analysis- Fundamental Concepts and Algorithms”- Cambridge India-2016.

Total Number Of Topics: 49

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	9	18.37
2.	Regional	10	20.41
3.	National	17	34.7
4.	Global	13	26.53

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits				
IV	20PCS4EC5-1	Data Mining					6	4				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2	✓			✓	✓	✓			✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓		✓		

<b>CO4</b>	✓	✓	✓		✓	✓	✓	✓	✓	✓
<b>CO5</b>	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 40- Relationship- High										
<b>Mapping</b>	1-29%		30-59%		60-69%		70-89%		90-100%	
<b>Matches</b>	1-14		15-29		30-34		35-44		45-50	
<b>Relationship</b>	Very Poor		Poor		Moderate		High		Very High	

## SEMESTER - IV

Course Code- 20PCS4EC5-2  
Instruction Hours- 6  
Credits- 4

Exam Hours- 3  
Internal Marks- 25  
External Marks- 75

### ELECTIVE COURSE 5 (2) - SOFT COMPUTING

#### Course Objective-

- To expose the students to soft computing- various types of soft computing techniques- and applications of soft computing.
- Design hybrid system to revise the principles of soft computing in various applications

#### Course Outcomes-

On successful completion of the course the students will be able to

- CO1-** Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
- CO2-** Understand the concepts of fuzzy sets- knowledge representation using fuzzy rules- approximate reasoning- fuzzy inference systems- and fuzzy logic
- CO3-** Impact the fundamental theory and concepts of neural networks- Identify different neural network architectures- algorithms- applications and their limitations.
- CO4-** Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.
- CO5-** Reveal different applications of these models to solve engineering and other problems.

#### Unit I

Introduction-Soft Computing Constituents - Soft Computing Vs Hard Computing- Characteristics - Applications - Artificial Neural Network (ANN)- Fundamental Concept- Application Scope- Basic Terminologies- Neural Network Architecture- Learning Process- Basic Models of ANN- McCulloch-Pitts Model -Herb Network - Linear Reparability.

#### Unit II

Supervised Learning Networks-Preceptor Networks -Adeline-Madeline Networks - Back Propagation Network -Radial Basis Function Network - Associative Memory Networks-BAM - Hopfield Network - Boltzmann Machine Unsupervised Learning Networks-Coonan Self Organizing Network-Counter Propagation Network -ART Network.

#### Unit III

Fuzzy Sets-Basic Concept -Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set - Properties of Fuzzy Sets-Fuzzy Relations-Concept -Fuzzy Composition - Fuzzy Equivalence and Tolerance Relation - Membership Functions- Features - Fuzzification - Methods of

Membership value assignments-Defuzzification Methods.

**Unit IV**

Fuzzy Arithmetic -Extension Principle -Fuzzy Measures-Fuzzy Rules - Fuzzy Reasoning-Fuzzy Propositions - Formation of Rules-Decomposition of Rules - Aggregation of Rules- Approximate Reasoning - Fuzzy Inference - Expert Systems - Fuzzy Decision Making - Fuzzy Logic Control Systems.

**Unit V**

Genetic Algorithm-Fundamental Concept - Basic Terminologies-Traditional Vs Genetic Algorithm-Elements of GA-Encoding- Fitness Function-Genetic Operators- Selection - Cross Over-Inversion and Deletion - Mutation-Simple and General GA - The Schema Theorem - Classification of Genetic Algorithm - Genetic Programming - Applications of GA.

**Text Book(s)-**

1. S.N. Sivanandam- S.N. Deepa- “Principles of Soft Computing”-Wiley India-2007.

**Reference Book(s)-**

1. S. Rajasekaran-G.A.V.Pai- “Neural Networks- Fuzzy Logic- Genetic Algorithms”- Prentice Hall India-2004.

Total Number Of Topics: 74

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	11	14.86
2.	Regional	12	16.22
3.	National	35	47.3
4.	Global	16	21.62

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits				
IV	20PCS4EC5-2	Soft Computing					6	4				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		

<b>CO1</b>	✓	✓	✓	✓	✓	✓		✓	✓	✓
<b>CO2</b>	✓	✓		✓	✓	✓	✓		✓	✓
<b>CO3</b>	✓	✓	✓	✓		✓	✓	✓		
<b>CO4</b>	✓		✓		✓	✓		✓	✓	✓
<b>CO5</b>	✓	✓	✓	✓	✓		✓		✓	
Number of matches (✓) = 38- Relationship- High										

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

#### SEMESTER - IV

Course Code- 20PCS4EC5-3

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 25

Credits- 4

External Marks- 75

#### ELECTIVE COURSE 5 (3) - DATA SCIENCE AND BIG DATA ANALYTICS

##### Course Objectives-

- Use the core concepts and technologies of data science for data collection- management and data storage.
- helping the students to learn its core concepts and technologies including simple linear regression- prediction models- deep learning- machine learning-etc.

##### Course Outcomes-

On successful completion of the course the students will be able to

- CO1-** Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
- CO2-** Acquire fundamental enabling techniques and scalable algorithms like Hadoop- Map Reduce and NO SQL in big data analytics
- CO3-** Interpret business models and scientific computing paradigms- and apply software tools for big data analytics.
- CO4-** Achieve adequate perspectives of big data analytics in various applications like recommender systems- social media applications etc..
- CO5-** Apply Hadoop ecosystem components and participated data science and big data analytics projects

## Unit I

**Introduction to Big Data Analytics** -Big Data Overview- Data Structures -Analyst Perspective on Data Repositories - State of the Practice in Analytics - BI Versus Data Science - Current Analytical Architecture - Drivers of Big Data - Big Data Ecosystem-DataAnalytics Lifecycle-Data Discovery - Data Preparation - Model Planning - Model Building - Communicate Results -Operationalize.

## UnitII

**Basic Data Analytic Methods Using R**-IntroductiontoR programming- RGraphicalUserInterfaces-DataImport-Export - Attribute - Data Types -Descriptive StatisticsExploratoryData Analysis - VisualizationBefore Analysis-DirtyData- VisualizingaSingleVariable-ExaminingMultipleVariablesDataExplorationVersus Presentation - Statistical Methods of Evaluation-Hypothesis Testing -Difference of Means - Wilcoxon Rank-Sum Test-Type and Type II Errors - Power and Sample Size -ANOVA.

## Unit III

**Advanced Analytical Theory and Methods**-Clustering - K Means- UseCases-Overview-Determiningnumberofclusters-Diagnostics-Reasons to choose - cautionsAdditional Algorithms- AssociationRules- Apriority Algorithm-EvaluationofCandidateRules Applications of Association Rules-Validation Testing -Diagnostics -Regression-Linear Regression -LogisticRegression- Use cases-Model Description - Diagnostics - Additional Regression Models.

## UnitIV

**Classification - Decision Trees - Overview**-GeneticAlgorithm- DecisionTreeAlgorithms- EvaluatingDecisionTree-DecisionTreesin R - Na'ive Bayes-BayesTheorem-NaïveBayesClassifier- Smoothing-Diagnostics-NaïveBayesinR-DiagnosticsofmClassifiers- Additional Classification Methods - Time Series Analysis Overview - Box - Jenkins Methodology - ARIMA Model- Autocorrelation Function - Autoregressive Models-MovingAverageModels - ARMA and ARIMA Models -BuildingandEvaluatingandARIMA Model - Text Analysis -TextAnalysisSteps- ExampleCollecting-RepresentingTermFrequency - Categorizing-Determining Sentiments-Gaining Insights.

## Unit V

**Advanced Analytics-Technology and Tools**-MapReduce and Hadoop- Analytics for Unstructured Data .- UseCases - MapReduce - Apache Hadoop - The Hadoop Ecosystem - pig Hive HbaseManout- NoSQL - Tools in Database Analytics - SQL Essentials - Joins - Set operations - Grouping Extensions - In Database Text Analysis- Advanced SQL - Windows Functions - User Defined Functions and Aggregates - ordered aggregates- MADiib-AnalyticsReports Consolidation - Communicating and operational zing and Analytics Project - Creating the Final Deliverables - Developing Core Material for Multiple Audiences - Project Goals - Main Findings - Approach Model Description-Key points support with Data - Model details - Recommendations - Data Visualization

**Text Book(s)-**

1. Data Science & Big Data Analytics- Discovering- Analyzing- Visualizing and Presenting Data”- EMC Education Services Published by John Wiley & Sons- Inc. 2015

**Reference Book(s)-**

1. Noreen Burlingame - “The little book on Big Data”- New Street publishers-2012.
2. Anil Maheshwari-“ Data Analytics”- McGraw Hill Education- 2017.
3. Norman Matloff- “The Art of R Programming- A Tour of Statistical SoftwareDesign”-StarchPress;1edition-2011.
4. Sandip Rakshit- “R for Beginners”- McGraw HillEducation- 2017
5. [http://www.johndcook.com/R\\_language\\_for\\_programmers.html](http://www.johndcook.com/R_language_for_programmers.html).
6. <http://bigdatauniversity.com/>.
7. <http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction>.

Total Number Of Topics: 122

S.No.,	Category(Local,Regional,National& Global)	No.Of Topics	Percentage
1.	Local	18	14.75
2.	Regional	20	16.39
3.	National	20	16.39
4.	Global	64	52.46

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
IV	20PCS3EC5-3	Data Science and Big Data Analytics					6	4			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO2	✓	✓		✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4			✓		✓	✓		✓	✓	✓	
CO5	✓	✓	✓	✓	✓			✓	✓		
Number of matches (✓) = 38- Relationship-High											
<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%						
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50						
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High						

## SEMESTER - IV

Course Code- 20PCS4CP4

Exam Hours- 3

Instruction Hours- 6

Internal Marks- 40

Credits- 4

External Marks-60

### CORE PRACTICAL 10- MACHINE LEARNING LAB

#### Course Objectives-

- Can know about the appropriate datasets to the Machine Learning algorithms
- Students can analyze the graphical outcomes of learning algorithms with specific datasets

#### Course Outcomes-

On successful completion of the course the students will be able to

**CO1**-Gain knowledge about basic concepts of Machine Learning

**CO2**-Identify machine learning techniques suitable for a given problem

**CO3**-Solve the problems using various machine learning techniques

**CO4**-Apply Dimensionality reduction techniques.

**CO5**-Design application using machine learning techniques.

1. Write a program to implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file
2. Write a program for a given set of training data examples stored in a .CSV file- implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample
4. Write a program to build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier- considering few test data sets
6. Write a program to assume a set of documents that need to be classified- use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy- precision- and recall for your data set
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. use Java/Python ML library classes/API
8. Write a program to apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two

algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program

9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

10. Write a program to implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

11. Total Number Of Topics: 10

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

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
IV	20PCS4CP4	Machine Learning Lab					6	4			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓		
CO2	✓	✓	✓		✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓		✓	✓	✓	
CO5		✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 39- Relationship-High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

**SEMESTER - IV**  
**DISSERTATION AND VIVA VOCE(INDUSTRY/RESEARCH)**

Course Code- 20PCS4PW

Instruction Hours- 6

Credits- 4

**Course Outcomes-**

On successful completion of the course the students will be able to

- CO1-** Demonstrate a sound technical knowledge of their selected project topic.
- CO2-** Undertake problem identification- formulation and solution.
- CO3-** Design solutions to complex problems utilizing a systems approach and enable to-  
Conduct the science projects.
- CO4-** Communicate large in written an oral forms.
- CO5-** Demonstrate the knowledge- skills and attitudes of a student

S.No	Work Description	Maximum Marks
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.

Relationship Matrix for Course Outcomes-Programme Outcomes and Programme Specific Outcomes-

Semester	Code	Title of the Course					Hours	Credits			
IV	20PCS4PW	Dissertation And Viva Voce(Industry/Research)					6	4			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40- Relationship-High											

<b>Mapping</b>	1-29%	30-59%	60-69%	70-89%	90-100%
<b>Matches</b>	1-14	15-29	30-34	35-44	45-50
<b>Relationship</b>	Very Poor	Poor	Moderate	High	Very High

2020

# M.Phil COMPUTER SCIENCE

## Course Structure and Syllabus

(For the candidates admitted from the academic year 2020 - 2021 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.



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

(For the candidates admitted from the academic year 2020-2021 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	20MPCS1CC1	Research Methodology	3*	4	3	25	75	100
	Core Course – II	20MPCS1CC2	Advanced Concepts in Computer Science	3*	4	3	25	75	100
	Core Course – III	20MPCS1CC3	Teaching and Learning Skills (Common Paper)	3*	4	3	25	75	100
	Core Course – IV	20MPCS1CC4	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	20MPCS2DW	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:** 20MPCS1CC1

**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 NPCompleteness

**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- 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- Research Ethics- Interpretation and Report Writing -Knapsack problem - job sequencing with deadlines -

optimal merge patterns - Dynamic Programming- Multistage graphs Optimal binary search trees - 0/1 knapsack - Reliability design -The traveling salesperson problem -Flow shop scheduling- Basic search and traversal techniques - Ethical issues and professional- Quantitative method-Spread sheet and statistical tools-GIS and Remote sensing- Biometric system-Natural language processing-Development of working hypothesis- Types of Algorithmic Research Problems-Types of Solution Procedure Algorithm- Steps of Development of Algorithm-Steps of Algorithmic Research-Design of Experiments - Comparison of Algorithms-Meta Heuristics for Combinatorial Problems.

#### 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:87

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	19	21.8
2	Regional	22	25.3
3	National	20	22.99
4	Global	47	54

**SEMESTER – I**  
**CORE COURSE I1 –ADVANCED CONCEPTS IN COMPUTER SCIENCE**

**Course Code:** 20MPCS1CC2

**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 - Cloud Storage Architectures- Software as a Service (SaaS)- SaaS service providers - Google App Engine- Salesforce.com and google platform- Benefits - Operational benefits - Economic benefits - Evaluating SaaS- architectural models -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:68

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	16	23.5
2	Regional	28	41.2
3	National	17	25
4	Global	26	38.2

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

**Course Code:** 20MPCS1CC3

**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 Weart, 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	38	41.9
2	Regional	20	17.1
3	National	49	31.8
4	Global	45	38.5

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

**Course Code:** 20MPCS1CC4

**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 XindongWu, Vipin Kumar
3. LongbingCao, Philip.Yu,ChengqiZhang, 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	16	26.7
2	Regional	18	30
3	National	13	21.67
4	Global	26	43.3

## SEMESTER – I

### CORE COURSE IV – GUIDE PAPER

**Course Code:** 20MPCS1CC4

**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 Massive Datasets".

Total Number Of Topics:80

S.No	Category( Local, Regional, National & Global)	No Of Topics	percentage
1	Local	23	28.8
2	Regional	15	18.8
3	National	12	15
4	Global	39	48.8