

2022

# **B.Sc INFORMATION TECHNOLOGY**

## **Course Structure and Syllabus**

(For the candidates admitted from the academic year 2022-2023 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 behaviour 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/ Computing Sciences/ Biological Sciences/ Life Sciences.

**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

Our graduates of B.Sc(IT) students will have

1. Acquire the knowledge of basic computing and IT concepts that is used to adopt perfectly with the net world.
2. Learn and develop the programming and technical skills to meets the requirements of the IT based industries.
3. Analyze the problems and provide solutions in IT, which increase the critical thinking.
4. Adopt the concept of IT to apply and implement real time applications for the society enhancement and that increase the entrepreneurship skills.
5. Score the comprehensive knowledge of system concept for higher studies and active participation in research.

Thanthai Hans Roever College (Autonomous), Elambalur, Perambalur - 621 220  
 Bachelor of Information Technology - UG Course Structure under CBCS  
 (For the candidates admitted from the academic year 2022-2023 onwards)

Semester	Part	Course Code	Title of the Course	Ins. Hours/ Weeks	Credits	Exam Hours	CIA (Max)	ESE (Max)	Total (Max)
1	I	22UT1/22UH1	Language-I	6	3	3	25	75	100
1	II	22UE1	English-I (Communicative English-I)	6	3	3	25	75	100
1	III	22UIT1CC1	Programming in Python	5	5	3	25	75	100
1	III	22UIT1CP1	Python Programming Lab	4	4	3	40	60	100
1	III	22UMA1AC1:1	Mathematics-I (Numerical Methods)	5	3	3	25	75	100
1	III	22UMA2AC2:1	Mathematics-II (Statistical Methods)	2	-	-	-	-	-
1	IV	22UVE	Value Education	2	2	3	25	75	100
Total				<b>30</b>	<b>20</b>	-	-	-	<b>600</b>
2	I	22UT2/22UH2	Language-I	6	3	3	25	75	100
2	II	22UE2	English-II (Communicative English-II)	6	3	3	25	75	100
2	III	22UIT2CC2	Programming in C	4	4	3	25	75	100
2	III	22UIT2CP2	C Programming Lab	4	4	3	40	60	100
2	III	22UMA2AC2:1	Mathematics-II (Statistical Methods)	3	3	3	25	75	100
2	III	22UMA2AC3:1	Mathematics-III (Operation Research)	5	3	3	25	75	100
2	IV	22UES	Environmental Studies	2	2	3	25	75	100
Total				<b>30</b>	<b>22</b>	-	-	-	<b>700</b>
3	I	22UT3/22UH3	Language-I	6	3	3	25	75	100
3	II	22UE3	English-III (Language Through Literature and Communicative Skills-I)	6	3	3	25	75	100
3	III	22UIT3CC3	Object Oriented Programming in C++	5	5	3	25	75	100
3	III	22UIT3CP3	Object Oriented Programming in C++ Lab	4	4	3	40	60	100
3	III	22UEL3AC1	Digital Electronics	5	3	3	25	75	100
3	III	22UEL4AP1	Digital Electronics Lab	2	-	-	-	-	-
3	IV	22UIT3NME1	Web design	2	2	3	25	75	100
Total				<b>30</b>	<b>20</b>	-	-	-	<b>600</b>
4	I	22UT4/22UH4	Language-I	6	3	3	25	75	100

4	II	22UE4	English-IV (Language Through Literature and Communicative Skills-II)	6	3	3	25	75	100
4	III	22UIT4CC4	Programming in Java	4	4	3	25	75	100
4	III	22UIT4CP4	Java Programming Lab	4	4	3	40	60	100
4	III	22UEL4AC2	Computer Organization	4	3	3	25	75	100
4	III	22UEL4AP1	Digital Electronics Lab	2	3	3	40	60	100
4	IV	22UIT4SBE1:1/ 22UIT4SBE1:2	Management Information System/ R Programming	2	2	3	25	75	100
4	IV	22UIT4NME2	Information and Communication Technology	2	2	3	25	75	100
Total				<b>30</b>	<b>24</b>	-	-	-	<b>800</b>
5	III	22UIT5CC5	Operating Systems	5	5	3	25	75	100
5	III	22UIT5CC6	Data Structure and Algorithms	5	4	3	25	75	100
5	III	22UIT5CC7	Relational Database Management Systems	5	4	3	25	75	100
5	III	22UIT5CP5	RDBMS Lab	4	4	3	40	60	100
5	III	22UIT5MBE1:1/ 22UIT5MBE1:2/ 22UIT5MBE1:3	Cloud Computing/ Internet of Things/ Computer Graphics	5	4	3	25	75	100
5	IV	22UIT5SBE2:1/ 22UIT5SBE2:2	Entrepreneurship Development/ Security in Computing	2	2	3	25	75	100
5	IV	22UIT5SBE3:1/ 22UIT5SBE3:2	E-Commerce/ IT Marketing	2	2	3	25	75	100
5	IV	22USSD	Soft Skill Development	2	2	3	25	75	100
Total				<b>30</b>	<b>27</b>	-	-	-	<b>800</b>
6	III	22UIT6CC8	Computer Networks	6	5	3	25	75	100
6	III	22UIT6CC9	VB.Net	5	4	3	25	75	100
6	III	22UIT6CP6	.Net Lab	5	4	3	40	60	100
6	III	22UIT6MBE2:1/ 22UIT6MBE2:2/ 22UIT6MBE2:3	Multimedia Systems/ Computer Architecture/ Software Engineering	5	4	3	25	75	100
6	III	22UIT6MBE3:1/ 22UIT6MBE3:2/ 22UIT6MBE3:3	Open Source Technology/ Linux and Shell Programming/ Android Programming	4	4	3	40	60	100
6	III	22UIT6PW	Mini Project	4	4	3	40	60	100
6	V	22UGS	Gender Studies	1	1	3	25	75	100
		VAC	Value Added Course		2*				
6	V	*****	Extension Activities	-	1	-	-	-	-
Total				<b>30</b>	<b>27</b>	-	-	-	<b>700</b>
Grand Total				<b>180</b>	<b>140</b>				<b>4200</b>

### List of Allied Courses

**Allied Course I**  
Mathematical

**Allied Course II**  
Electronics

**Paper Details:**

Tamil Paper-Part I	- 4
English Paper-Part II	- 4
Core Course Paper	- 9
Core Course Practical	- 6
Mini Project	- 1
Allied Course Paper	- 5
Allied Course Practical	- 1
Non-Major Elective	- 2
Skill Based Elective	- 3
Major Based Elective	- 3
Environmental Studies	- 1
Value Education	- 1
Soft Skill Development	- 1
Gender Studies	- 1
Extension Activities	- 1 (Credit Only)

- For those who studied Tamil up to 10th +2 (Regular Stream)
- Syllabus for other Languages should be on par with Tamil at degree level
- those who studied Tamil up to 10th +2 but opt for other languages in degree level under Part I should study special Tamil in Part IV
- Extension Activities shall be outside instruction hours

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

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**

22UIT3NME1 – **Web Design (Theory)**

22UIT4NME2 – **Information and Communication Technologies (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]

**Value Added Course Paper - 2**

22UVAIT01 -- Big Data Technologies

22UVAIT02 – Machine Learning

## SEMESTER - I

Course Code: 22UIT1CC1  
Instruction Hours: 5  
Credits: 5

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

### **CORE COURSE I – PROGRAMMING IN PYTHON**

#### **Objective:**

- The course is designed to provide basic knowledge of Python.

#### **Course Outcomes (COs):**

- CO1: Understand why Python is a useful scripting language for developers.
- CO2: Understand the basic programming language concepts in the Python.
- CO3: Demonstrate the use of functions, lists, tuples and dictionaries and write control statements in Python.
- CO4: Understand the design of object-oriented programs with Python classes.
- CO5: Identify the tools support for Python program development environment.

#### **UNIT I**

Introduction to Python – Importance of Python – Installing in Various Operating Systems – Implementations of Python – Executing Python Programs – Basic Programming Concepts – Variables – Expressions and Statements – Input/Output – Operators.

#### **UNIT II**

Conditions – Functions – Arguments – Return values – Iteration Loops – Write & execute Python Programs – Strings – Data Structures – Lists – Dictionaries – Tuples – Sequences – Exception Handling.

#### **UNIT III**

File Handling – Modules – Regular Expressions – Text handling – Object Oriented Programming – Classes: Specification and Usage – Objects – Inheritance: Types of Inheritance – Overloading – Polymorphism Interacting with Databases – Introduction to MySQL – Python Identifiers – 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 and It's Applications – PyGame.

#### **UNIT V**

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

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

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 1st Edition 2012, O'Reilly.

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

1. Jeff McNeil, "Python 2.6 Text Processing: Beginners Guide", 2010, Packet Publications.
2. Mark Pilgrim, "Dive Into Python", 2nd edition 2009, Apress.
3. John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press, 2013.

**Web References:**

1. The Python Tutorial, <https://docs.python.org/2.7/tutorial/>
2. [https://www.w3schools.com/python/python\\_intro.asp](https://www.w3schools.com/python/python_intro.asp)
3. <https://www.programiz.com/python-programming>
4. Total Number of Topics Present in the course: 53

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	09	17.00
2.	Regional	04	07.55
3.	National	04	05.66
4.	Global	37	69.80

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	22UIT1CC1	PROGRAMMING IN PYTHON					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 (✓) = 42, 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: 22UIT1CP1

Instruction Hours: 4

Credits: 4

Exam Hours: 3

Internal Marks: 40

External Marks: 60

### CORE PRACTICAL I - PYTHON PROGRAMMING LAB

#### Objectives:

- Introduce core programming basics and program design with functions using Python programming language and understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.

#### Course Outcomes (COs):

- CO1: To understand the programming basics in Python for writing, testing and debugging it's programs.
- CO2: To understand the object-oriented program design for develop and using it in Python programs
- CO3: Implement Conditionals and Loops statements for Python programs
- CO4: Use functions and represent Compound data using Lists, Tuples and Dictionaries
- CO5: Read and write data from & to the 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
  - use tuple as 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
11. Write a program using regular expressions
12. Program to parse apache log file
13. Create a GUI program using pygtk

Total Number of Topics Present in the course: 13

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	2	23.07
2.	Regional	2	-
3.	National	1	-
4.	Global	8	76.92

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	22UIT1CP1	PYTHON PROGRAMMING LAB					4	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-II

Course Code: 22UIT2CC2  
Instruction Hours: 4  
Credits: 4

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

### **CORE COURSE II - PROGRAMMING IN C**

#### **Objective:**

- To know the basic terminology used in structured programming, understand various features in C and develop the programming skills using C language.

#### **Course Outcomes (COs):**

On successful completion of the course the students 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 Character Set – Identifier and Keywords – Data Types – Constants – Variables – Declarations – Expressions – Statements – Arithmetic – Unary – Relational and Logical, Assignment - Conditional Operators – Ternary Operators – Library Functions.

#### **UNIT II**

Data Input/Output Functions – Simple C Programs – if and if else – while, do while and for loop – Nested Control Structures – Switch – break and continue – go to statements..

#### **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 – String Handling Functions – User Defined Data Types – Passing Structures to Functions – Recursions – Categories of Function – Storage Classes Unions – Bitwise Operations.

#### **UNIT V**

Pointers – Declarations – Passing Pointers to Functions- Operation in Pointers - Pointer and Arrays – Arrays of Pointers – Pointer Expression – Structures, String and Pointers - Files: Creating Processing – Opening and Closing a Data File – Preprocessor - Applications of File Concepts.

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

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

**Reference Book(s):**

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 Delhi1996.

**Web References:**

1. [https://www.vssut.ac.in/lecture\\_notes/lecture1424354156.pdf](https://www.vssut.ac.in/lecture_notes/lecture1424354156.pdf)
2. <https://techniyojan.com/2019/12/c-programming-basics-notes.html>
3. <https://www.codewithharry.com/videos/c-tutorial-in-hindi-with-notes>

Total Number of Topics Present in the course: 61

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	07	11.10
2.	Regional	-	-
3.	National	-	-
4.	Global	54	88.90

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	22UIT2CC2	PROGRAMMING IN C					4	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											

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: 22UIT2CP2  
Instruction Hours: 4  
Credits: 4

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

### CORE PRACTICAL II – C PROGRAMMING LAB

#### Objective:

The basic knowledge of programming fundamentals of C language introduced and imparts writing skill of C programming and solving problems.

#### Course Outcomes (COs):

On successful completion of the course the students 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 algorithms.
- CO3: Implement programs with pointers and arrays.
- CO4: Using pointer to perform arithmetic operation.
- CO5: Write programs that perform operations using derived data types.

#### 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. Palindrome Checking.
3. 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 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: 5

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	1	20.00
2.	Regional	-	-
3.	National	-	-
4.	Global	4	80.00

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	22UIT2CP2	C PROGRAMMING LAB					4	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

## SEMESTER – III

Course Code: 22UIT3CC3  
Instruction Hours: 5  
Credits: 5

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

### CORE COURSE III

### OBJECT ORIENTED PROGRAMMING IN C++

#### Objective:

Understand the Object Oriented Programming, define the classes and objects of C++ and describe the working principle of Inheritance and I/O operations.

#### Course Outcomes (COs):

After completion of this course, 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 – Decision Making – Looping – Functions in C++.

#### UNIT II

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

#### UNIT III

Inheritance: Single – Multiple, Multilevel, Hierarchical and Hybrid – Extending Classes – Pointers – Virtual Functions and Polymorphism – Compile Time Polymorphism – Run Time Polymorphism – Virtual Base Classes – Abstract Classes.

#### UNIT IV

Managing Console I/O Operations – Working with Files – C++ streams and C++ Stream Classes – Unformatted I/O Operations.

#### UNIT V

Standard Template Library – Manipulating Strings – Templates – Exception Handling – Object Oriented System Development.

#### Text Book(s):

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

#### Reference Book(s):

1. Ashok Kamthane, Programming in C++, Pearson Education, 2013.
2. Steve Oualline, “Practical C++ programming”, O’Reilly/Shroff publishers & distributors.
3. “C++ primer”, Stanley B. Lippman, Josee Lajoie, Barbara E. Moo. – 5th ed...

#### Web References:

1. <https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/>
2. [https://www.w3schools.com/cpp/cpp\\_oop.asp](https://www.w3schools.com/cpp/cpp_oop.asp)
3. <https://www.simplilearn.com/tutorials/cpp-tutorial>

Total Number of Topics Present in the course: 32

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	05	15.6
2.	Regional	01	3.13
3.	National	02	6.25
4.	Global	24	75

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	22UIT3CC3	<b>OBJECT ORIENTED PROGRAMMING IN C++</b>					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											

<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: 22UIT3CP3  
Instruction Hours: 4  
Credits: 4

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

### CORE PRACTICAL III OBJECT ORIENTED PROGRAMMING C++ LAB

#### Objective:

- The objectives of the course are to have students identify and practice the object-oriented programming concepts and techniques, practice the use of C++ classes and class libraries, arrays, vectors, inheritance and file I/O stream concepts.

#### Course Outcomes (COs):

After successfully completed course, students will be able to:

- CO1: To implement various concepts related to language.
- CO2: Identify importance of object oriented programming and difference between structured oriented and object oriented programming features.
- CO3: Able to make use of objects and classes for developing programs.
- CO4: Able to use various object oriented concepts to solve different problems.
- CO5: Ability to develop computing based applications.

#### 1. Classes

Write A Program Using A Class To Represent A Bank Account With Data Members – Name Of Depositor, Account Number, Type Of Account and Balance And Member Functions – Deposit Amount – Withdrawal Amount. Show Name and Balance. Check The Program With Own Data.

#### 2. Constructor & Destructor

Write A Program To Read An Integer And Find The Sum Of All The Digits Until It Reduces To A Single Digit Using Constructor, Destructor And Default Constructor.

#### 3. Default & Reference Argument

Write A Program Using Function Overloading To Read Two Matrices Of Different Data Types Such As Integers And Floating Point Numbers. Find Out The Sum Of The Above Matrices Separately And Display The Total Sum Of These Arrays Individually.

#### 4. Operator Overloading

- A. Addition Of Two Complex Numbers.
- B. Matrix Multiplication

#### 5. Inheritance

Prepare Pay Roll Of An Employee Using Inheritance.

#### 6. Pointers

- A. Write a Program to Find the Number of Vowels in a Given Text
- B. Write a Program to Check for Palindrome

#### 7. Files

Prepare Students Mark List in a file With Student Number, Mark In Four Subjects

And Mark Total. Write A Program To Arrange These Records In The Ascending Order Of Mark Total And Write Them In The Same File Overwriting The Earlier Records.

8. Exception Handling

Prepare Electricity Bill that Handle Any Two Exceptions

9. Sorting and Searching

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

Total Number of Topics Present in the course: 9

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	01	11.11
2.	Regional	-	-
3.	National	01	11.11
4.	Global	07	77.08

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

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

Semester	Code	Title of the Course					Hours	Credits			
III	22UIT3CP3	OBJECT ORIENTED PROGRAMMING C++ LAB					4	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 (✓) = 41, 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: 22UEL3AC1

Instruction Hours: 5

Credits: 3

Exam Hours: 3

External Marks: 75

Internal Marks: 25

### ALLIED COURSE I – DIGITAL ELECTRONICS

#### Objectives:

Acquire the basic knowledge of digital logic gates and application, understand digital electronics circuits and perform the analysis and design of various digital electronic circuits.

#### Course Outcomes (COs):

After studying this course the students would gain enough knowledge

CO1: Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.

CO2: To understand and examine the structure of various number systems and its application in digital design.

CO3: The ability to understand, analyze and design various combinational and sequential circuits.

CO4: Ability to identify basic requirements for a design application and propose a cost effective solution.

CO5: To develop skill to build, and troubleshoot digital circuits.

#### UNIT I:

Logic Gates and Circuits: Boolean Algebra and Logic Gates – AND, OR, NOT, NAND, NOR – Exclusive OR and Exclusive OR Gates – Applications of XOR Gate – The Exclusive NOR Gate – Positive and Negative Logic – Logic Characteristics – Bipolar Logic Families – Integrated Circuits.

#### UNIT II:

Boolean Algebra: Definitions – Fundamentals of Boolean Algebra – Boolean Functions – Minterms and Maxterms – Laws and Theorems of Boolean Algebra – DeMorgan's Theorem – Universal Building Blocks (UBB) – NAND Gate as UBB – NOR Gate as UBB – Simplifying Logic Circuits – Sum of Products – AND-OR Networks – Sum of Products and Product of Sums Forms.

#### UNIT III:

Boolean Algebra: Karnaugh Maps – Product of Sums Simplification – NAND and NOR Implementation – AND-OR-INVERT Implementation – OR-AND-INVERT Implementation – Don't Care Conditions – Overlapping Groups – Rolling the Map – Eliminating Redundant Groups.

#### UNIT IV:

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

#### UNIT V:

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

#### Text Book(s):

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

#### Reference Book(s):

1. "Digital Design" M.Morris Mano, Prentice Hall of India.

2. "Fundamentals Of Digital Circuits" A. Anand kumar, PHI Learning Pvt. Ltd.,
3. "Modern Digital Electronics", R. P. Jain, Tata McGraw-Hill Education. Copyright.

Total Number of Topics Present in the course: 53

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	17	32.1
2.	Regional	10	18.9
3.	National	10	18.9
4.	Global	16	30.2

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	22UEL3AC1	DIGITAL ELECTRONICS					5	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 (✓) = 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
Relationship	Very Poor	Poor	Moderate	High	Very High

## SEMESTER-III

Course Code: 22UIT3NME1  
Instruction Hours: 2  
Credits: 2

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

### NON MAJOR ELECTIVE 1 – WEB DESIGN

#### Objective:

- Develop skills in analyzing the usability of a web site. Understand how to plan and conduct user research related to web usability. Learn the language of the web: HTML and CSS.

#### Course Outcomes (COs):

- CO1: Describe the basics of the Internet
- CO2: Recognize the different Internet devices and their functions
- CO3: Acquire the knowledge of HTML
- CO4: Apply the knowledge of Internet Technologies
- CO5: Develop Web Pages for real-world problems

#### UNIT I

Introduction to the Internet – Computers in Business – Networking – Internet – E-Mail – Resource Sharing – Gopher – World Wide Web – Usenet – Telnet – Bulletin Board Service – Wide Area Information Service.

#### UNIT II

Internet Technologies – Modem – Internet Addressing – Physical Connections – Telephone Lines – Internet Browsers – Internet Explorer – Netscape Navigator.

#### UNIT III

Introduction to HTML – History of HTML – HTML Documents – Anchor Tag – Hyperlinks – Head and Body Sections – Header Section – Title – Prologue – Links – Colorful Web Page – Comment Lines.

#### UNIT IV

Designing the Body Section – Heading Printing – Aligning the Headings – Horizontal Rule – Paragraph – Tab Settings – Ordered and Unordered Lists – Lists – Unordered Lists – Ordered Lists.

#### UNIT V

Table Handling – Tables – Table Creation in HTML – Frames – Frameset Definition – Frame Definition – Nested Framesets.

#### Text Book(s):

1. C. Xavier, World Wide Web Design with HTML, Tata McGraw Hill Company Limited, New Delhi, 19<sup>th</sup> Reprint 2008. (UNIT I Chapter 1; UNIT II Chapters 2 & 3; UNIT III Chapters 4 & 5; UNIT IV Chapters 6 & 7; UNIT V Chapters 8 & 10)

#### Reference Book(s):

1. Thomas A. Powell, HTML & XHTML, TMH, Fourth Edition, Thirteenth Reprint, 2007.
2. N.P. Gopalan and J. Akilandeswari, Web Technology A Developer's Perspective, PHI, Second Printing, 2008.

#### Web References:

1. <https://www.geeksforgeeks.org/the-internet-and-the-web/>
2. <https://www.w3schools.com/html>
3. <https://freepdf-books.com/web-designing/>

Total Number of Topics Present in the course: 49

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	01	02.04
2.	Regional	04	08.16
3.	National	03	06.12
4.	Global	41	83.67

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	22UIT3NME1	WEB DESIGN					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 (✓) = 42, 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: 22UIT4CC4  
Instruction Hours: 4  
Credits: 4

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

### CORE COURSE IV - PROGRAMMING IN JAVA

#### Objective:

- Understand the basic concepts of Object Oriented Programming with Java language.

#### Course Outcomes (COs):

After successful completion of this course, students will be able to:

- CO1: Understand the basic concepts of object oriented programming with Java language
- 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 window based applications with event handling.

#### UNIT I

Introduction to Java Programming: Introduction – Features of Java – Applications and Applets – Java Developer Kit – Java Language Fundamentals: The Building Blocks of Java – Data Types – Variable Declarations: Declaring, Initializing and Variables – Variable Types in Java – Wrapper Classes – Operators – Control Structures – Arrays – Strings.

#### UNIT II

Java as an OOP Language – Defining Classes – Defining Methods – Knowing This – Passing Arguments to Methods – Overloading Methods – Constructor Methods – Inheritance Concept – Overriding Methods – Modifiers: The Four Ps of Protection – Finalizing Classes, Methods and Variables – Abstract Classes and Methods – Packages – Interfaces.

#### UNIT III

Exception Handling: Introduction – Basics of Exception Handling in Java – Exception Hierarchy – Constructors and Methods in Throwable Class – Handling Exceptions in Java – Throwing User Defined Exceptions – Multithreading – Overview of Threads – Creating Threads – Thread Life – Cycle – Thread Priorities and Thread Scheduling.

#### UNIT IV

Files and I/O Streams: Java I/O – File Streams – FileInputStream and FileOutputStream – Filter Streams – RandomAccessFile – Applets: Introduction – Java Applications Versus Java Applets – Applet Life Cycle – Working with Applets – The HTML Applet Tag.

#### UNIT V

The Abstract Window Toolkit: Fundamental Classes in AWT – Drawing with Graphics class – Class Hierarchy in AWT – Event Handling – AWT Controls – Layout Managers and It's Types – Applications in Event Handling Concept.

**Text Book(s):**

1. P. Radha Krishna, Object Oriented Programming through JAVA, Universities Press, 2007. [UNIT I: Chapter 1,2; UNIT II: Chapter 3; UNIT III: Chapter 5,6; UNIT IV: Chapter 7,8; UNIT V: Chapter 10]

**Reference Book(s):**

1. Herbert Scheldt, “The Complete Reference Java”, Fifth Edition, Tata McGraw-Hill, 2008.
2. E. Balagurusamy, “Programming with Java”, Tata McGraw-Hill Education India, 2014.
3. Sagayaraj, Denis, Karthik and Gajalakshmi, “JAVA Programming for Core and Advanced Learners”, 2018.

**Web References:**

1. <https://www.programiz.com/java-programming>
2. <https://www.javatpoint.com/java-tutorial>
3. <https://www.guru99.com/java-tutorial.html>

Total Number of Topics Present in the course: 56

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	04	07.14
2.	Regional	-	-
3.	National	06	10.71
4.	Global	46	82.14

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	22UIT4CC4	PROGRAMMING IN JAVA					4	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 (✓) = 41, 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: 22UIT4CP4  
Instruction Hours: 4  
Credits: 4

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

### CORE PRACTICAL IV - JAVA PROGRAMMING LAB

#### Objective:

- Make the student learn an object oriented way of solving problems using java and make the students to write programs using multithreading concepts, handle exceptions and web designing through Applet.

#### Course Outcomes (COs):

After successful completion of this course, students will be able to:

- CO1: To familiarize the students with Java environment.
- CO2: To implement various concepts related to Java language.
- CO3: Learn the basic concepts & techniques of Java.
- CO4: Learn the advanced concepts of Java.
- CO5: Generate an application based upon the concepts of Java

#### 1. Simple Programs using Control Statements

- a) If statement,      b) while loop,      c) for loop,      d) switch statement

#### 2. Program to arrange the alphabetical order of given names using string handling function

#### 3. Program to demonstrate the class and objects

#### 4. Program to demonstrate the following inheritance

- a) Single Inheritance      b) Multilevel Inheritance

#### 5. Program to demonstrate the concepts a Interface and Abstract Class

#### 6. Program to calculate EB-Bill preparation using package

#### 7. Program to demonstrate multiple catch clauses

#### 8. Program to create a Thread using the following

- a) Extends Thread Class
- b) Implements Runnable interface

#### 9. Program to demonstrate various I/O Streams

- a) To find the properties of a given directory or file
- b) To copy a file into another.

#### 10. Program to change the background color based on the selection of controls using Applet.

Total Number of Topics Present in the course: 10

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	02	20.00
2.	Regional	-	-
3.	National	-	-
4.	Global	08	80.00

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	22UIT4CP4	JAVA PROGRAMMING LAB					4	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

Course Code: 22UEL4AC2  
Instruction Hours: 4  
Credits: 3

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

### ALLIED COURSE II - COMPUTER ORGANIZATION

#### OBJECTIVE:

- Acquire knowledge of the basic structure of computers & machine instructions, input/output organization, memory system and fundamental concepts of basic processing unit.

#### Course Outcomes (COs):

After studying this course the students would gain enough knowledge

- CO1: Understand the basics of computer organization: structure and operation of computers and their peripherals.  
CO2: Understand the concepts of programs as sequences or machine instructions.  
CO3: Expose different ways of communicating with I/O devices and standard I/O interfaces.  
CO4: Describe hierarchical memory systems including cache memories and virtual memory.  
CO5: Describe arithmetic and logical operations with integer and floating-point operands.

#### UNIT I:

Basic Structure of Computers: Basic Operational Concepts – Bus Structures – Performance – Processor Clock – Basic Performance Equation – Clock Rate – Performance Measurement.

#### UNIT II:

Input/Output Organization: Accessing I/O Devices – Interrupts – Interrupt Hardware – Enabling and Disabling Interrupts – Handling Multiple Devices – Controlling Device Requests – Exceptions – Direct Memory Access – Buses – Interface Circuits – Standard I/O Interfaces – PCI Bus – SCSI Bus – USB.

#### UNIT III:

Memory System: Basic Concepts – Semiconductor RAM Memories – Read Only Memories – Speed, Size, and Cost, Cache Memories – Mapping Functions – Virtual Memories – Secondary Storage.

#### UNIT IV:

Arithmetic: Numbers – Arithmetic Operations and Characters – Addition and Subtraction of Signed Numbers – Design of Fast Adders – Multiplication of Positive Numbers – Signed Operand Multiplication – Fast Multiplication – Integer Division.

#### UNIT V:

Basic Processing Unit: Some Fundamental Concepts – Execution of a Complete Instruction – Multiple Bus Organization – Hardwired Control – Micro programmed Control – The structure of General Purpose Multiprocessors.

#### Text Book(s):

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002.

#### Reference Book(s):

1. Computer Organization, Carl Hamacher, zvonko Vranesic and Safwat Zaky, McGraw Hill, 5th edition.
2. William Stallings, “Computer Organization and Architecture: Designing for Performance”, Eighth Edition, Pearson.
3. Computer architecture and organization , 4th edition , P Chakraborty , JAICO publishers.

Total Number of Topics Present in the course: 42

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	01	02.38
2.	Regional	21	50.00
3.	National	13	30.95
4.	Global	07	16.67

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	22UEL4AC2	COMPUTER ORGANIZATION					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 (✓) = 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
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER – IV

Course Code: 22UEL4AP1  
 Instruction Hours: 4  
 Credits: 3

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

**ALLIED PRACTICAL I - DIGITAL ELECTRONICS LAB**

**Objectives:**

- To know the concepts of Logic gates and Universal gates.
- To understand the concepts of Multiplexer and Demultiplexer.

**Course Outcomes (COs):**

- CO1: Define different types of logic gates, identify their ICs and also verify their truth table.  
 CO2: Derive basic logic gates, adder, and subtractor using universal gates.  
 CO3: Illustrate realization of Boolean expression in SOP and POS form and design it using logic gates.  
 CO4: Design and test Universal Gates NAND and NOR.  
 CO5: Implement Multiplexer and Demultiplexer.

1. Verification and interpretation of truth table for AND, OR and NOT gates.
2. Verification and interpretation of truth table for NAND, NOR, Ex-OR and Ex-NOR gates.
3. Construction of half and full adder using XOR and NAND gates and verification of its operation.
4. To Study and Verify Half and Full Subtractor.
5. Realization of logic functions with the help of Universal Gates NAND.
6. Realization of logic functions with the help of Universal Gates NOR.
7. Design and Verify the 4-Bit Serial In - Parallel Out Shift Registers.
8. Implementation and verification of decoder or de-multiplexer using logic gates.
9. Implementation and verification of encoder using logic gates.
10. Implementation of 4x1 multiplexer and 1x4 demultiplexer using logic gates.

Total Number of Topics Present in the course: 10

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	04	40.00
2.	Regional	03	30.00
3.	National	-	-
4.	Global	03	30.00

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	22UEL4AP1	DIGITAL ELECTRONICS LAB					4	3		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓			✓	✓		

<b>C02</b>	✓	✓					✓			✓
<b>C03</b>	✓	✓	✓	✓		✓	✓	✓	✓	✓
<b>C04</b>	✓	✓	✓	✓		✓	✓	✓	✓	✓
<b>C05</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: 22UIT4SBE1:1  
Instruction Hours: 2  
Credits: 2

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

### PART-IV

#### SKILL BASED ELECTIVE I

#### MANAGEMENT INFORMATION SYSTEM

##### Objective:

- Enable the students to learn management information system in an organization.

##### Course Outcomes (COs):

Upon completion of this course, students will be able to:

- CO1: Relate the basic concepts and technologies used in the field of management informationsystems.
- CO2: Compare the processes of developing and implementing information systems.
- CO3: Outline the role of the ethical, social, and security issues of information systems.
- CO4: Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
- CO5: Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.

##### UNIT I

Management information system: Meaning – Features – Requisites of an Effective MIS – MIS Model – Components – Subsystems of an MIS – Role and Importance – Corporate Planning for MIS – Growth of MIS in an Organization – Centralization vs. Decentralization of MIS.

##### UNIT II

System Concepts – Elements of System – Characteristics of a System – Types of System – Categories of Information System – System Development Life Cycle – System Enhancement.

##### UNIT III

Information Systems in Business and Management – Transaction Processing System – Information Repeating and Executive Information System.

##### UNIT IV

Database Management Systems – Conceptual Presentation – Client Server Architectures Networks.

##### UNIT V

Functional Management Information System: Financial – Accounting – Marketing – Production – Human Resource – Business Process Outsourcing.

##### Text Book(s):

1. Gordon B.Davis & Margrethe H.Olson, “Management information system”. McGraw Hill Publishing.

##### Reference Book(s):

1. Aman Jindal, “Management Information system”, Kalayani publishers.
2. “Fundamentals of Management Information System” – Mohammed Azam, Vijay Nicole Imprints Pvt. Ltd., Chennai

3. Dr.S.P.Rajagopalan, “Management information system” – Margham Publishing.

**Web References:**

1. <http://www.freebookcentre.net/business-books-download/Management-Information-Systems.html>
2. [https://en.wikipedia.org/wiki/Management\\_information\\_system](https://en.wikipedia.org/wiki/Management_information_system)
3. <http://www.micrlinkcolleges.net/elib/files/undergraduate/Management%20Information%20System/Management%20Information%20System.pdf>

Total Number of Topics Present in the course: 29

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	02	06.89
2.	Regional	09	31.00
3.	National	14	48.03
4.	Global	04	13.79

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	22UIT4SBE1:1	MANAGEMENT INFORMATION SYSTEM					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 (✓) = 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 – IV

Course Code: 22UIT4SBE1:2  
Instruction Hours: 2  
Credits: 2

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

### PART-IV

#### **SKILL BASED ELECTIVE – I – 2. R PROGRAMMING**

##### **Objective:**

- Introduction to the fundamentals of R Programming.

##### **Course Outcomes (COs):**

- CO1: Understand the basics of Fundamentals of R.
- CO2: Understands the loading, retrieval techniques of data.
- CO3: Understand how data is analyzed and visualized using statistic functions.
- CO4: Learn the main R data structures – vector and data frame.
- CO5: Compute basic summary statistics.

##### **UNIT I**

Introduction to R: Define R – Need of R – Advantages of R Over Other Programming Languages – R Studio: R Command Prompt – R Script File – Comments – Handling Packages in R: Installing a R Package – Few Commands to Get Started: Installed packages(), packageDescription(), help(), find. package(), library() – Input and Output – Entering Data from Keyboard – Printing Fewer Digits or More Digits – Special Values Functions : NA, Inf and – inf.

##### **UNIT II**

R Data Types: Vectors – Lists – Matrices – Arrays – Factors – Data Frame – R Variables: Variable Assignment – Data Types of Variable – Finding Variable ls() – Deleting Variables – R Operators: Arithmetic Operators – Relational Operators – Logical Operator – Assignment Operators – Miscellaneous Operators – R Decision Making: if Statement and if else Statement – if else if Statement and switch Statement – R Loops: repeat loop, while loop, for loop – Loop Control Statement: break Statement – next Statement.

##### **UNIT III**

R-Function : Function Definition – Built in Functions: mean(), paste(), sum(), min(), max(), seq(), User Defined Function – Calling a Function – Calling a Function Without an Argument, Calling a Function with Argument Values – R Strings – Manipulating Text in Data: substr(), strsplit(), paste(), grep(), toupper(), tolower() – R Vectors – Sequence Vector, rep function, vector access, vector names, vector math, vector recycling, vector element sorting – R List – Creating a List – List Tags and Values – Add/Delete Element to or from a List – Size of List – Merging Lists – Converting List to Vector – R Matrices – Accessing Elements of a Matrix – Matrix Computations: Addition, subtraction, Multiplication and Division – R Arrays: Naming Columns and Rows, Accessing Array Elements – Manipulating Array Elements – Calculation Across Array Elements – R Factors – Creating Factors – Generating Factor Levels gl().

##### **UNIT IV**

Data Frames – Create Data Frame – Data Frame Access – Understanding Data in Data Frames: dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() Functions – Extract Data from Data Frame – Expand Data Frame: Add Column, Add Row – Joining Columns and Rows in a Data Frame rbind() and cbind() – Merging Data Frames merge() – Melting and Casting data melt(), cast() – Loading and Handling Data

in R: Getting and Setting the Working Directory – getwd(), setwd(), dir() – R CSV Files – Input as a CSV file , Reading a CSV File, Analyzing the CSV File: summary(), min(), max(), range(), mean(), median(), apply() – Writing into a CSV File – R ExcelFile – Reading the Excel File.

## UNIT V

Descriptive Statistics: Data Range, Frequencies, Mode, Mean and Median – Mean Applying Trim Option – Applying NA Option – Median Mode Standard Deviation – Correlation – Spotting Problems in Data with Visualization: Visually Checking Distributions for a Single Variable – R Pie Charts: Pie Chart Title and Colors – Slice Percentages and Chart Legend – 3D Pie Chart – R Histograms – Density Plot – R Bar Charts – Bar Chart Labels – Title and Colors.

### Text Book(s):

1. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (India), 2017, ISBN: 978-93-5260-455-5.

### Reference Book(s):

1. Seema Acharya, Data Analytics using R, McGrawHill Education (India), 2018, ISBN:978-93-5260-524-8.
2. Tutorials Point (I) simply easy learning, Online Tutorial Library (2018), R Programming, Retrieved from [https://www.tutorialspoint.com/r/r\\_tutorial.pdf](https://www.tutorialspoint.com/r/r_tutorial.pdf).
3. Andrie de Vries, Joris Meys, R for Dummies A Wiley Brand, 2nd Edition, John Wileyand Sons, Inc, 2015, ISBN: 978-1-119-05580-8

### Web References:

1. <https://www.javatpoint.com/r-tutorial>
2. <https://www.statmethods.net/r-tutorial/index.html>
3. <https://www.listendata.com/p/r-programming-tutorials.html>

Total Number of Topics Present in the course: 87

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	02	02.30%
2.	Regional	04	04.59%
3.	National	06	06.89%
4.	Global	75	86.21%

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

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme

SpecificOutcomes:

Semester	Code	Title of the Course					Hours	Credits				
V	22UCS5SBE3:2	R 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	✓	✓	✓	✓		✓	✓	✓	✓			

<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: 22UIT4NME2  
Instruction Hours: 2  
Credits: 2

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

### NON MAJOR ELECTIVE – II INFORMATION AND COMMUNICATION TECHNOLOGIES

#### Objective:

- To study the basic concepts of ICT and Information Technology.

#### Course Outcomes (COs):

- CO1: To give a broad exposure to issues related to user-centred design
- CO2: Implementation of services and products related to various information and communication technologies.
- CO3: The focus is in the application areas of education, healthcare, governance and rural development.
- CO4: Most ICT applications are developed in projects for which a number of innovative ideas have to be created and critical decisions need to take place.
- CO5: Provides a practical approach to the project design process for ICT applications.

#### UNIT I

ICT – Concepts – Objectives – Need and Importance of ICT – Characteristics and Scope of ICT – Recent Trends in the Area of ICT – Interactive Video – Interactive White Board – Video Conferencing – M Learning.

#### UNIT II

Social Media – Community Radio - GyanDarshan – Gyanvani – Sakshat Portal – e-Gyankosh – Blog – MOCC – WhatsApp – Facebook – Twitter.

#### UNIT III

Introduction – History of the Internet – Understanding WWW – Web Browsers – Favourites and Bookmarks – Kinds of Information Available – Parts of Internet – Searching the net – Researching on the net.

#### UNIT IV

Introduction – Overview of a Network – Communication Processors – Communication Media – Types of Networks – Network Topologies – Network Architecture – Communication Satellites – Radar – Fiber Optics – ISDN.

#### UNIT V

Computers in Business and Industry – Computers in Home – Computers in Education and Training – Computers in Entertainment, Science, Medicine and Engineering

#### Text Book(s):

1. G. Kavitha, Information and Communication Technology in Education, Saradha Publication, Chennai. (UNIT I : Chapters 1.1, 1.1.1, 1.1.2, 1.1.3, 2.1 – 2.5, UNIT II : Chapters 2.6, 2.7.1 – 2.7.9, UNIT III : Chapters 6.1 – 6.9)
2. Alexis Leon and Mathews Leon, Fundamentals of Information Technology, Vikas Publishing House Pvt Ltd, 2009. (UNIT IV : Chapters 18.1 – 18.4, 18.7, 18.8, 18.11,

19.6, 19.9, 19.11, 19.12; UNIT V: Chapters 33, 34, 35, 36)

**Reference Book(s):**

1. A. Kumar, Internet and IT, Anmol Publications Pvt Ltd, First Edition, 2002.

**Web References:**

1. <https://aiou.edu.pk/SoftBooks/5403.pdf>
2. [https://www.academia.edu/30878252/Basic\\_Concepts\\_of\\_Information\\_and\\_Communication\\_Technology\\_Notes](https://www.academia.edu/30878252/Basic_Concepts_of_Information_and_Communication_Technology_Notes)
3. [https://teacher-network.in/OER/images/9/9a/ICT\\_student\\_textbook.pdf](https://teacher-network.in/OER/images/9/9a/ICT_student_textbook.pdf)

Total Number of Topics Present in the course: 45

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	06	13.33
2.	Regional	12	26.67
3.	National	01	02.22
4.	Global	26	57.78

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	22UIT4NME2	INFORMATION AND COMMUNICATION TECHNOLOGIES					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 (✓) = 42, 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-V

Course Code: 22UIT5CC5  
Instruction Hours: 5  
Credits: 5

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

### CORE COURSE V – OPERATING SYSTEMS

#### Objective:

- Have the knowledge of fundamental concepts of an operating system, state memorymanagement and process management for handling Operating System.

#### Course Outcomes (COs):

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

- CO1: Understand what is an operating system and the role it plays
- CO2: Describe and explain the fundamental components of a computer operating system.
- CO3: Define, restate, discuss, and explain the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems
- CO4: Describe and extrapolate the interactions among the various components of computingsystems.
- CO5: A high-level understanding of the structure of operating systems, applications, and therelationship between them.

#### UNIT I

Introduction – History Of Operating System – Operating System Zoo – Operating System Concepts – Interrupt Structure & Processing – System Calls – Operating System Structure.

#### UNIT II

Processes and Threads: Processes – Threads – Processor and User Modes – Thread Model and Usage – Inter Process Communication.

#### UNIT III

Scheduling – Job Scheduling – Real Time Scheduling – Memory Management: Memory Abstraction – Virtual Memory – Page Replacement Algorithms - Paging.

#### UNIT IV

Deadlocks: Resources – Introduction to Deadlocks – Deadlock Occurrence – Deadlock Detection and Recovery – Deadlocks Avoidance – Deadlock Prevention – Recovery from Deadlock – Multiple Processor System: Multiprocessors – MultiComputers.

#### 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.

#### Text Book(s):

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

#### Reference Book(s):

1. William Stallings, "Operating Systems - Internals & Design Principles", 5thEdition,Prentice - Hall of India private Ltd, New Delhi, 2004.
2. Sridhar Vaidyanathan, "Operating System", 1st Edition,Vijay Nicole

Publications,2014.

3. “System Programming and Operating Systems” – D.M. Dhamdhere, Tata McGraw HillPublishing Co., Limited.

**Web References:**

1. <https://www.javatpoint.com/os-tutorial>
2. [https://www.tutorialspoint.com/operating\\_system/index.htm](https://www.tutorialspoint.com/operating_system/index.htm)
3. <https://www.geeksforgeeks.org/last-minute-notes-operating-systems/>

Total Number of Topics Present in the course: 33

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	03	09.09
2.	Regional	0	12.12
3.	National	02	09.09
4.	Global	23	69.69

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

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme

SpecificOutcomes:

Semester	Code	Title of the Course					Hours	Credits			
V	22UIT5CC5	OPERATING SYSTEMS					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

## SEMESTER – V

Course Code: 22UIT5CC6  
Instruction Hours: 5  
Credits: 4

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

### CORE COURSE VI – DATA STRUCTURES AND ALGORITHMS

#### Objective:

Provide an introduction to basic data structures and algorithms for manipulating them.

#### Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to

- CO1: Describe how arrays, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.
- CO2: Compare alternative implementations of data structures with respect to performance.
- CO3: Compare and contrast the benefits of dynamic and static data structures implementations
- CO4: Discuss the computational efficiency of the principal algorithms for sorting, searching, and merging.
- CO5: Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.

#### 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 – Storage Structures for Arrays – Multiple Stacks and Queues – Priority Queue – Double Ended Queue – Applications of Queue – 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 – Height Balanced Trees – Threaded Binary Trees – Counting Binary Trees – Graphs: Terminology and Representations – Traversals – Connected Components and Spanning Trees – Single Source Shortest Path Problem and It's Applications.

#### 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

Internal Sorting: Insertion Sort – Quick Sort – 2 Way Merge Sort – Heap Sort and Shell Sort – Sorting on Keys – Files: Files – Queries and Sequential Organizations – Index Techniques – File Organization.

#### Text Book(s):

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

#### Reference Book(s):

1. "Data structures Using C", Aaron M. Tenenbaum, Yedidyah Langsam, Moshe

- J. Augenstein, Kindersley (India) Pvt. Ltd.,
- “Data structure and Algorithms”, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, Pearson Education Pvt. Ltd.,
  - “Data Structures” – Lipschuta, Tata McGraw Hill, Schaum’s Outline Series, 2006.

**Web References:**

- [https://w3.cs.jmu.edu/spragunr/CS240\\_F12/ConciseNotes.pdf](https://w3.cs.jmu.edu/spragunr/CS240_F12/ConciseNotes.pdf)
- <https://apps2.mdp.ac.id/perpustakaan/ebook/Karya%20Umum/Dsa.pdf>
- <https://people.cs.vt.edu/shaffer/Book/Java3e20110103.pdf>

Total Number of Topics Present in the course: 48

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	03	6.25
2.	Regional	01	2.08
3.	National	04	8.33
4.	Global	40	83.3

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	22UIT5CC6	DATA STRUCTURE AND ALGORITHMS					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 (✓) = 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

Total Number of Topics Present in the course: 30

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

## SEMESTER – V

Course Code: 22UIT5CC7  
Instruction Hours: 5  
Credits: 4

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

### CORE COURSE VII - RELATIONAL DATABASE MANAGEMENT SYSTEMS

#### Objective:

- Have the theoretical foundation of relational database management system.

#### Course Outcomes (COs):

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

- CO1: Understand database concepts and structures in relational algebra, ER model and relational model.
- CO2: To design and build a simple database system with the fundamental tasks of modelling, designing, and implementing a DBMS.
- CO3: Understand functional dependency and functional decomposition and apply various normalization techniques.
- CO4: Perform PL/SQL programming using concept of cursor management, error handling, Package and triggers.
- CO5: 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 – File Oriented System Versus – Database System Transaction Management – Database System Structure – Application Architecture – Data Models: Basic Concepts – Constraint: Types of Constrains – Integrity Constraints – Keys – ER Diagram – Weak Entity – Extended ER Features – UML – Relational Model: Structure of Relational Databases – Relational Algebra – Views.

#### UNIT II

SQL: Background – Basic Structure of MySQL – Set Operation – Aggregate Function – Null Values – Nested Sub Queries – Views – Modification of the Database – Data Definition Language – Basic Concepts of Files – 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 – Closures of a Set of Functional Dependencies – 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 – ACID Properties – States – Serializability. Lock Based Concurrency Control– Locks – Granting – Two Phase Locking Protocol – Time Stamp Based Protocol: Timestamps – Timestamp Ordering Protocol – Dead Lock Handling – Dead Lock Avoidence.

**Text Book(s):**

1. A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", 5th Edition McGraw-Hill, 2005.

**Reference Book(s):**

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

**Web References:**

1. <https://annamalaiuniversity.ac.in/studport/download/sci/cis/resources/MCA01-%20RDBMS%20-%2019MCAC203.pdf>
2. <https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm>
3. [https://www.w3schools.com/mysql/mysql\\_rdbms.asp](https://www.w3schools.com/mysql/mysql_rdbms.asp)

Total Number of Topics Present in the course: 61

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	1	14.75
2.	Regional	1	08.19
3.	National	2	06.55
4.	Global	57	70.49

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	22UIT5CC7	RELATIONAL DATABASE MANAGEMENT SYSTEMS								5	4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO 1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓		✓	✓		✓	✓	
CO2	✓	✓				✓	✓	✓		✓	
CO3	✓	✓	✓	✓		✓	✓		✓	✓	
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 41, 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

Total Number of Topics Present in the course: 30

## SEMESTER – V

Course Code: 22UIT5CP5  
Instruction Hours: 4  
Credits: 4

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

### **CORE PRACTICAL V - RDBMS LAB**

#### **Objective:**

- The objective of this lab course is to understand the practical applicability of relational database management system concepts and working on existing database systems, designing of database, creating relational database, analysis of table design.

#### **Course Outcomes (COs):**

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

- CO1: Enhance the knowledge and understanding of database analysis and design.
- CO2: Enhance the knowledge of the processes of database development and administration using SQL and PL/SQL.
- CO3: Solve Database problems using Oracle 9i SQL and PL/SQL.
- CO4: To improve and enhance programming skills and techniques using SQL and PL/SQL.
- CO5: 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. Creating Database and Tables using DDL statements.
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 too 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 auditclient (client\_no, name, bal\_due, operation, userid, oupdate) 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	3	33.33
2.	Regional	-	-
3.	National	1	11.1
4.	Global	5	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			
V	22UIT5CP5	RDBMS LAB					4	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 - V

Course Code: 22UIT5MBE1:1  
Instruction Hours: 5  
Credits: 4

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

### MAJOR BASED ELECTIVE I - 1. CLOUD COMPUTING

#### Objective:

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

#### Course Outcomes (COs):

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

- CO1: Learn the Concept of Cloud Infrastructure Model and analyze the performance of CloudComputing.
- CO2: Understand the concept of Cloud Security.
- CO3: To know the fundamental concepts of cloud computing.
- CO4: To understand the cloud models and services
- CO5: To design and implement applications in the cloud environment

#### UNIT I

Introduction to the Cloud: Definition of Cloud – Cloud Drivers – Cloud Adoption Inhibitors.

#### UNIT II

Laying the Groundwork: Introduction – Authentication – Computing Concepts – Hardware Virtualization – Web Development Technologies.

#### UNIT III

Cloud Deployment Models: Introduction – Public Clouds – Private Clouds – Community Clouds – Hybrid Clouds – Cloud Service Models: Introduction – Software as a Service – Platform as a Service – Infrastructure as a Service – Additional Service Models.

#### UNIT IV

Making the Decision: Introduction – To Go to the Cloud – Choosing a Cloud Service Model – Choosing a Cloud Deployment Model – Choosing a Public Cloud Service Provider.

#### UNIT V

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

#### Text Book(s):

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

**Reference Book(s):**

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

**Web References:**

1. <https://www.javatpoint.com/cloud-computing-tutorial>
2. [https://www.tutorialspoint.com/cloud\\_computing/index.htm](https://www.tutorialspoint.com/cloud_computing/index.htm)
3. <https://www.guru99.com/cloud-computing-for-beginners.html>

Total Number of Topics Present in the course: 32

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	04	12.5
2.	Regional	02	6.25
3.	National	03	3.13
4.	Global	23	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		
V	22UIT5MBE1:1	CLOUD COMPUTING					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 (✓) = 41, 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 – V

Course Code: 22UIT5MBE1:2  
Instruction Hours: 5  
Credits: 4

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

### **MAJOR BASED ELECTIVE I – 2. INTERNET OF THINGS**

#### **Objective:**

- Enabling the interconnection and integration of the physical world and the cyber space. It represents the trend of future networking, and leads the third wave of the IT industry revolution.

#### **Course Outcomes (COs):**

Upon completion of the course, the student should be able to:

- CO1: To understand overview of IoT and Internet principles.
- CO2: To learn about the concepts of IoT and various IoT related protocols
- CO3: Analyze various protocols for IoT.
- CO4: Apply data analytics and use embedded code related to IoT.
- CO5: Analyze applications of IoT in real time scenario

#### **UNIT I**

The Internet of Things: An Overview – The Flavour of the Internet of Things – The “Internet” of “Things” – Technology of Internet of Things – Enchanted Objects – Making of the Internet of Things – Design Principles for Connected Devices: Calm and Ambient Technology – Magic as Metaphor, Privacy, Keeping Secrets – Web Thinking for Connected Devices – Small Pieces – Loosely Joined – Best Citizens On The Internet – Optimized Degradation and Affordances.

#### **UNIT II**

Internet Principles – Internet Communications – An Overview – IP/TCP – The IP Protocol Suite (TCP/IP) – UDP – IP Addresses – DNS – Static IP Address Assignment – Dynamic IP Address Assignment – IPv6 – MAC Addresses – TCP and UDP Ports – An Example: HTTP Ports – Other Common Ports – Application Layer Protocols – HTTP. HTTPS: Encrypted HTTP – Other Application Layer Protocols – Thinking About Prototyping: Sketching, Familiarity, Costs versus Ease of Prototyping – Prototypes and Production – Changing Embedded Platform – Physical Prototypes and Mass Personalisation – Climbing into the Cloud – Open Source versus Closed Source – Closed/Open and Mixing Open – Closed Source – Closed Source for Mass Market Projects – Tapping into the Community.

#### **UNIT III**

Prototyping Embedded Devices: Electronics, Sensors – Actuators, Scaling Up the Electronics – Embedded Computing Basics – Microcontrollers – System on Chips – Choosing Your Platform Arduino – Developing on the Arduino – Tips on the Hardware – Openness, Raspberry Pi, Cases and Extension Boards – Developing on the Raspberry Pi – Some Notes on the Hardware – Openness – Designing the Physical Design: Preparation, Sketch, Iterate, and Explore, Nondigital Methods – Laser Cutting – Select a Laser Cutter – Software – Hinges and Joints, – 3D Printing – Categories of 3D Printing – Software – CNC Milling –

Repurposing/Recycling.

#### UNIT IV

Prototyping Online Components: Creating an API – Mashing Up APIs – Scraping, Legalties, Writing a New API, Clockodillo, Security, Implementing the API – Using Curl to Test – Going Further – Real Time Reactions – Applications – Polling, Comet, Other Protocols, MQ Telemetry Transport – Extensible Messaging and Presence Protocol – Constrained Application Protocol – Techniques for Writing Embedded Code: Memory Management – Categories of Memory – Making the Most of Your RAM – Performance and Battery Life – Libraries – Debugging.

#### UNIT V

Business Models: A Short History of Business Models – Space and Time – From Craft to Mass Production – The Long Tail of the Internet – Learning from History – The Business Model Canvas – User of Business Model – Models, Make Thing, Sell Thing – Subscriptions – Customisation – Be a Key Resource – Provide Infrastructure: Sensor Networks – Take a Percentage – Funding an Internet of Things Startup – Real Time Applications of IoT: Hobby Projects and Open Source – Venture Capital – Government Funding – Crowd funding – Lean Startups.

#### Text Book(s):

1. “Designing the Internet of Things”, by Adrian McEwen, Hakim Cassimally, Wiley Publisher, 1<sup>st</sup> Edition, 2014.

#### Reference Book(s):

1. “Rethinking the Internet of Things – A scalable approach to connecting everything”, by Francis DaCosta, Apress open publication, 2013.
2. “Learning Internet of Things” by Peter Waher, PACKT Publishing-Birmingham-mumbai-2015.
3. “Internet of Things: A Hands on Approach”, by Arhdeep Bahga and Vijay Madiseti

#### Web References:

1. <http://www.internet-of-things-book.com/>.
2. <https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT>
3. <https://www.iotforall.com/what-is-internet-of-things>

Total Number of Topics Present in the course: 98

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	11	11.2
2.	Regional	02	2.04
3.	National	09	9.18
4.	Global	76	77.6

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	22UIT5MBE1:2	INTERNET OF THINGS					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 (✓) = 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-V

Course Code: 22UIT5MBE1:3  
Instruction Hours: 5  
Credits: 4

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

### MAJOR BASED ELECTIVE I – 3. COMPUTER GRAPHICS

#### Objective:

- The course introduces the basic concepts of computer graphics. It provides the necessary theoretical background and demonstrates the application of computer science to graphics.

#### Course Outcomes (COs):

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

- CO1: Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
- CO2: Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
- CO3: Use of geometric transformations on graphics objects and their application in composite form.
- CO4: Extract scene with different clipping methods and its transformation to graphics display device.
- CO5: 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 Modeling 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(s):

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

### Reference Book(s):

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.
2. Jeffrey McConnell, "Computer Graphics: Theory into Practice", Jones and Bartlett Publishers, 2006.
3. Hill F S Jr., "Computer Graphics", Maxwell Macmillan", 1990.

### Web References:

1. <http://nptel.ac.in/>
2. <http://www.svecw.edu.in/Docs%5CCSECGLNotes2013.pdf>
3. <http://www.tutorialsspace.com/Download-Pdf-Notes/Computer-Graphics-Notes.aspx>

Total Number of Topics Present in the course: 61

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	05	28.19
2.	Regional	23	34.42
3.	National	05	08.19
4.	Global	28	45.90

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	22UIT5MBE1:3	COMPUTER GRAPHICS					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 (✓) = 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-V

Course Code: 22UIT5SBE2:1  
Instruction Hours: 2  
Credits: 2

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

### PART-IV

#### SKILL BASED ELECTIVE II – ENTREPRENEURSHIP DEVELOPMENT

##### Objective:

To develop and fortify entrepreneurial quality, develop small and medium scale enterprises in order to generate employment and widen the scope of industrial ownership.

##### Course Outcomes (COs):

Students will be able to

- CO1: Know the parameters to assess opportunities and constraints for new business ideas.
- CO2: Understand the systematic process to select and screen a business idea.
- CO3: Design and evaluate strategies for successful implementation of ideas.
- CO4: Identify the elements of success of entrepreneurial ventures and write a business plan.
- CO5: Consider the legal and financial conditions for starting a business venture.

##### UNIT I

Entrepreneurship Introduction – Meaning and Definition of Entrepreneurship – Entrepreneur and Enterprise – Functions of Entrepreneur – Factors influencing Entrepreneurship – Qualities of an Entrepreneur – Types of Entrepreneur.

##### UNIT II

Small Scale Industries Meaning and Definition – Product Range – Capital Investment – Ownership Patterns – Meaning and importance of Tiny Industries – Ancillary Industries – Cottage Industries – Roles of SSIs – Problems of SSI's – Policies Governing SSI's.

##### UNIT III

Formation of Small Scale Industry Business opportunity – Scanning the Environment – Evaluation of Alternatives and Selection Based on Personal Competencies – Formation of a Small Business Venture: location, clearances, permits required, formalities, licensing and registration procedures.

##### UNIT IV

Preparing the Business Plan(BP) Meaning – Importance – Preparation – BP Format: Financial Aspects – Marketing Aspects, Human Resource Aspects – Technical Aspects and Social Aspects of the BP – Common Pitfalls to be Avoided in Preparation of a BP.

##### UNIT V

Project Assistance Financial Assistance through SFC's – SIDBI – Commercial Banks – IFCI – Non Financial Assistance from DIC, SISI, AWAKE, KVIC – Financial Incentives for SSI's and Tax Concessions – Assistance for obtaining Raw Material – Machinery – Land and Building and Technical Assistance – Industrial Estates: Role and Types.

##### Text Book(s):

1. Vasant Desai, "Entrepreneurship Development", Himalaya Publishing House, 2016.

- H.R. Appannaiah, Gopala Krishna D.S, H.A Bhaskar, "Entrepreneurship Development", Himalaya Publishing House, 2017.

**References Book(s):**

- Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi.
- Tendon.C, "Environment and Entrepreneur", Cluigh Publications, Allahabad.
- Srivastava S. B, "A Practical Guide to Industrial Entrepreneurs", Sultan Chand and Sons, New Delhi.

**Web References:**

- <http://ediindia.ac.in/e-policy/> [Entrepreneurial Policy India]
- [http://en.wikipedia.org/wiki/List\\_of\\_venture\\_capital\\_companies\\_in\\_India](http://en.wikipedia.org/wiki/List_of_venture_capital_companies_in_India) [Venture Capital]
- [indiavca.org/venture-capital-in-india.html](http://indiavca.org/venture-capital-in-india.html) [Venture Capital]

Total Number of Topics Present in the course: 38

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	02	05.26
2.	Regional	11	28.94
3.	National	18	50.00
4.	Global	07	15.78

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	2UCS5SBE2:1	ENTERPRENEURSHIP DEVELOPMENT					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

## SEMESTER-V

Course Code: 22UIT5SBE2:2  
Instruction Hours: 2  
Credits: 2

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

### **PART-IV** **SKILL BASED ELECTIVE II - SECURITY IN COMPUTING**

#### **Objective:**

- The purpose of this course is to provide understanding of the main issues related to security in modern networked computer systems.

#### **Course Outcomes (COs):**

- CO1: State and explore the concepts and terms of security.
- CO2: Understand existing attacks and security measures.
- CO3: Explain the techniques used to materialize threats into attacks.
- CO4: Analyze the recent threats, vulnerabilities and attacks and evaluate their effects.
- CO5: Draw solutions for protecting the system from being exposed to the threats and attacks.

#### **UNIT I**

**Introduction: Computer Security – Threats – Harm – Vulnerabilities – Controls – Authentication – Access Control – Cryptography.**

#### **UNIT II**

**Security: Security in Operating Systems – Security in the Design of Operating Systems.**

#### **UNIT III**

**Security Counter Measures: Cryptography in Network Security – Firewalls – Intrusion Detection and Prevention Systems – Network Management.**

#### **UNIT IV**

**Privacy: Privacy Concepts – Privacy Principles and Policies – Authentication and Privacy – Governing Data Mining – Privacy Preserving – Privacy on the Web.**

#### **UNIT**

**Management and Incidents: Security Planning – Handling Incidents – Risk Analysis – Protecting Programs and Data – Information and Law.**

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

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies, “Security in Computing”, 5th Edition, Pearson Education, 2015.

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

1. George K. Kostopoulos, “Cyber Space and Cyber Security”, CRC Press, 2013.

2. Martti Lehto, Pekka Neittaanmäki, "Cyber Security: Analytics, Technology and Automation", Springer International Publishing, Switzerland, 2015.
3. Nelson Phillips, Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.

#### Web References:

1. [https://www.tutorialspoint.com/computer\\_security/index.htm](https://www.tutorialspoint.com/computer_security/index.htm)
2. [https://www.tutorialspoint.com/basics\\_of\\_computer\\_science/basics\\_of\\_computer\\_science\\_security.htm](https://www.tutorialspoint.com/basics_of_computer_science/basics_of_computer_science_security.htm)
3. <https://www.javatpoint.com/cyber-security-tutorial>

Total Number of Topics Present in the course: 25

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	03	12.00
2.	Regional	03	12.00
3.	National	02	08.00
4.	Global	17	68.00

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	22UIT5SBE2:2	SECURITY IN COMPUTING					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 (✓) = 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-V

Course Code: 22UIT5SBE3:1  
Instruction Hours: 2  
Credits: 2

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

### PART-IV SKILL BASED ELECTIVE III - E-COMMERCE

#### Objective:

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

#### Course Outcomes (COs):

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

- CO1: To acquire the knowledge in Electronic Commerce, Electronic Payment Systems, security systems, online advertising and marketing.
- CO2: To analyze the impact of E-commerce on business models and strategy.
- CO3: To identify the key security threats in the E-commerce environment.
- CO4: To describe how procurement and supply chains relate to B2B E-commerce.
- CO5: Describe the major types of E-commerce.

#### UNIT I

Welcome to Electronic Commerce: Electronic Commerce Framework – Electronic Commerce and Media Convergence – The Anatomy of E-Commerce Applications – Electronic Commerce Consumer Applications.

#### UNIT II

Electronic Commerce Organization Applications – The Network Infrastructure for Electronic Commerce: Components of I Way – Network Access Equipment – Global Information Distribution Networks.

#### UNIT III

The Internet As Network Infrastructure: The Internet Terminology – NSFNET Architecture and Components – National Research And Education Network – The Business of Internet Commercialization: Telco/Cable/On-line Companies – National Independent ISPs – Regional Level of ISPs – Local Level of ISPs – Internet Connectivity Options.

#### UNIT IV

Electronic Commerce and the World Wide Web: Architectural Framework for Electronic Commerce – World Wide Web as the Architecture – Technology Behind the Web – Security and the Web Consumer – Oriented Electronic Commerce: Consumer – Oriented Applications – Mercantile Process Models.

#### UNIT-V

Electronic Payment Systems: Types of Electronic Payment Systems – Digital Tokens – Based Electronic Payment Systems – Smart Cards And Electronic Payment Systems – Credit Card Electronic Payment Systems – Risk And Electronic Payment Systems – Designing Electronic Payment Systems.

**Text Book(s):**

1. "Frontiers of Electronic Commerce", Ravikalakota & Andrew Whinston, Addison Wesley, 2000.[UNIT I Chapter-1; UNIT II Chapter-1 & 2; UNIT III Chapter-3 & 4; UNIT IV Chapter-6 & 7; UNIT V Chapter-8.]

**Reference Book(s):**

1. "E-Commerce", S. Jaiswal, Galgotia publications private limited, Revised Edition, 2009.
2. "Electronic Commerce", Pete Loshin & Paul A.Murphy, Second edition, Jaico PublishingHouse, 2000.
3. "Introduction to E-Commerce", Zheng Qin, Springer, 2009.

**Web References:**

1. [https://www.tutorialspoint.com/e\\_commerce/index.htm](https://www.tutorialspoint.com/e_commerce/index.htm)
2. <https://www.geeksforgeeks.org/e-commerce/>
3. <https://www.wisdomjobs.com/e-university/e-commerce-concepts-tutorial-7/introduction-to-e-commerce-11845.html>

Total Number of Topics Present in the course: 30

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	07	23.3
2.	Regional	02	10.0
3.	National	18	60.00
4.	Global	03	06.67

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

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

Semester	Code	Title of the Course					Hours	Credits				
V	22UIT5SBE3:1	E-COMMERCE					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 (✓) = 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-V

Course Code: 22UIT5SBE3:2  
Instruction Hours: 2  
Credits: 2

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

### PART-IV

#### **SKILL BASED ELECTIVE III - IT MARKETING**

##### **Objective:**

- To understand IT Marketing, educate the students various concepts of Marketing AND develop their interest in Marketing.

##### **Course Outcomes (COs):**

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

- CO1: Demonstrate strong conceptual knowledge in the functional area of marketing.
- CO2: Demonstrate effective understanding of relevant functional areas of marketing and its application.
- CO3: Demonstrate analytical skills in identification and resolution of problems pertaining to marketing.
- CO4: Understand the tools used by marketing managers in decision situations.
- CO5: Understand the marketing environment.

##### **UNIT-I**

Definition and Meaning of Marketing – Modern Concept of Marketing – Marketing and Selling – Marketing Functions – Buying – Transportation – Warehousing – Standardization – Grading – Packaging.

##### **UNIT-II**

Product Planning and Development – Product Life Cycle – Brand Management – Developing New Product – Market Segmentation – Marketing Mix.

##### **UNIT-III**

Pricing Decision – Meaning – Objectives – Factors Determining Pricing – Pricing Policies – Kinds of Pricing.

##### **UNIT-IV**

Promotional Methods – Advertising – Publicity – Personal Selling – Sales Promotion.

##### **UNIT-V**

E – Commerce: Electronic Commerce Framework – Electronic Commerce and Media Coverage – The Anatomy of E Commerce Applications – E Commerce Consumer Applications – E Commerce Organization Applications. The Network Infrastructure for E Commerce: Components of the I Way – Global Information Distribution Networks.

**Text Book(s):**

1. R.S. N.Pillai & Bagavath: Modern Marketing Principles and Practice. S.C hand & company Ltd. New Delhi, 2010.
2. Ravikalakota & Andrewwhinst one, Frontiers of Electronic Commerce, Addison Wesley,2000.

**Reference Book(s):**

1. “Decision Support, Analytics, Business Intelligence”, Power, Daniel J, Second Edition.
2. “Principles of Marketing”, Student Value Edition, Philip Kotler, Gary Armstrong, Pearson Education, 2013.
3. “E-Commerce An Introduction”, Amir Manzoor, Lambert Academic Publishing,2010.

**Web References:**

1. <https://www.simplilearn.com/tutorials/digital-marketing-tutorial>
2. <https://www.javatpoint.com/marketing-tutorial>

Total Number of Topics Present in the course: 34

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	01	2.94
2.	Regional	09	26.5
3.	National	03	8.82
4.	Global	21	61.8

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	22UIT5SBE3:2	IT MARKETING					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 (✓) = 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 – VI

Course Code: 22UIT6CC8  
Instruction Hours: 6  
Credits: 5

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

### CORE COURSE VIII - COMPUTER NETWORKS

#### Objective:

- Understand the computer networking basics, different components of computer networks, various protocols, modern technologies and their applications.

#### Course Outcomes (COs):

After successful completion of this course, students will be able to:

- CO1: 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.
- CO2: To study transmission media and realization.
- CO3: To explain the role of protocols in networking and to analyze the services and features of the protocol stack.
- CO4: Able to understand network layer techniques for designing subnets and supernets and analyze packet flow on basis of routing protocols.
- CO5: 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 – Functions of the OSI Layer.

#### UNIT II

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

#### UNIT III

Elementary Data Link Protocols – TCP/IP Protocol Suites – Sliding Window Protocols – Data Link Layer in the Internet – Media Access Control: Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.

#### UNIT IV

Network Layer – Design Issues – Routing Algorithms – Routers and Switches – 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(s):

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

**Reference Book(s):**

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.

**Web References:**

1. <https://www.cse.iitk.ac.in/users/dheeraj/cs425/>
2. [https://mrcet.com/downloads/digital\\_notes/CSE/III%20Year/COMPUTER%20NET%20WORKS%20NOTES.pdf](https://mrcet.com/downloads/digital_notes/CSE/III%20Year/COMPUTER%20NET%20WORKS%20NOTES.pdf)
3. [www.iare.ac.in/sites/default/files/lecture\\_notes/CN%20\\_LECTURE\\_NOTES.pdf](http://www.iare.ac.in/sites/default/files/lecture_notes/CN%20_LECTURE_NOTES.pdf)

Total Number of Topics Present in the course: 42

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	03	7.14
2.	Regional	02	4.76
3.	National	04	9.52
4.	Global	33	78.6

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			
VI	22UIT6CC8	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 (✓) = 35 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 – VI

Course Code: 22UIT6CC9  
Instruction Hours: 5  
Credits: 4

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

### CORE COURSE IX - VB.NET

#### Objective:

- The student will use VB.Net to build Windows applications using structured and object-based programming techniques.

#### Course Outcomes (COs):

- CO1: Understand the programming algorithm, process, and structure.
- CO2: Understand and identify the fundamental concepts of object-oriented programming.
- CO3: Understand and use the concepts of objects, primitive value, message, method, selection control structure, repetition control structures, object reference, container, and method parameter.
- CO4: Understand and identify the importance of object-oriented programming for the Internet based electronic commerce.
- CO5: Understand the impact of VB.NET on business.

#### UNIT I

Visual Basic.NET: A New Framework – The Common Language Runtime – Managed Execution – Microsoft Intermediate Language (MSIL) – The Just In Time Compiler – Executing Code – Assemblies – The Common Type System – Classes – Interfaces – Value Types – Delegates – The .NET Framework Class Library – Self Describing Components – Cross Language Interoperability – The Catch Security – Code Access Security (CAS) – Role Based Security.

#### UNIT II

VB.Net Application: The Start Page – Creating a New Project – Examining the IDE – Creating Your First VB.NET Application – Windows Application Enhancements – Resizing Controls Automatically – Anchoring Controls to the Form Edges – Easier Menus – Setting Tab Order – Line and Shape Controls: You're Outta Here – Form Opacity.

#### UNIT III

VB.Net Changes: General Changes – Default Properties – Subs and Functions Require Parentheses – Changes to Boolean Operators – Declaration Changes – Support for New Assignment Operators – Procedure Changes – Array Changes – Data Type Changes – Structured Error Handling – Structures Replace UDTs – IDE Changes – Constructors and Destructors.

#### UNIT IV

Database Access with VB.Net and ADO.Net: Accessing a Database from a Windows Application Using the Data Adapter Configuration Wizard – ADO.NET – About ADO.NET – DataSets – Working with the ADO.NET Objects – XML Integration – The XML Designer.

#### UNIT V

Web Applications With VB.Net And ASP.Net: Your First ASP.NET Application – How ASP.NET Works – Web Pages and Code – Server Controls – Validation Controls – Data Binding – Handling Reentrant Pages.

#### Text Book(s):

1. Craig Utley, "A Programmer's Introduction to Visual Basic.NET", Sams Publishing,

**Reference Books(s):**

1. Visual Basic .NET Black Book, Steven Holzner, Paraglyph Press, 2002.
2. Introduction to Visual basic.NET - NIIT Prentice Hall of India, 2005.
3. Designing Microsoft ASP.NET Applications-Douglas J. Reilly-Microsoft Press.

**Web References:**

1. [https://www.tutorialspoint.com/vb.net/vb.net\\_quick\\_guide.htm](https://www.tutorialspoint.com/vb.net/vb.net_quick_guide.htm)
2. <https://www.pdfdrive.com/vb.net-books.html>
3. <https://riptutorial.com/ebook/vb-net>

Total Number of Topics Present in the course: 56

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	11	19.64
2.	Regional	09	16.07
3.	National	06	07.14
4.	Global	32	57.14

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	22UIT6CC9	VB.NET					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

## SEMESTER – VI

Course Code: 22UIT6CP6  
Instruction Hours: 5  
Credits: 4

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

### CORE PRACTICAL VI - .NET LAB

#### Objective:

- To impart practical training in .Net Programming Language

#### Course Outcomes (COs):

At the end of this lab course students will be able to:

- CO1: Handle the various controls for user interfacing
- CO2: Develop applications using VB.NET and ASP .NET
- CO3: Create user interactive web pages using VB.Net.
- CO4: Create simple data binding applications using ADO.Net connectivity.
- CO5: Performing Database operations for Windows Form and web applications.

1. Program to create addition, subtraction, multiplication and division using standard control.
2. Program to find your age using date calculator.
3. Program to scroll a text from left to right and right to left of the client area using timer control.
4. Program to design a calendar of a year.
5. Program to design and implement a scientific calculator.
6. Program to expand and shrink objects using timer control.
7. Program to create and design the different shapes control.
8. Program to create animation using timer control.
9. Program to create and design a traffic signal using timer control.
10. Program to populate the employee details using Data Control.

Total Number of Topics Present in the course: 10

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	03	30
2.	Regional	-	-
3.	National	-	-
4.	Global	07	70

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	22UIT6CP6	.NET 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

## SEMESTER - VI

Course Code: 22UIT6MBE2:1  
Instruction Hours: 5  
Credits: 4

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

### MAJOR BASED ELECTIVE II – 1. MULTIMEDIA SYSTEMS

#### Objective:

- To understand multimedia in respect to many application including business, schools, home, education, and virtual reality.

#### Course Outcomes (COs):

After successfully completed course, students will be able to:

- CO1: Describe the types of media and define multimedia system.
- CO2: Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video).
- CO3: Use and apply tools for image processing, video, sound and animation.
- CO4: Apply methodology to develop a multimedia system.
- CO5: 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 – Multimedia Applications – Computers and Text – Font Editing and Design Tools – Hypermedia – Hypertext.

#### UNIT II

Images: Plan Approach – Organize Tools – Configure Computer Workspace – Making Still Images – Color – Image File Formats – Multimedia Data Interface Standards – Sound: The Power of Sound – Digital Audio – Midi Audio – Working with MIDI – Audio File Formats – Adding sound to Multimedia project – 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 video – Editing Video – Virtual Reality.

#### UNIT IV

Making Multimedia: The Stage of Multimedia Project – The Intangible Needs – Overview of Multimedia Software Tools – 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 – Producing – Content and Talent: Acquiring Content – Ownership of Content Created for Project – Acquiring Talent.

**Text Book(s):**

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

**Reference Book(s):**

1. Ralf Steinmetz & Klara Nahrstedt "Multimedia Computing, Communication & Applications", Pearson Education, 2012.
2. David Hillman, Multimedia Technology and Applications, Galgotia Publications Pvt. Ltd.
3. V.K. Jain, Introduction to Multimedia and its applications, Khanna Publishing, 2012.

**Web References:**

1. [http://engineering.futureuniversity.com/BOOKS%20FOR%20IT/DCAP303\\_MULTIMEDIA\\_SYSTEMS.pdf](http://engineering.futureuniversity.com/BOOKS%20FOR%20IT/DCAP303_MULTIMEDIA_SYSTEMS.pdf)
2. <https://www.pdfdrive.com/multimedia-systems-books.html>
3. <http://www.jru.edu.in/wp-content/uploads/moocs/e-books/computer-science-and-IT/Multimedia.pdf>

Total Number of Topics Present in the course: 52

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	05	11.54
2.	Regional	02	32.69
3.	National	07	21.15
4.	Global	38	34.62

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	22UIT6MBE2:1	MULTIMEDIA SYSTEMS					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											

<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-VI

Course Code: 22UIT6MBE2:2  
Instruction Hours: 5  
Credits: 4

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

### MAJOR BASED ELECTIVE II – 2. COMPUTER ARCHITECTURE

#### Objective:

- To learn the basic structure and operations of a computer.

#### Course Outcomes (COs):

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

- CO1: To understand the basic structure of computers, operations and instructions.
- CO2: To understand digital electronics circuits.
- CO3: To understand pipelined execution and design control unit.
- CO4: To understand parallel processing architectures.
- CO5: To understand the various memory systems and I/O communication.

#### UNIT I

Basic Structure of a Computer System: Functional Units – Basic Operational Concepts – Performance – Instructions: Language of the Computer – Operations, Operands – Instruction Representation – Logical Operations – Decision Making – MIPS Addressing.

#### UNIT II

Arithmetic for Computers: Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism

#### UNIT III

Processor And Control Unit: A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined Datapath and Control – Handling Data Hazards & Control Hazards – Exceptions.

#### UNIT IV

Parallelism: Parallel Processing Challenges – Flynn's Classification – SISD, MIMD, SIMD, SPMD and Vector Architectures – Hardware Multithreading – Multi core Processors and Other Shared Memory Multiprocessors – Introduction to Graphics Processing Units – Clusters – Warehouse Scale Computers and other Message – Passing Multiprocessors.

#### UNIT V

Memory & I/O Systems: Memory Hierarchy – Memory Technologies – Cache Memory – Measuring and Improving Cache Performance – Virtual Memory – TLB's – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits – USB.

#### Text Book(s):

- David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann/Elsevier, 2014.
- Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

**Reference Book(s):**

1. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.
2. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012.
3. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

**Web References:**

1. <http://www.cs.iit.edu/~virgil/cs470/Book/>
2. <https://www.geeksforgeeks.org/last-minute-notes-computer-organization/>
3. [https://ccsuniversity.ac.in/bridge-library/pdf/btech-COMPUTER-ORGANIZATION-\(R17A0510\)-All.pdf](https://ccsuniversity.ac.in/bridge-library/pdf/btech-COMPUTER-ORGANIZATION-(R17A0510)-All.pdf)

Total Number of Topics Present in the course: 45

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	08	20.00
2.	Regional	17	35.56
3.	National	10	22.22
4.	Global	10	22.22

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	22UIT6MBE2:2	COMPUTER ARCHITECTURE					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 (✓) = 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-VI

Course Code: 22UIT6MBE2:3  
Instruction Hours: 5  
Credits: 4

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

### MAJOR BASED ELECTIVE II – 3. SOFTWARE ENGINEERING

#### Objective:

- To understand the professional and ethical responsibility software development.

#### Course Outcomes (COs):

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

- CO1: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- CO2: An ability to apply engineering design to produce solutions that meet specified needs with consideration of public Needs,
- CO3: An ability to communicate effectively with a range of audiences to the software products.
- CO4: An ability to recognize ethical and professional responsibilities in engineering based on the software testing.
- CO5: To understand how to manage the software reliability and quality.

#### UNIT I

Introduction – Software Engineering Discipline – Evolution – 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 – Features of 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 – Coupling – Neat Arrangement – Software Design Approaches – Scope of Software Engineering.

#### 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 – Verification and validation – Coding and Testing: Coding – Testing: Techniques of Testing – Unit Testing – Black Box Testing – White Box Testing – Debugging – Integration Testing – System Testing.

#### UNIT V

Software Reliability – Quality Management: Software Reliability – Features of Software Reliability – Statistical Testing – Software Quality and Maintenance – 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 –

## Software Engineering for Projects and Products.

### Text Book(s):

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

### Reference Book(s):

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

### Web References:

1. [https://www.vssut.ac.in/lecture\\_notes/lecture1428551142.pdf](https://www.vssut.ac.in/lecture_notes/lecture1428551142.pdf)
2. [https://www.tutorialspoint.com/software\\_engineering/index.htm](https://www.tutorialspoint.com/software_engineering/index.htm)
3. <https://www.geektonight.com/software-engineering-notes/>

Total Number of Topics Present in the course: 69

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	07	10.1
2.	Regional	03	4.35
3.	National	04	5.8
4.	Global	55	79.7

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	22UIT6MBE2:3	SOFTWARE ENGINEERING					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 (✓) = 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-VI**

Course Code: 22UIT6MBE3:1  
Instruction Hours: 4  
Credits: 4

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

## **MAJOR BASED ELECTIVE III – 1.OPEN SOURCE TECHNOLOGY**

### **Objective:**

- To expose students to free open source software environment and introduce them to use open source packages.

### **Course Outcomes (COs):**

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

CO1: Write PHP scripts to handle HTML forms.

CO2: Write regular expressions including modifiers, operators, and meta characters.

CO3: Create PHP programs that use various PHP library functions, and that manipulate files and directories.

CO4: Analyze and solve various database tasks using the PHP language.

CO5: 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 – 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: 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 Book(s):**

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 Book(s):**

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>

### Web References:

1. [https://www.tutorialspoint.com/basics\\_of\\_computers/basics\\_of\\_computers\\_open\\_source\\_software.htm](https://www.tutorialspoint.com/basics_of_computers/basics_of_computers_open_source_software.htm)
2. <https://opensource.com/resources/what-open-source>
3. <https://www.geeksforgeeks.org/introduction-to-open-source-and-its-benefits/>

Total Number of Topics Present in the course: 33

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	06	18.18
2.	Regional	03	09.09
3.	National	05	15.15
4.	Global	19	57.58

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	22UIT6MBE3:1	OPEN SOURCE TECHNOLOGY					4	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-VI

Course Code: 22UIT6MBE3:2  
Instruction Hours: 4  
Credits: 4

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

### MAJOR BASED ELECTIVE II 2. LINUX & SHELL PROGRAMMING

#### Objective:

- To understand and make effective use of Linux utilities and shell scripting language to solve problem

#### Course Outcomes (COs):

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

- CO1: To understand the Linux OS and study the shell programming concepts.
- CO2: To simulate the file commands.
- CO3: To write shell program for handling files.
- CO4: To write programs for familiarizing control statements.
- CO5: To write programs for handling strings.

#### UNIT I

Introduction to Linux: Operating System and Linux – Linux Architecture – Linux File System – History of Linux and Unix – Linux Overview – Linux Distributions – Vi Editors – Linux Commands.

#### 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 – Process Identifiers – Text Filtering Tools – Working with Commands – Logical Operators – Local Variables and Its Scope – Working with Arrays – Decision Making – Loop Control.

#### 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(s):

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

#### Reference Book(s):

1. Learning the Unix Operating System- Jerry Peek, Grace Todino & John Strang, Fourth Edition, O'Reilly, 1998.
2. Sumitabha Das "Unix Concepts and Applications", Tata McGraw Hill Education.
3. Graham Steven, Shah Steve, Linux Administration – A beginner's guide, Third edition, Dreamtech press, 2003.

#### Web References:

1. <https://fisnikd.files.wordpress.com/2009/11/beginning-shell-scripting.pdf>
2. [https://www.tutorialspoint.com/unix/shell\\_scripting.htm](https://www.tutorialspoint.com/unix/shell_scripting.htm)

3. <https://www.geeksforgeeks.org/introduction-linux-shell-shell-scripting/>

Total Number of Topics Present in the course: 36

S.No	Category (local/regional/global)	No. of Topics covered	Percentage
1.	Local	01	2.78
2.	Regional	01	2.78
3.	National	03	8.33
4.	Global	31	86.1

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	22UIT6MBE3:2	LINUX & SHELL PROGRAMMING					4	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-VI

Course Code: 22UIT6MBE3:3  
Instruction Hours: 4  
Credits: 4

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

### MAJOR BASED ELECTIVE III 3. ANDROID PROGRAMMING

#### Objective:

- To provide concepts to enable the students for creating applications for smart devices using Android

#### Course Outcomes (COs):

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

- CO1: Understand the basic concepts of Android programming
- CO2: Install and configure Android application development tools.
- CO3: Design and develop user Interfaces for the Android platform.
- CO4: Save state information across important operating system events.
- CO5: 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 – 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(s):

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

#### Reference Book(s):

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

#### Web References:

1. <https://www.codewithharry.com/videos/android-tutorial-in-hindi-with-notes/>
2. <https://enos.itcollege.ee/~jpoial/allalaadimised/reading/Android-Programming-Cookbook.pdf>
3. <https://info448-s17.github.io/lecture-notes/introduction.html>

Total Number of Topics Present in the course: 29

S.No	Category (local/regional/global)	No. of Topics	Percentage
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		<b>covered</b>	
1.	Local	03	10.34
2.	Regional	02	06.89
3.	National	03	10.34
4.	Global	21	72.41

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	22UIT6MBE3:3	ANDROID PROGRAMMING					4	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											

2022

# M.Sc INFORMATION TECHNOLOGY

## Course Structure and Syllabus

(For the candidates admitted from the academic year 2022–2023 onwards)

## CHOICE BASED CREDIT SYSTEM (CBCS)



**HANTHAI 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):**

### Postgraduate Programmes

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

- ✓ Gain advanced knowledge resulting in entrepreneurship; innovation and newer opportunities for being employable in public and private sectors, research and development organizations.
- ✓ Apply enhanced new techniques and adopt new technologies needed in the respective disciplines.
- ✓ Appreciate the diversity of the behavior in professional practice and act in accordance with the core values of chosen profession.
- ✓ Demonstrate the knowledge, values and skills to be critical consumer of research practice and possess investigative skills to evaluate the practice.
- ✓ Engage in lifelong learning process, have the ability to communicate the findings of language / Commerce / Management Studies / Social Work / Computer Sciences / Physical Sciences / Biological Sciences / Life Sciences with the current knowledge.

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

- ✓ At the end of the programme, the student should be able to understand the concepts and applications in the field of Information Technology.
- ✓ Apply the learning from the courses and develop applications for real world problems.
- ✓ Understand the technological developments in the usage of modern design and development tools to analyze and design for a variety of applications.
- ✓ Competent and complete software professional to meet the requirement of corporate world and Industry standard to provide solutions to industry, society and business.
- ✓ A thorough and practical expert in the use of state of the art techniques for developing Software based systems.

M.Sc., INFORMATION TECHNOLOGY – Course Structure

Under CBCS (For the candidates admitted from the academic year 2022–2023 onwards)

Sem.	Name of the Course	Course Code	Title of the Course	Ins. Hours/ Weeks	Credits	Exam Hours	CIA (Max)	ESE (Max)	Total (Max)
I	Core Course–I	22PIT1CC1	OOAD and UML	6	5	3	25	75	100
	Core Course–II	22PIT1CC2	Database Management Systems	6	5	3	25	75	100
	Core Choice Course–I (Any One Choice)	22PIT1CCC1:1 22PIT1CCC1:2	Web Programming Advanced Data Structures	6	4	3	25	75	100
	Core Practical–I	22PIT1CP1	RDMBS Practical	3	2	3	40	60	100
	Core Choice Course Practical–I (Any One Choice)	22PIT1CCCP1:1 22PIT1CCCP1:2	Web Programming Practical Advanced Data Structures Practical	3	2	3	40	60	100
	Core Elective–I (Any One Choice)	22PIT1CE1:1 22PIT1CE1:2 22PIT1CE1:3	E–Commerce Mobile Computing Wireless Network	6	4	3	25	75	100
	VAC–I* (Any One Choice)	22PVAIT1:1 22PVAIT1:2	Manet Applications Angular JS	–	2*	3	–	–	100*
Total				30	22	–	–	–	600
II	Core Course–III	22PIT2CC3	Design and Analysis of Algorithms	6	5	3	25	75	100
	Core Course–IV	22PIT2CC4	Java Programming	5	5	3	25	75	100
	Core Choice Course–II (Any One Choice)	22PIT2CCC2:1 22PIT2CCC2:2	Distributed Technologies Data Mining and Tools	5	4	3	25	75	100
	Core Practical–II	22PIT2CP2	Java Programming Practical	3	2	3	40	60	100
	Core Choice Course Practical–II (Any One Choice)	22PIT2CCCP2:1 22PIT2CCCP2:2	Distributed Technologies Practical Data Mining and Tools Practical	3	2	3	40	60	100
	Core Elective–II (Any One Choice)	22PIT2CE2:1 22PIT2CE2:2 22PIT2CE2:3	Big Data Analytics Management Information Systems Embedded System	5	4	3	25	75	100
	Non–Major Elective–I (Any One Choice)	22PIT2NME1:1 22PIT2NME1:2	Fundamentals of Information Technology Business Analytics	3	2	3	25	75	100
	Extra Credit Course **	22PIT2INT	INTERNSHIP**	–	2**	–	–	–	–
Total				30	24	–	–	–	700
	Core Course–V	22PIT3CC5	Enterprise Resource Planning	6	5	3	25	75	100
	Core Course–VI	22PIT3CC6	Machine Learning	6	5	3	25	75	100

III	Core Choice Course–III (Any One Choice)	22PIT3CCC3:1 22PIT3CCC3:2	Open Source Technologies J2EE Technologies	6	4	3	25	75	100
	Core Practical–III	22PIT3CP3	Machine Learning practical	3	2	3	40	60	100
	Core Choice Course Practical–III (Any One Choice)	22PIT3CCCP3:1 22PIT3CCCP3:2	Open Source Technologies practical J2EE Technologies practical	3	2	3	40	60	100
	Core Elective–III (Any One Choice)	22PIT3CE3:1 22PIT3CE3:2 22PIT3CE3:3	Software Engineering Human Computer Interaction Software Project Management	6	4	3	25	75	100
	VAC–II *(Any One Choice)	22PVAIT2:1  22PVAIT2:2	Academic research and report writing  Content Management Tools	–	2*	-	-	-	100*
	Extra Credit Course ***	22PIT3OC	SWAYAM / NPTEL Online Course***	-	2***	-	-	-	-
Total				30	22	–	–	–	600
I V	Core Course–VII	22PIT4CC7	Internet of Things	6	5	3	25	75	100
	Core Course–VIII	22PIT4CC8	Cloud Computing	6	5	3	25	75	100
	Core / Industrial Based Core	22PIT2IBC	Digital Marketing	6	5	3	25	75	100
	Non–Major Elective–II (Any One Choice)	22PIT4NME2:1 22PIT4NME2:1	Security in Computing Social Media Analytics	3	2	3	25	75	100
	Project	22PIT4PW	Dissertation=100 Marks [2 reviews –20+20=40 marks Report Valuation = 40 marks] Viva = 20 Marks	9	5	3	80	20	100
	Total				30	22	–	–	–
Grand Total				120	90	–	–	–	2400

\*The VALUEADDED COURSES and Extracredit courses will not be included in the total CGPA.

\*\*The INTERNSHIP Course is extra-credit course in end of the Second Semester.

\*\*\*The Online SWAYAM/NPTEL Course are extra-credit course in end of Third Semester

#### **PROGRAM SPECIFIC OUTCOMES:**

After the successful completion of M.Sc. (Information Technology) programme, the Graduates will be able to :

- Understand how technical developments can be achieved.
- Enhance the development of critical thinking, code writing skills and configuring the technical tools.
- Prepares students for a wide variety of careers in IT related all industries with research bent of mind.
- Able to develop strong analytical skills, critical thinking and experimental skills.
- Understand how technological advances impact society and the social, legal, ethical and cultural ramifications of computer technology and their usage.

### LIST OF CORE CHOICE COURSES

<b>Core Choice Course I</b>		<b>Core Choice Course I Practical</b>	
1.	Web Programming	1.	Web Programming Lab
2.	Advanced Data Structures	2.	Advanced Data Structures Lab
<b>Core Choice Course II</b>		<b>Core Choice Course II Practical</b>	
1.	Distributed Technologies	1.	Distributed Technologies Lab
2.	Data Mining and Tools	2.	Data Mining and Tools Lab
<b>Core Choice Course III</b>		<b>Core Choice Course III Practical</b>	
1.	Open Source Technologies	1.	Open Source Technologies Lab
2.	J2EE Technologies	2.	J2EE Technologies Lab

### LIST OF ELECTIVE COURSES

<b>Core Elective I</b>	
1.	E- Commerce
2.	Mobile Computing
3.	Wireless Network
<b>Core Elective II</b>	
1.	Big Data Analytics
2.	Management Information System
3.	Embedded System
<b>Core Elective III</b>	
1.	Software Engineering
2.	Human Computer Interaction
3.	Software Project Management

### NON MAJOR ELECTIVE COURSES

Non Major Elective I	
1.	Fundamentals of Information Technology
2	Business Analytics
Non Major Elective II	
1	Security in Computing
2	Social Media Analytics

### VALUE ADDED COURSES

Value Added Course I 3
------------------------

1.	Manet Applications
2.	Angular JS
Value Added Course II	
1.	Academic research and report writing
2.	Content Management Tools

### SUMMARY OF CURRICULUM STRUCTURE OF PG PROGRAMMES

Sl. No.	Types of the Course	No. of Courses	No. of Credits	Marks
1.	Core Course	8	40	800
2.	Core Choice Courses	3	12	300
3.	Core Practical	6	12	600
4.	Elective Courses	3	12	300
5.	Entrepreneurship / Industry Based Course	1	5	100
6.	Project	1	5	100
7.	Non–Major Elective Courses	2	4	200
8.	Value Added Courses *	2*	4*	200*
9.	Internship**	1**	2**	-
10	SWAYAM / NPTEL Online Course	1***	2***	-
	Total	24	90	2400

1. Theory Internal: 25 marks, External: 75 marks
2. Practical Internal: 40 marks, External: 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)

Project:100 Marks

Dissertation:  
80Marks

Vivo Voce : 20 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: 22PIT1CC1  
Instruction Hours: 6  
Credits: 5

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

## CORE COURSE I – OOAD AND UML

### • Course Objective:

- To give a detailed knowledge on Structured approach to system construction, Various object oriented methodologies, Object oriented analysis, Object oriented design and UML examples.

### • Course Outcomes:

- CO1: Ability to analyze and model software specifications.
- CO2: Ability to abstract object-based views for generic software systems.
- CO3: Explain OOAD concepts and various UML diagrams
- CO4: Select an appropriate design pattern
- CO5: Illustrate about domain models and conceptual classes

### • Unit I

Structured approach to system construction: SSADM/SADT – An overview of object oriented systems development & Life cycle–Software– Development Process – Building High Quality Software –Dynamic binding – OOSD life cycle – Process Analysis – Design – prototyping – Implementation –Importance of modeling –Testing.

### • Unit II

Various object oriented methodologies – Introduction to UML – UML Diagram – Class diagram – Dynamic modeling – Analysis and design –Conceptual model of UML–Architecture– principles of modeling.

### • Unit III

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

### • Unit IV

Object oriented design – Design axioms – Designing classes – Layering the software design: –data access layer ,User interface layer,Control layer – business logic layer.

### • Unit V

UML Examples on: Behavioural models –UML Features –Structural models – Architectural models from realworld problems– UML and programming.

### Text Books:

1. Bahrami Ali, Object oriented systems development, Irwin McGrawHill, 2005 (First 4 units covered here).
2. Booch Grady, Rumbaugh James, Jacobson Ivar, The Unified modeling language – User Guide, Pearson education, 2006 (ISBN 81–7758–372–7) IT –5 covered here).

### Reference Books:

1. Grady Booch, “Object – Oriented Analysis and Design with Applications“, PearsonEducation, 9th Indian Reprint, 2002.
2. Tom Pender, “UML 2 Bible“, Wiley Publishing Inc., USA.
3. Hans–Erik Eriksson and Magnus Penker, “UML Toolkit“, Wiley Computer Publishing, New York.

Total Number of Topics Present in the course: 39

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	3	7.6
2.	National	16	41.0
3.	Regional	4	10.2
4.	Global	6	15.3

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			
I	22PIT1CC1	OOAD and UML					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 – I

Course Code: 22PIT1CC2  
Instruction Hours: 6  
Credits: 5

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

### **CORE COURSE II – DATABASE MANAGEMENT SYSTEMS**

- **Course Objective:**

- The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve – efficiently, and effectively – information from a DBMS.

- **Course Outcomes:**

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 advance SQL queries related to Transaction Processing & Locking using concept of Concurrency control.

### **UnitI**

Introduction: Database System Applications – Purpose of Database Systems – Views of Data – Database Languages – Data Storage and Querying – Database Users and Administrator – Structure of Relational Database – Keys – # Schema Diagrams # – Formal Relational Query Languages – Relational Algebra – The Tuple Relational Calculus – The Domain Relational Calculus.

## Unit II

Introduction to SQL: Overview of SQL – SQL Definition – Basic Structure of SQL Queries – Additional Basic Operations – Set Operations – # Null Values – Aggregate Functions # – Nested Sub-queries – Modification of the database – Intermediate SQL: Join Expression – Views Database Design: Entity-Relationship Model – Constraints – Entity Relationship Diagram.

## Unit III

Normalization: Purpose of Normalization – How Normalization Support Database Design – Data Redundancy and Update Anomalies – Functional Dependencies – First Normal Form – Second Normal Form – Third Normal Form. Advanced Normalization: More on Functional Dependencies – BCNF – 4NF – 5NF.

## Unit IV

Transaction: Transaction Concept – A simple Transaction Model – Storage Structure – Transaction Atomicity and Durability – Transaction Isolation – Serializability – Concurrency Control: Lock-Based Protocol – # Timestamp-Based Protocol – Validation-Based Protocol # – Recovery Systems: Failure Classification – Recovery and Atomicity.

## Unit V

Database-System Architectures: Centralized and Client-Server Architectures – Server System Architecture. Distributed Databases: Homogeneous and Heterogeneous Databases – Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control in Distributed Database – Data Warehousing and Mining: Decision Support Systems – Data Warehousing – Data Mining – Classification .

### Text Books:

1. Abraham Silberschatz, Hendry F. Korth and S. Sudarshan, Database System Concepts, 6<sup>th</sup> Edition, Mcgraw– Hill International Edition
2. Database Systems A Practical Approach to Design, Implementation, and Management, 4<sup>th</sup> Edition by Thomas M.Connolly, Carolyn E.Begg, Pearson Education, Fifth Impression, 2012.

### Reference Books:

- 1 .C.J. Date, A. Kannan and S.Swaminathan, An Introduction to Database Systems, 8<sup>th</sup> Edition, Pearson Education Asia.
2. Fundamentals of Database Systems, 5<sup>th</sup> Edition by Ramez Elmasri, Shamkant B.Navathe, Pearson Education Ltd.

**Web Reference:**

<https://www.db-book.com/db6/slide-dir/>

Total Number of Topics Present in the course: 64

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	6	9.3
2.	National	10	15.6
3.	Regional	10	15.6
4.	Global	38	59.3

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				
I	22PIT1CC2	DATABASE MANAGEMENT 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 (✓) = 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 – I

Course Code: 22PIT1CCC1:1  
Instruction Hours: 6  
Credits: 4

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

### CORE CHOICE COURSE I – **WEB PROGRAMMING**

#### COURSE OBJECTIVES:

To introduce the concepts of PHP, MySQL, HTML 5, CSS,

- To introduce the concepts JavaScript, jQuery and Angular.
- It provides concepts of creating dynamic web application using client and
- Server-side scripting languages

#### • **Course Outcomes:**

CO1: Understand the concepts of dynamic web design

CO2: Apply the concepts of data driven web design using PHP with MySQL

CO3: Analyze the usage of SQL language, JavaScript, jQuery, PHP and CSS for realtime applications

CO4: Design dynamic web application using server and client side

CO5: Create Web application using Angular framework

#### UNIT I

**INTRODUCTION TO CSS:** Importing style sheet – CSS Rules – Style Types – CSS Selectors – Fonts and Typography – Managing Text styles – color – positioning elements – Box model and Layout – Advanced CSS and CSS3: – Attribute Selectors – Box sizing Property – CSS3 Backgrounds – Borders – Multicolumn Layout – Text effects

#### UNIT II

**ACCESSING CSS FROM JAVASCRIPT:** Revisiting the getElementById function – Accessing CSS properties from JavaScript – Inline Javascript – Adding NEW elements – Using Interrupts – Introduction to jQuery: selectors – Handling events – Event functions and Properties – Special effects – Manipulating the DOM – Dynamically Applying classes – Modifying Dimensions – DOM Traversal – Using jQuery without selectors.

#### UNIT III

**INTRODUCTION TO DYNAMIC WEB CONTENT:** HTTP and HTML – The Request /Response Procedure – Benefits of PHP. My SQL, Javascript, CSS and HTML5 – Introduction to PHP – Expressions and Control Flow in PHP – PHP Functions and Objects – Arrays – File Handling

#### UNIT IV

**ACCESSING MYSQL USING PHP:** Form handling – Cookies, Sessions, and Authentication – Exploring JavaScript – Functions – Objects – Arrays – JavaScript and PHP validation and Error Handling: Validating User Input with JavaScript – Using Ajax

#### UNIT V

**LEARNING ANGULAR: Jumping into typescript – Angular components – Expressions – Data binding – Advanced Angular: Events and Change detection – Implementing Angular services in Web applications.**

**REFERENCES:**

1. Robin Nixon (2017). Learning PHP, MySQL & JavaScript with jQuery, CSS & HTML5, (4/e) with jQuery, Thomson Press (India) Ltd., Delhi.
2. Brad Dayley, Brendan Dayley, Caleb Dayley (2018), Node.js, MongoDB and Angular Web Development: The definitive guide to using the MEAN stack to build web applications (Developer's Library), (2/e), Pearson education
3. Ralph Moseley, M.T. Savaliya, (2013). Developing Web Applications, (2/e), Wiley India Pvt. Ltd., New Delhi.
4. Nicholas C. Zakas (2012). Professional JavaScript for Web Developers (3/e), Wiley India Pvt. Ltd., New Delhi
5. [https://www.tutorialspoint.com/php/php\\_and\\_mysql.htm](https://www.tutorialspoint.com/php/php_and_mysql.htm)
6. <https://www.w3schools.com/angular/default.asp>
7. <https://angular.io/start>
8. <https://www.greengeeks.in/tutorials/make-dynamic-website/>

Total Number of Topics Present in the course: 52

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	5	9.6
2.	National	9	17.3
3.	Regional	9	17.3
4.	Global	29	55.7

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				
I	22PIT1CCC1:1	Web Programming					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 (✓) = 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
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## SEMESTER – I

Course Code: 22PIT1CCC1:2  
Instruction Hours: 6  
Credits: 4

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

### CORE CHOICE COURSE I – **ADVANCED DATA STRUCTURES**

#### **COURSE**

#### **OBJECTIVE:**

- To provide the knowledge of advanced data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

- **Course Outcomes:**

CO1: Understand the implementation of symbol table using hashing techniques

CO2: Develop and analyse algorithms for red-black trees, B-trees and Splay trees

CO3: Develop algorithms for text processing applications

CO4: Students would be able to work on disjoint sets of data structures.

CO5: Identify suitable data structures and develop algorithms for computational problems

#### **UNIT I INTRODUCTION:**

Arrays – Singly Linked List – Circularly Linked List – Stack – Queues – List  
Abstract Data Type (ADT) – Iterators – Graphs and Sorting 1– Graphs: Graph ADT  
– Data Structures for Graphs – Graph Traversals – Directed Acyclic Graphs – Shortest  
Paths – Minimum Spanning Tree – Sorting: Merge Sort – Quick Sort – Selection Sort.

#### **UNIT II HASHING:**

General Idea, Hash Function, Separate Chaining– Hash Tables without linked lists:  
Linear Probing, Quadratic Probing– Double Hashing, Rehashing, Hash Tables in the  
Standard Library– Universal Hashing– Extendible Hashing.

#### **UNIT III PRIORITY QUEUES (HEAPS):**

Model, Simple implementations– Binary Heap: Structure Property– Heap Order  
Property, Basic Heap Operations: insert, delete– Percolate down, Other Heap  
Operations.

#### **UNIT IV TREES:**

AVL: Single Rotation, Double Rotation, B-Trees. Multi-way Search Trees– Trees:  
Searching for an Element in a Tree, Inserting a New Element in a Tree, Deleting an  
Element from a Tree. Red-Black Trees – Properties of red-black trees, Rotations,  
Insertion, Deletion.

#### **UNIT V GRAPHS ALGORITHMS:**

Elementary Graph Algorithms: Topological sort Single- Source Shortest Path Algorithms: Dijkstra's, Bellman-Ford All Pairs Shortest Paths: Floyd-Warshall's Algorithm.

## REFERENCES:

1. Mark Allen Weis, Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, 4th Edition, 2014, Pearson.
2. Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms, 3rd Edition, 2009, The MIT Press.
3. Ellis Horowitz, Satraj Sahani and Rajasekharam, Fundamentals of Computer Algorithms, 2nd Edition, 2009, University Press Pvt. Ltd.
4. Reema Thareja, S. Rama Sree, Advanced Data Structures, Oxford University Press, 2018.
5. <http://www.coursera.org/learn/advanced-data-structures>
6. <http://ocw.mit.edu/6-851S12> (MIT OPEN COURSEWARE, Massachusetts Institute of Technology)
7. <https://nptel.ac.in/courses/106/106/106106133/>
8. <https://www.mooc-list.com/search/node?keys=Advanced+Data+Structures>
9. <http://freevidelectures.com/Course/2279/Data-Structures-And-Algorithms>

Total Number of Topics Present in the course: 36

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	5	13.8
2.	National	18	50
3.	Regional	6	16.6
4.	Global	7	19.4

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			
I	22PIT1CCC1:2	Advanced Data Structures					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 (✓) = 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 – I

Course Code: 22PIT1CP1  
Instruction Hours: 3  
Credits: 2

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

### **CORE PRACTICAL I – RDBMS PRACTICAL**

- **Course Objectives:**

- To provide practical knowledge on designing and creating relational database systems.

- **Course Outcomes:**

- CO 1: Infer database language commands to create simple database
- CO 2: Analyze the database using queries to retrieve records
- CO 3: Applying PL/SQL for processing database
- CO 4: Analyze front end tools to design forms, reports and menus
- CO 5: Develop solutions using database concepts for real time requirements.

#### **I. Data Definition Languages**

1. Create the relations to perform the query operation.
2. Alter with three options  
Add – add columns in the existing table  
Modify – modify the data type and size in the existing table  
Drop – delete column from existing table

#### **II. Data Manipulation Languages**

1. Insert Operation
2. Rename Operation
3. String Operations
4. Set Operation – (union, Intersect, minus)
5. Aggregate functions – (average, minimum, maximum, total, and count)

#### **III. PL/SQL Procedure**

1. Student Mark Sheet Preparation
2. Pay Roll preparation
3. Find factorial number using recursive function.
4. Find Fibonacci series using recursive function.

#### **IV. SQL FORMS**

1. Student Mark System
2. Pay Roll Preparation
3. Income Tax Calculation

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	0	0
2.	National	1	25
3.	Regional	1	25
4.	Global	2	50

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	22PIT1CP1	RDBMS Practical					3	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 (✓) = 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 – I

Course Code: 22PIT1CCCP1:1  
Instruction Hours: 3  
Credits: 2

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

**CORE CHOICE COURSE PRACTICAL I – WEB PROGRAMMING PRACTICAL**

• **Course Objectives:**

- To provide practical knowledge on Web Programming concepts.

- **Course Outcomes:**

CO 1: Describe the architecture of client-side and server-side web applications

CO 2: Evaluate and validate web applications for conformance to the latest W3C markup standards.

CO 3: Identify the tools needed to create dynamic client-side and server-side web applications.

CO 4: Analyze and evaluate web applications for conformance to section 508 and W3C accessibility standards

CO 5: Develop solutions using database concepts for real time requirements.

1. Develop a Program to pass information between web pages using GET and POST methods.
2. Develop a Program string functions to manipulate strings.
3. Develop a Program to implement file operations.
4. Develop a Program to create menus, styles, Animation using CSS.
5. Develop a Program to validate the HTML form fields using Javascript.
6. Develop a Program to using jQuery and CSS.
7. Develop a Program to handle events and special effects using jQuery
8. Develop a Program to implement explode and implode functions
9. Develop a Program to create data base connectivity using PHP and MySQL
10. Using PHP, Create Admin Login ,Logout form using session variables.

Total Number of Topics Present in the course: 10

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	2	20
2.	National	1	10
3.	Regional	1	10
4.	Global	6	60

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	22PIT1CCCP1: 1	Web Programming Practical					3	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 (✓) = 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 – I

Course Code: 22PIT1CCCP1:2

Instruction Hours: 3

Credits: 2

Exam Hours:3

Internal Marks: 40

External Marks: 60

### **CORE CHOICE COURSE PRACTICAL I – ADVANCED DATA STRUCTURES PRACTICAL**

- **Course Objectives:**

- To provide practical knowledge on Data Structure concepts.

- **Course Outcomes:**

CO 1: Implement different sorting and searching algorithms

CO 2: Implement the stack, Queue and their

CO 3: Implement various types of linked lists and their applications.

CO 4: Perform basic operations on trees and graphs and determine minimum spanning tree.

CO 5: Develop solutions using Kruskals algorithm using a disjoint set data structure

1. Develop a program to perform the following operations on doubly linked list.  
i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways
2. Develop a program that implements stack and its operations using i) Arrays ii) linked list.
3. Develop a programs that implements Queue and its operations using i) Arrays ii) linked list.
4. Develop a program that implements the Quick sort method to sort a given list of integers in ascending order.
5. Develop a program that implement the Merge sort method to sort a given list of integers in ascending order.
6. Develop a program to perform the following: i) Creating a Binary Tree of integers ii) Traversing the above binary tree in preorder, inorder and postorder.
7. Develop a program to perform the following: i) Creating a AVL Tree of integers ii) Traversing the above binary tree in preorder, inorder and postorder.
8. Develop a program that uses functions to perform the following: i) Creating a SplayTree of integers ii) Traversing the above binary tree in preorder, inorder and postorder.
9. Develop program to perform the following: i) Creating a B–Tree of integers ii) Traversing the above binary tree in preorder, inorder and postorder.
10. Develop a program that implements Kruskals algorithm using a disjoint set data structure. The program takes as input a file (data.txt), in which each line either represents a vertex or an edge. For the edge lines, the first integer on that line representing the starting vertex, the second the ending vertex, and the third the weigh of the edge. Use this file to construct, line by line, the graph upon which Kruskal’s algorithm will be run (do NOT hardcode this graph!).

Total Number of Topics Present in the course:10

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	1	10
2.	National	2	20
3.	Regional	1	10
4.	Global	6	60

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	22PIT1CCCP1: 2	Advanced Data Structures Practical					3	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 (✓) = 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 – I

Course Code: 22PIT1CE1:1  
Instruction Hours: 6  
Credits: 4

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

### CORE ELECTIVE 1 (1) – E-COMMERCE

#### • Course Objective:

- This course provides an introduction to information systems for business and management.

#### • Course Outcomes:

- CO1: Analyze the impact of E-commerce on business models and strategy.
- CO2: Describe the major types of E-commerce.
- CO3: Explain the process that should be followed in building an E-commerce presence.
- CO4: Identify the key security threats in the E-commerce environment.
- CO5: Describe how procurement and supply chains relate to B2B E-commerce.

#### • Unit I

Electronic Commerce Framework – Traditional commerce Vs. E-Commerce– Electronic Commerce and Media Convergence – Features of Electronic Commerce –The Anatomy of E-Commerce Applications – Electronic Commerce Consumer Applications – Electronic Commerce Organization Applications. The Network Infrastructure for Electronic Commerce: Components of the High way – Network Access Equipment – Global information Distribution Networks – Produce a generic framework for E Commerce– Architectural framework of Electronic Commerce– Web based E Commerce Architecture– Business Models for E-commerce– Scope of E-commerce.

#### UNIT II

The Internet as a Network Infrastructure: The Internet Terminology - NSFNET Architecture and components – National Research and Education Network – Internet Governance – An overview of Internet Applications. The Business of Internet Commercialization: Telco/Cable/On-Line Companies – National Independent ISPs – Regional Level ISPs – Local –level ISPs – Internet Connectivity options.

#### UNIT III

Electronic Commerce and the World Wide Web: Architectural Framework for Electronic Commerce – World Wide Web as the Architecture – Technology behind the Web – Security and the Web–Consumer Oriented Electronic Commerce: Consumer Oriented Applications – mercantile process model – mercantile models from the consumer's perspective– Analyzes a business and designs – ECommerce plan to achieve targets.

#### UNIT IV

Electronic Payment Systems: Types of Electronic Payment Systems – Digital Token based Electronic Payment Systems– Dimensions of Electronic Payment System – Traditional Payment Systems vs Electronic Payment Systems – Electronic Payments and Protocols – Credit Card – Based Electronic Payment Systems–Risk and Electronic Payment Systems – Designing Electronic Payment Systems. Inter Organizational Commerce and EDI: Electronic Data Interchange – EDI Applications in Business – EDI: Legal, Security and Privacy issues – Managerial Issues in Electronic Payment Systems – Electronic Payment Systems in India –Future of Electronic Payment Systems.

## UNIT V

Advertising and the Marketing on the Internet: The New Age of Information Search and Retrieval – Electronic Commerce Catalogs – Information filtering – Consumer – Data Interface – Emerging Tools. On Demand Education and Digital Copyrights: Computer based Education – Training – Technological Components of Education on demand. Software Agents: Characteristics and Properties of Agents – The Technology behind Software Agents – Applets–Browsers and Software Agents.

### Text Book

#### Text Book:

1. “Frontiers of Electronic Commerce”, Ravikalakota & Andrew Whinston, AdisonWesley, 2000.

#### Reference Books:

1. “Electronic Commerce”, Pete Loshin & Paul A.Murphy, Second edition, JaicoPublishing House, 2000.
2. David Whiteley, "E-Commerce Strategy, Technologies and Applications", 1stEdition, Tata Mc-Graw-Hill, 2001.

#### Web Reference:

<https://forms.iimk.ac.in/libportal/ebook/EB8.pdf>

Total Number of Topics Present in the course: 60

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	4	6.66
2.	National	7	11.66
3.	Regional	7	11.66
4.	Global	42	70

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	22PIT1CE1:1	E-Commerce	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 (✓) = 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 – I

Course Code: 22PIT1CE1:2  
Instruction Hours: 6  
Credits: 4

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

### CORE ELECTIVE 1 (2) – **MOBILE COMPUTING**

#### • **Course Objective:**

- To make the student understand the concept of mobile computing paradigm, its novel applications and limitations

#### • **Course Outcomes:**

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 for mobile computing – Mobility and 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 and replication of Mobile Data – SMS architecture – GPRS – Mobile Computing through Telephony.

#### • **Unit III**

Mobile Application Development – Android– wifi –GPS – Camera – Movement – 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 – work flow –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 Books:**

1. Jochen Schiller, Mobile Communications, Second Edition, 2012.
2. William Stallings, "Wireless Communications & Networks", Pearson Education, 2009.

**Reference Books:**

1. C.Siva Ram Murthy, B.S. Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", 2nd Edition, Pearson Education. 2004
2. Ashok K Talukder, Roopa R Yavagal, "Mobile Computing", Tata McGraw Hill, 2005.

Web Reference: [https://www.researchgate.net/publication/350108815\\_Mobile\\_Computing\\_Full\\_Book](https://www.researchgate.net/publication/350108815_Mobile_Computing_Full_Book)

Total Number of Topics Present in the course: 60

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	5	8.3
2.	National	10	16.6
3.	Regional	9	15
4.	Global	36	60

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

[https://www.worldcat.org/Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:](https://www.worldcat.org/Relationship+Matrix+for+Course+Outcomes,+Programme+Outcomes+and+Programme+Specific+Outcomes)

Semester	Code	Title of the Course					Hours	Credits			
I	22PIT1CE1:2	Mobile Computing					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 (✓) = 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 – I

Course Code: 22PIT1CE1:3

Exam Hours: 3

Instruction Hours: 6

Internal Marks: 25

Credits: 4

External Marks: 75

### CORE ELECTIVE 1 (3) – WIRELESS NETWORKS

- Course Objective:

- Understand the fundamentals of wireless communications systems, the wireless network architectures, protocols, and applications.

- Course Outcomes:

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 – Hiper 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 UTMS Terrestrial Radio Access Network–UMTS Core Network Architecture: 3GMSC, 3GSGSN, 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.

**Text Books:**

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012 (Unit I, II, III)
2. Vijay Garg, "Wireless Communications And Networking", First Edition, Elsevier 2014 (Unit IV, V)

**Reference Books:**

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per 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, Elsevier 2011.
3. Simon Haykin, Michael Moher, David Koilpillai, Modern Wireless Communications", First Edition, Pearson Education 2013.
4. David G. Messerschmitt, "Understanding Networked Applications", Elsevier, 2010.

**Web Reference:**

.org/title/encyclopedia-of-wireless-networks/oclc/1156331432

Total Number of Topics Present in the course: 41

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	3	7.3
2.	National	22	53
3.	Regional	7	17
4.	Global	9	21.9

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			
I	22PIT1CE1:3	Wireless Network					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 (✓) = 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: 22PIT2CC3  
Instruction Hours: 6  
Credits: 5

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

### CORE COURSE VI – DESIGN AND ANALYSIS OF ALGORITHMS

#### • **Course Objective:**

- To provide students with solid foundations to deal with a wide variety of computational problems and to provide a thorough knowledge of the most common algorithms and data structures.

#### • **Course Outcomes:**

CO1: To apply knowledge of computing and mathematics to algorithm design.

CO2: To analyze a problem and identify the computing requirements appropriate for its solution.

CO3: To design, implement, and evaluate an algorithm to meet desired needs.

CO4: To apply mathematical foundations, algorithmic principles, and computer science theory to the modeling and design of computer-based systems.

CO5: An ability to use current techniques, skills, and tools necessary for computing practice.

#### • **Unit I**

Introduction: Algorithm Definition – Algorithm Specification – Performance Analysis–Asymptotic Notations. Elementary Data Structures: Stacks and 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 – A Worst Case Optimal Algorithm – Implementation of Selection– Heap Sort – Multiplication of Large Integers – Closest–Pair and Convex –Hull Problems – Travelling salesman problem – 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 – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: Least Cost searched – 0/1 Knapsack Problem.

**Text Books:**

1. Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.

**Reference Books:**

1. “Data Structures Using C”, Langsam, Augenstein, Tenenbaum, PHI.
2. “Introduction to design and Analysis of Algorithms”, S.E.Goodman, ST.Hedetniem, TMH.

**Web Reference:**

[https://mrcet.com/downloads/digital\\_notes/IT/Design%20and%20Analysis%20Algorithms.pdf](https://mrcet.com/downloads/digital_notes/IT/Design%20and%20Analysis%20Algorithms.pdf)

Total Number of Topics Present in the course: 53

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	2	7.5
2.	National	4	7.5
3.	Regional	5	9.4
4.	Global	41	77.3

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			
II	22PIT2CC3	Design and Analysis of Algorithms					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: 22PIT2CC4  
Instruction Hours: 5  
Credits: 5

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

### CORE COURSE V – JAVA PROGRAMMING

#### • **Course Objective:**

- This course develops programming ability of students to create dynamic web applications using server side technology with Java Database Connectivity.

#### • **Course Outcomes:**

CO1: Knowledge of the structure and model of the Java programming language, (knowledge)  
CO2: Use the Java programming language for various programming technologies (understanding)  
CO3: Develop software in the Java programming language, (application)  
CO4: Evaluate user requirements for software functionality required to decide whether the Java  
CO5: programming language can meet user requirements (analysis)

#### • **Unit – I**

Introducing Classes: Class Fundamentals – Declaring Objects – Introducing Methods – Constructors – The `this` keyword – Garbage Collection – Overloading Methods – Call by value, Call by reference – Recursion – Understanding static – final. Inheritance: Inheritance Basics – Using `super` – Method overriding – #Dynamic Method Dispatch #– Using Abstract Classes.

#### • **Unit – II**

Packages and Interfaces: Declaring Packages – Access Protection – Importing Packages – Defining, Implementing, Applying Interfaces – Exception Handling: Exception Types – `try catch` – `throw` – `throws` – `finally` – Creating User defined Exceptions. Multithreaded Programming: The Java Thread Model – Creating a Thread – Thread Priorities – String Handling.

#### • **Unit – III**

The Collection Interfaces and Utility Classes: ArrayList LinkedList Vector Stack StringTokenizer and Date classes Files and IO Streams: File – The Byte Streams: `DataInputStream` – `DataOutputStream` – `FileInputStream` – `FileOutputStream` – `SequenceInputStream` – `PrintStream`. #The Character Streams: `FileReader` – `FileWriter` #– Serialization.

#### • **Unit – IV**

Networking: Introduction–Networks Domain Names and Protocols – Ports–Transmission Control Protocol–UDP Approach. Java Database Connectivity: Establishing a connection – # Creation of data tables – Entering data into table– Table Updating # – Use of `PreparedStatement` – Obtaining metadata.

#### • **Unit – V**

Event Handling: Event Model – Event Classes – Event Listeners and Interfaces. Swing Component classes: Icons and `JLabels` – `JText` Fields – `JButtons` – `JCheckBoxes` – `JRadioButtons`– `JComboBoxes`.

**Text Books:**

1. Herbert Schildt, The Complete Reference Java 2, Fifth Edition, TMH Education Pvt. Ltd.
2. C. Muthu, Programming with Java, Vijay Nicole imprints private Limited, 2004.

**Reference Book:**

1. Herbert Schildt with Joe O' Neil, Java –Programmer's Reference, TMH.

**Web Reference:**

<https://www.programiz.com/java-programming>

Total Number of Topics Present in the course: 50

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	6	12
2.	National	9	18
3.	Regional	8	16
4.	Global	27	54

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	22PIT2CC4	Java 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	✓	✓					✓	✓	✓		
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: 22PIT2CCC2:1  
Instruction Hours: 5  
Credits: 4

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

### CORE COURSE-I – **DISTRIBUTED TECHNOLOGIES**

- **Course Objective:**

- To introduce the technologies behind the distributed computing environment and to provide the programming expertise to develop applications for distributed environment.

- **Course Outcomes:**

- CO1: Recognize the architecture of various distributed technologies
- CO2: Understand the software components of distributed programming
- CO3: Understand the ASP .NET environment and how to develop small programs
- CO4: Understand ADO .NET and develop database applications
- CO5: Performing Database operations for Windows Form and web applications.

- **Unit I**

Introduction to distributed Computing – Challenges involved in establishing remote connection – Strategies involved in remote computation – Current Distributed computing practices through Dot Net and Java technologies– Distributed Vs Parallel technology

- **Unit II**

Advanced ADO.NET – Disconnected Data Access – Gridview, Details View, Form View controls – Crystal Reports – Role of ADO.NET in Distributed Applications– ADO.NET provider for SQL server.

- **Unit III**

ASP.NET :Introduction – architecture – ASP.NET Runtime – Advanced ASP.NET – AdRotator, Multiview, Wizard and Image Map Controls– Using Validation Controls – Rich Controls –Master Pages –Site Navigation – Web Parts – Uses of these controls and features in Website development–. Calendar controls – ASP.NET Parser

- **Unit IV**

Advanced features of ASP.NET – Security in ASP.NET – State Management in ASP.NET – Mobile Application development in ASP.NET – Validation Controls – Security Management – Critical usage of these features in Website development

- **Unit V**

Web services in Distributed Computing – Role of Web services in Distributed Computing – WSDL, UDDI, SOAP concepts involved in Web Services – Connected a Web Service to a Data Base – Accessing a Web Service through in ASP.NET application – SQL Connection Management.

**Text Book:**

1. Walther, "ASP.NET 3.5", SAMS Publication, 2005.

**Reference Books:**

1. “ASP. NET Black Book”, Dream Tech.
2. Dave Mercer, “ASP.NET: A Beginner’s Guide”, Tata Mcgraw Hill Publishing Company Limited, New Delhi.
3. Dino Esposito, “Introducing Microsoft ASP.NET 2.0”, Prentice Hall of India Private Limited.
4. Rebecca M. Riorden, “Microsoft ADO.NET Step by Step”, Prentice Hall of India Private Limited.

**Web Reference:**

<https://www.sigc.edu/sigc/qb-18/cs/I%20M.Sc%20CS-%20Distributed%20Technologies.pdf>

Total Number of Topics Present in the course: 37

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	2	5.4
2.	National	7	18.9
3.	Regional	6	16.2
4.	Global	22	59.4

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			
II	22PIT2CCC2:1	Distributed Technologies					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 (✓) = 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: 22PIT2CCC2:2  
Instruction Hours: 5  
Credits: 4

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

### **CORE COURSE-I – DATA MINING AND TOOLS**

#### **COURSE OBJECTIVES:**

- Introduce the basic concepts of data mining and various data mining techniques like classification, clustering, and association rule mining.
- Acquire the knowledge about various applications of data mining such as Text mining, Web mining, Multimedia mining, Image mining, Spatial mining
- To gain the concept of data visualization

#### **Course Outcomes:**

CO1: Understand basic concepts of data mining like classifications, clustering, association rule mining, prediction and related algorithms  
CO2: Apply data mining techniques to carry out simple data mining tasks  
CO3: Analyze data using data visualization with Tableau  
CO4: Design different data mining models for real world problems  
CO5: Develop predictive models using advanced Data Mining Techniques

#### **UNIT I INTRODUCTION TO DATA MINING:**

Mining from database – Data mining functionalities – Mining patterns – Classification of data mining systems – Major issues in Data mining.

#### **UNIT II DATA PREPROCESSING:**

Need for preprocessing – Data summarization – Data cleaning – Data integration – Data transformation – Data reduction – Data discretization. Association Rule Mining: Apriori algorithm.

#### **UNIT III CLASSIFICATION:**

Decision trees – Naïve Bayes – K Nearest Neighbour – Support Vector Machine – Neural Networks – Deep Neural Networks – Evaluation of classification algorithms. Prediction – Regression, Evaluation of Prediction methods.

#### **UNIT IV CLUSTERING:**

Cluster Analysis – Partitioning Methods: K-Means, K-Medoids – Hierarchical Methods – BIRCH, ROCK – Density based methods: DBSCAN, OPTICS – Evaluation of clustering algorithms. Data Visualization: Foundations for building visualizations – Visualizing data – Working with Data in Tableau – Moving from Foundational to Advanced Visualizations.

#### **UNIT V ADVANCED DATA MINING TECHNIQUES:**

Mining Data Streams – Mining Time Series Data – Mining Sequence Patterns in Biological Data – Graph Mining – Social Network Analysis – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web – Data Mining Applications and Tools.

**REFERENCES:**

1. Jaiwei Han, Micheline Kamber (2006). Data Mining–concepts and techniques, 2/e, Morgan Kaufmann Publishers, San Francisco.
2. Joshua N.Milligan (2015). Learning Tableau, PACKT publishing
3. Mark A. Hall, Ian H. Witten, Eibe Frank (2011),Data Mining: Practical Machine Learning Tools and Techniques, 4/e, Morgan Kaufmann Publishers, San Francisco .
4. David Hand, HeikkiMannila and Padhraic Smyth (2001). Principles of Data Mining, Prentice Hall of India, New Delhi
5. Arun K. Pujari (2001). Data Mining Techniques; Universities Press, Hyderabad
6. Soman KP (2005). Data mining from theory to practice, 2/e, PHI Learning Pvt. Ltd., New Delhi
7. <https://www.javatpoint.com/data-mining-techniques>
8. <https://www.tutorialride.com/data-mining/data-mining-tutorial.htm>
9. <https://www.javatpoint.com/classification-algorithm-in-machine-learning>
10. <https://developers.google.com/machine-learning/clustering>

Total Number of Topics Present in the course: 38

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	4	10.5
2.	National	6	18.4
3.	Regional	7	15.8
4.	Global	21	55.3

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			
I	22PIT2CCC2:2	Data Mining and Tools					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 (✓) = 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: 22PIT2CP2  
Instruction Hours: 3  
Credits: 2

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

### **CORE PRACTICAL II – JAVA PROGRAMMING PRACTICAL**

#### • **Course Objective:**

- Develop error-free, well-documented Java programs; develop and test Javainetwork, search engine, and web framework programs.

#### • **Course Outcomes:**

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. To create class and object to prepare student report.
2. To implement inheritance to find area & perimeter of a rectangle.
3. To create abstract class Department with abstract method calcBonus(double salary) and normal method dispTotSalary(string dept). Define classes Accounts and Sales which extends Department and contains calcBonus() with its own implementation.
4. To implement multilevel inheritance by applying various access controls to its data members and methods.
5. To create two threads. First thread displays a message for every one second, the second thread displays a message for every two seconds.
6. To create thread using Runnable interface to compute and display factorials of first five natural numbers.
7. To arrange the given names in alphabetical order and to display the all the names in reverse order.
8. To demonstrate various Vector operations.
9. To print the contents of ArrayList in reverse order.
10. To display the file properties of a given file or directory.

11. To merge the two files using `SequenceInputStream`.
12. To find the local machine and Host IP address.
13. To send a text from one system to another using `TCP/IP Sockets`.
14. To prepare invoice using swing controls and to store the details in database using `JDBC`.
15. Program using Swing controls to create three buttons Red, Green and Blue. Using Action Event class set background by applying color on button click.

Total Number of Topics Present in the course: 15

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	2	13.3
2.	National	2	13.3
3.	Regional	2	13.3
4.	Global	9	60

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	22PIT2CP2	JAVA PROGRAMMING Practical					3	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											

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: 22PIT2CCCP2:1  
Instruction Hours: 3  
Credits: 2

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

### CORE CHOICE COURSE PRACTICALS II(1) – **DISTRIBUTED TECHNOLOGIES PRACTICAL**

#### • **Course Objective:**

- To learn the practical knowledge of using distributed application development packages.

#### • **Course Outcomes:**

CO1: Understand the ASP .NET environment and how to develop small programs

CO2: Develop menu based program for text manipulation

CO3: Understand ADO .NET and develop database applications

CO4: Develop the applications using Data Grid for displaying records

CO5: Develop applications for distributed environments.

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

Total Number of Topics Present in the course: 12

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	1	8.3
2.	National	1	8.3
3.	Regional	4	33.3
4.	Global	6	50

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

Semester	Code	Title of the Course					Hours	Credits			
II	22PIT2CCCP2: 1	Distributed Technologies Practical					3	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											

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: 22PIT2CCCP2:2  
Instruction Hours: 3  
Credits: 2

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

### CORE CHOICE COURSE PRACTICALS II (2)– **DATA MINING AND TOOLS PRACTICAL**

#### Course Objective:

- Implement the following Data mining techniques in C/C++.

#### Course Outcomes:

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

CO3: Identify what kinds of technologies are used for different application.

CO4: Manipulate data preprocessing, data Warehouse and OLAP technology, data cube technology; mining frequent patterns and association, classification, clustering, and outlier detection.

CO5: Develop tools for Data Mining.

1. Preprocessing Activities
2. Exercise on Filters
3. Feature Selection
4. Apriori algorithm
5. Bayes classification.
6. Nearest Neighbor classification
7. k-means clustering technique.
8. Exercise on Association Rule Mining
9. Exercise on Knowledge Flow
10. Exercise on Text Mining

Total Number of Topics Present in the course: 10

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	1	10
2.	National	2	20
3.	Regional	2	20
4.	Global	5	50

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

Semester	Code	Title of the Course					Hours	Credits			
II	22PIT2CCCP2: 2	DATA MINING AND TOOLS PRACTICAL					3	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											

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: 22PIT2CE2:1  
Instruction Hours: 5  
Credits:4

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

### ELECTIVE COURSE 3 (1) – **BIG DATA ANALYTICS**

- **Course objective:**

- To study the basic technologies that forms the foundations of Big Data.

- **Course Outcomes:**

- CO1: Identify big data and its business implications.
- CO2: List the components of hadoop and hadoop eco-system.
- CO3: Access and process data on distributed file system.
- CO4: Manage job execution in hadoop environment.
- CO5: Develop big data solutions using hadoop eco system.

- **Unit I**

Introduction to big data: Data– Characteristics of data and Types of digital data: Unstructured– Semi structured and Structured– Sources of data–Working with unstructured data–Evolution and Definition of big data– Characteristics and Need of big data–Challenges of big data– Data environment versus big data environment

- **Unit II**

Big data analytics: Overview of business intelligence– Data science and Analytics–Meaning and Characteristics of big data analytics–Need of big data analytics– Classification of analytics– Challenges to big data analytics– Importance of big data analytics–Basic terminologies in big data environment – Data Analytics Life Cycle.

- **Unit III**

Big data technologies and Databases: Introduction to NoSQL–Uses and Features and Types–Need– Advantages– Disadvantages and Application of NoSQL– Overview of NewSQL–Comparing SQL– NoSQL and NewSQL– Introduction to MongoDB and its needs– Characteristics of MongoDB– Introduction of apache cassandra and its needs– Characteristics of Cassandra

- **Unit IV**

- Hadoop foundation for analytics: History– Needs– Features –Key advantage and Versions of Hadoop– Essential of Hadoop ecosystems– RDBMS versus Hadoop– Key aspects and Components of Hadoop– Hadoop architectures – Working with Distributed Computation.
- –Advanced Concepts of Programming

### Unit V

HadoopMapReduce and YARN framework: Introduction to MapReduce– Processing data with Hadoop using MapReduce–Introduction to YARN– Components– Need and Challenges of YARN– Dissecting YARN–MapReduce application– Data serialization and Working with common serialization formats– Big data serialization formats–**Testing and Version Control**

**Text Book:**

1. Seema Acharya and Subhashini Chellappan, “Big Data and Analytics”, Wiley India Pvt. Ltd., 2016

**Reference Books:**

1. “Big Data” by Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, Wiley Publications, 2014.
2. “Big Data Imperatives : Enterprise Big Data Warehouse, BI Implementations and Analytics” by Soumendra Mohanty, Madhu Jagadeesh and Harsha Srivatsa, Apress Media, Springer Science + Business Media New York, 2013
3. “Mining of Massive Datasets”, Anand Rajaraman, Jure Leskovec, Jeffery D. Ullman, Springer, July 2013.
4. “Hadoop: The definitive Guide”, Tom White, O'Reilly Media, 2010.

**Web reference:**

<https://www.pdfdrive.com/big-data-books.html>

Total Number of Topics Present in the course: 50

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	4	8
2.	National	4	8
3.	Regional	5	10
4.	Global	37	74

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	22PIT2CE2:1	Big Data Analytics					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 (✓) = 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: 22PIT2CE2:2  
Instruction Hours: 5  
Credits: 4

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

### **ELECTIVE COURSE 2 (2) – MANAGEMENT INFORMATION SYSTEMS**

#### **• Course Objective:**

- To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.

#### **• Course Outcomes:**

- CO1: Evaluate the role of information systems in today's competitive business environment.
- CO2: Define an information system from both a technical and business perspective and distinguish between computer literacy and information systems literacy.
- CO3: Assess the relationship between the digital firm, electronic commerce, electronic business and internet technology.
- CO4: Identify the major management challenges to building and using information systems in organizations and identify managerial risks related to information system organization processing and utilizing.
- CO5: To inculcate the principles and use of computer based information systems for Management of Businesses and Organizations.

#### **• Unit I**

Introduction to Information Systems: Why study Information System? – Why Business need Information Technology? – Fundamentals of Information Systems – Overview of Information Systems – Business Applications Programming

#### **• Unit II**

Solving Business Problems with Information Systems: System Approach to Problem Solving – Developing Information System Solution. Database Management: Managing Data Resources – Technical Foundation of Database Management – Information Systems Design

#### **• Unit III**

- **Information Systems for Strategic Advantage: Fundamentals – Strategic Advantage – Strategic Applications and Issues in IT – Managing: Enterprise and Global Management**

#### **• Unit IV**

Business Applications of Information Technology: The Internet Electronic Commerce – Fundamentals of Electronic Commerce – Information System for Business Operations – Business Information System – Transaction Processing Systems – Sales and Marketing Systems – Manufacturing and Production Systems – Finance and Accounting Systems – Human Resources Systems

#### **• Unit V**

Information Systems for Managerial Decision Support: Executive Support System – Decision Support

Systems – Artificial Intelligence Technology in Business – Management IT – Planning for Business Change with IT – Implementing Business Changes with IT – Security and Control Issues in I/S – Ethical and Societal Challenge of Information Technology.

– Implementing Business Changes with IT – Security and Control Issues in I/S – Ethical and Societal Challenge of Information Technology.

**Text Book:**

1. James A. O’Brien, “Management Information Systems”, Galgotia Publications, Fourth Edition, 1999.

**Reference Books:**

1. Gordon B. Davis, Margrethe H. Olson, “Management Information Systems”, McGraw Hill, 2000.
2. Ravi Kalakota and Marcia Robinson, “E-Business Roadmap for Success”, Addison-Wesley, New Delhi, 2000.
3. W.S. Jaswadekar, “Management Information Systems”, Tata McGraw Hill, New Delhi, 1998.

**Web Reference:**

<https://www.phindia.com/Books/ShoweBooks/ODE/Management-Information-Systems>

Total Number of Topics Present in the course: 30

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	2	6.6
2.	National	2	6.6
3.	Regional	4	13.3
4.	Global	22	73.3

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				
II	22PIT2CE2:2	Management Information Systems					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 (✓) = 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: 22PIT2CE2:3  
Instruction Hours: 5  
Credits: 4

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

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

#### • **Course Objective:**

- This course emphasizes on comprehensive treatment of embedded hardware and real time operating systems along with case studies, in tune with the requirements of Industry.

#### • **Course Outcomes:**

- 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

#### • **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, and Watchdog timer – PCB and Passive Components

#### • **Unit III**

Embedded Systems – Washing machine: Application-specific – Automotive: Domain specific. Hardware Software CoDesign – 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 Synchronisation – 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:**

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

**Reference Books:**

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

**Web Reference:**

[https://drive.google.com/file/d/1wrcikHVJSg\\_9jraHqhLEKiqWw\\_z1eCYw/view](https://drive.google.com/file/d/1wrcikHVJSg_9jraHqhLEKiqWw_z1eCYw/view)

Total Number of Topics Present in the course: 40

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	5	12.5
2.	National	7	17.5
3.	Regional	16	42
4.	Global	12	30

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	22PIT2CE2:3	Embedded System					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 (✓) = 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: 22PIT2NME1:1  
Instruction Hours: 3  
Credits: 2

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

### NON-MAJOR ELECTIVE-I (1) – **FUNDAMENTALS OF INFORMATION TECHNOLOGY**

#### **COURSE OBJECTIVES:**

- To understand the revolution in computers and communications
- To know about various application software
- To understand the information systems and software development

#### **Course Outcomes:**

CO1: To know the latest trends in information technology  
CO2: To understand the fundamentals of computers  
CO3: To gain knowledge about networks  
CO4: To acquire knowledge about different software  
CO5: To understand Internet basics

#### **UNIT I INFORMATION TECHNOLOGY:**

Introduction – Information systems – Definition of computer and system – Software and Data – IT in business and Industry – IT in the Home and at Play – IT in Education and Training – IT in Entertainment and the Arts – IT in Science, Engineering, and Mathematics – Global Positioning System.

#### **UNIT II INTRODUCTION TO COMPUTERS:**

History of computers– Types of computers, Characteristics of computers– Basic Anatomy of a computer, Applications of computer – Memory – Memory types.

#### **UNIT III SOFTWARE:**

Kinds of Software – The five types of Applications software – Word processing – Spreadsheets – Database software, Presentation graphics software – Communications software System Software – Operating system – functions

#### **UNIT IV COMPUTER NETWORKS:**

Introduction – Definition Computer Networks – Types of Networks – Local Area Network – Metropolitan Area Network – Wide Area Network – Personal Area Network – internet – Intranet – firewalls – Network Topology – Bus – Ring – Hybrid – Star

#### **UNIT V BASIC INTERNET CONCEPTS:**

Analog and Digital Signals – modems and communication Software, ISDN lines, and Cable Modems – Definition of Internet – The World Wide Web – Connecting to the Internet – Browsing the web – Web browser – Uniform Resource Locator (URL) – E mail communication.

#### **REFERENCES:**

1. Dennis P.Curtin, Kim dolwy, KunL Awn, Xrhleen morin, Information Technology, the breaking wave, TMH 2000.
2. Stacey C Sawyer, Brain K Williams, Sarah E Hutchinson Using Information Technology –Brief Version

3. A Practical Introduction to Computer and Communications Third Edition, McGraw Hill Companies 2011
4. James O'Brien – Introduction to Information systems. 16th edition, 2005.
5. The Internet Book: Everything You Need to Know About Computer Networking and How the Internet Works, Douglas E. Comer, Pearson, 2000
6. <https://www.javatpoint.com/internet>
7. <http://www.steves-internet-guide.com/networking/>

Total Number of Topics Present in the course: 47

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	4	8.5
2.	National	17	36.1
3.	Regional	7	14.8
4.	Global	19	40.4

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				
II	22PIT2NME1:1	Fundamentals of Information Technology					3	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 (✓) = 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: 22PIT2NME1:2  
Instruction Hours: 3  
Credits: 2

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

### NON-MAJOR ELECTIVE-I (2) – **BUSINESS ANALYTICS**

#### **COURSE OBJECTIVES:**

- To understand the revolution in business communications
- To know about various business information.

#### **Course Outcomes:**

CO1: Understand various domain areas and their challenges  
CO2: Understand data analytics in various domain areas  
CO3: Apply the concepts of analytics to make better decisions  
CO4: Analyse the challenging areas in all domains  
CO5: Assess the data analytics technique suitable for use cases in various functional areas

#### **UNIT I INFORMATION TECHNOLOGY:**

Introduction – Information systems – Definition of computer and system – Software and Data – IT in business and Industry – IT in the Home and at Play – It in Education and Training – IT in Entertainment and the Arts – IT in Science, Engineering, and Mathematics – Global Positioning System.

#### **UNIT II INTRODUCTION TO COMPUTERS:**

History of computers, Types of computers – Characteristics of computers – Basic Anatomy of a computer, Applications of computer – Memory – Memory types.

#### **UNIT III SOFTWARE:**

Kinds of Software – The five types of Applications software – Word processing – Spreadsheets – Database software, Presentation graphics software – Communications software System Software – Operating system – functions

#### **UNIT IV COMPUTER NETWORKS:**

Introduction – Definition Computer Networks – Types of Networks – Local Area Network – Metropolitan Area Network – Wide Area Network – Personal Area Network – internet – Intranet – firewalls – Network Topology – Bus – Ring – Hybrid – Star

#### **UNIT V BASIC INTERNET CONCEPTS:**

Analog and Digital Signals – modems and communication Software, ISDN lines, and Cable Modems – Definition of Internet – The World Wide Web – Connecting to the Internet – Browsing the web – Web browser – Uniform Resource Locator (URL) – E mail communication.

#### **REFERENCES:**

1. Dennis P.Curtin, Kim dolwy, KunL AWN, Xrhleen morin, Information Technology, the breaking wave, TMH 2000.
2. Stacey C Sawyer, Brain K Williams, Sarah E Hutchinson Using Information

Technology –Brief Version

3. A Practical Introduction to Computer and Communications Third Edition, McGraw Hill Companies 2011
4. James O’Brien – Introduction to Information systems. 16th edition, 2005.
5. The Internet Book: Everything You Need to Know About ComputerNetworking and How the Internet Works, Douglas E. Comer, Pearson, 2000
6. <https://www.javatpoint.com/internet>
7. <http://www.steves-internet-guide.com/networking/>

Total Number of Topics Present in the course: 47

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	3	6.3
2.	National	7	14.8
3.	Regional	5	10.6
4.	Global	32	68

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	22PIT2NME1:2	Business Analytics					3	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 (✓) = 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

Course Code: 22PIT3CC5  
Instruction Hours: 6  
Credits: 5

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

## CORE COURSE V – ENTERPRISE RESOURCE PLANNING

### • **Course Objective:**

- In this course students shall learn various components of an application software that help computerize functioning of an enterprise such as sales, materials, production, financial, customer relationship AND supply chain modules.

### • **Course Outcomes:**

- CO1: Identify the important business functions provided by typical business software such as enterprise resource planning and customer relationship management.
- CO2: Describe basic concepts of ERP systems for manufacturing or service companies.
- CO3: Analyze the technical aspect of telecommunication systems, internet and their roles in business environment.
- CO4: Develop skills necessary for building and managing relationships with customers, and stakeholders.
- CO5: Students will also be able to develop and design the modules used in ERP systems.

### • **Unit I**

A Foundation for Understanding Enterprise Resource Planning systems – Reengineering and Enterprise Resource Planning Systems – Planning, Design and Implementation of Enterprise Resource Planning Systems – ERP Systems: Sales and Marketing – ERP Systems: Accounting and finance ERP Systems: Production and Materials Management ERP Systems: Human Resources.

### • **Unit II**

Managing an ERP Project – Supply chain Management and the marketplace – Rules of the game – Winning as a team.

### • **Unit III**

Solutions Supply chains as Systems – Modeling the Supply Chain – Supply Chain Software – Operations – Meeting Demand – Maintaining Supply – Measuring Performance.

### • **Unit IV**

Planning Forecasting Demand – Scheduling Supply – Improving performance – Mastering Demand – Designing the Chain – Maximizing Performance.

### • **Unit V**

Essentials of Customer relationship management – Designing CRM application – Various modules of CRM application – Advantages of CRM.

Text books:

1. Sumner Mary, Enterprise Resource Planning, First edition, Pearson education, 2006 (ISBN 81-317-0240-5) (Unit 1: Chapters 1 to 7; Unit 2: Chapters 8, 9 (continued on text book number TWO))
2. Taylor David A., Supply Chains (A managers guide), Pearson education, 2004 (ISBN 81-297-0334-3) (Unit 2: Chapters 1, 2, 3; Unit 3: Chapters 4, 5, 6, 7, 8, 9; Unit 4: Chapters 10, 11, 12, 13)
3. Tiwana, Essential guide to knowledge management : The e-business and CRM applications, Pearson education (ISBN 81-780-8326-4) (Unit 5).

Reference book:

1. Leon, ENTERPRISE RESOURCE PLANNING, Tata Mc Graw Hill, 2013
2. ALTEKAR Rahul V., Enterprise wide resource planning (Theory and practice), Prentice Hall of India, 2005 (ISBN 81-203-2633-4)

Web Reference:

[https://mrcet.com/downloads/digital\\_notes/CSE/III%20Year/ERP%20Digital%20notes.pdf](https://mrcet.com/downloads/digital_notes/CSE/III%20Year/ERP%20Digital%20notes.pdf)

Total Number of Topics Present in the course: 25

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	3	12
2.	National	5	20
3.	Regional	9	36
4.	Global	8	32

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	22PIT3CC5	Enterprise Resource Planning					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 – III

Course Code: 22PIT3CC6  
Instruction Hours: 6  
Credits: 5

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

### CORE COURSE VI – MACHINE LEARNING

#### • *Course Objective:*

- To be able to formulate machine learning problems corresponding to different applications.

#### • *Course Outcomes:*

CO1: To Learn about Machine Intelligence and Machine Learning applications

CO2: Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.

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 un-supervised learning.

CO5: Be able to design and implement various machine learning algorithms in a range of real-world applications

#### • *Unit I*

Introduction: Machine learning process – intelligent machines– well posed machine learning problems – examples of applications in diverse fields – data representation – domain knowledge for productive use of machine learning – diversity of data – structured / unstructured data – forms of learning – direct learning – undirected learning – reinforcement learning.

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#### • *Unit II*

Rationale and basics: Learning from observations – Computational learning theory – Heuristic search in Inductive Learning – Search through Hypothesis Space – Ensemble Learning – Evaluation of a Learning System – Estimating Generalization Errors – Holdout Method and Random Subsampling – Cross-validation – Bootstrapping – Misclassification Error – Confusion Matrix.

#### • *Unit III*

Statistical Learning: Machine learning and Inferential Statistical Analysis – Descriptive Statistics in Learning Techniques – Probability Distributions – Descriptive Measures of Probability Distributions – Descriptive Measures from Data Sample – Normal Distributions – Data Similarity – Bayesian Reasoning – Bayes Theorem – Naïve Bayes Classifier – Bayesian Belief Networks – KNN Classifier– Learning with Support Vector Machines: Linear Discriminant Functions for Binary Classification– Variants of Basic SVM Techniques.

- **Unit IV**

Learning with Neural Networks: Cognitive Machine – From Perceptions to deep Networks – Neuron Models – Biological Neuron – Artificial Neuron – Mathematical Model – Network Architectures – Feed forward Networks – Recurrent Networks– Decision tree and Classification.

- **Unit V**

An Introduction to Analytics – Machine Learning, Data Mining– and Predictive Analytics – Basic Analytics Techniques – The CRISP–DM Model – Data Warehousing and Outline Analytical Processing – Mining Frequent Patterns and Association Rules – Intelligent Information Retrieval Systems.

Text Book:

1. Gopal, M., “Applied Machine Learning”, First Edition, Tata McGraw Hill Publications, Chennai, 2018 .

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.

Web Reference:<http://www.cs.cmu.edu/~tom/mlbook–chapter–slides.html>

Total Number of Topics Present in the course: 55

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	5	9
2.	National	9	16.3
3.	Regional	10	18.1
4.	Global	31	56.3

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			
III	22PIT3CC6	Machine Learning					6	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓		✓		✓			
CO2	✓	✓			61		✓	✓	✓		

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 – III

Course Code: 22PIT3CC6  
Instruction Hours: 6  
Credits: 5

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

### CORE CHOICE COURSE III(1) – OPEN SOURCE TECHNOLOGIES

#### COURSE OBJECTIVES:

- Understand the difference between open–source software and commercial software.
- Understand the policies, licensing procedures and ethics of FOSS.

#### COURSE OUTCOMES:

CO1:Can identify the licensing of open source systems and make decisions on their use, based on an understanding of the legal, economical and technical issues.

CO2:Can find open source projects related to a given development problem

CO3:Differentiate between Open Source and Proprietary software and Licensing.

CO4:Recognize the applications, benefits and features of Open–Source Technologies

CO5:Gain knowledge to start, manage open–source projects.

#### Unit I INTRODUCTION:

Introduction to Open Source: Open Source, Need and Principles of OSS, Open–Source Standards, Requirements for Software– OSS success, Free Software, Examples, Licensing, Free Vs. Proprietary Software, Free Software Vs. Open– Source Software, Public Domain– History of free software– Proprietary Vs Open– Source Licensing Model, use of Open– Source Software– FOSS does not mean no cost. History: BSD, The Free Software Foundation and the GNU Project.

#### UNIT II OPEN SOURCE PRINCIPLES AND METHODOLOGY:

Open Source History– Open Source Initiatives– Open Standards Principles, Methodologies, Philosophy, Software freedom– Open Source Software Development, Licenses, Copyright vs. Copy left– Patents, Zero marginal cost, Income–generation Opportunities, Internationalization. Licensing: What Is A License, How to create your own Licenses– Important FOSS Licenses (Apache, BSD, PL, LGPL), copyrights and copy lefts, Patent.

#### UNIT III OPEN SOURCE PROJECTS:

Starting and maintaining own Open – Source Project, Open Source Hardware– OpenSource Design, Open source Teaching– Opensource media. Collaboration: Community and Communication– Contributing to OpenSource Projects Introduction to GitHub– interacting with the community on GitHub– Communication and etiquette,

testing open source code– reporting issues, contributing code– Introduction to Wikipedia, contributing to Wikipedia or contributing to any prominent open source project of student’s choice

#### **UNIT IV OPEN SOURCE ETHICS AND SOCIAL IMPACT:**

Open source vs. closed source– Open source Government– Ethics of Open source, Social and Financial impacts of open source technology– Shared software– Shared source– Open Source as a Business Strategy

#### **UNIT V UNDERSTANDING OPEN SOURCE ECOSYSTEM:**

Open Source Operating Systems: GNU/Linux, Android– Free BSD, Open Solaris. Open Source Hardware– Virtualization Technologies– Containerization Technologies: Docker, Development tools– IDEs, Debuggers– Programming languages, LAMP– Open Source Database technologies

## REFERENCES:

1. “Open–Source Technology”, Kailash Vadera&Bhavyesh Gandhi, University Science Press, Laxmi Publications, 2009
2. “Open–Source Technology and Policy”, Fadi P. Deek and James A. M.McHugh, Cambridge University Press, 2008.  
“Perspectives on Free and Open–Source Software”, Clay Shirky and Michael Cusumano, MIT press.
3. “Understanding Open Source and Free Software Licensing”, Andrew M. St. Laurent, O’Reilly Media.
4. “Open Source for the Enterprise”, Dan Woods, Gautam Guliani, O’Reilly Media
5. [https://www.tutorialspoint.com/basics\\_of\\_computers/basics\\_of\\_computers\\_open\\_source\\_software.htm](https://www.tutorialspoint.com/basics_of_computers/basics_of_computers_open_source_software.htm)
6. Linux kernel Home: <http://kernel.org>
7. Open–Source Initiative: <https://opensource.org/>
8. The Linux Foundation: <http://www.linuxfoundation.org/>
9. The Linux Documentation Project: <http://www.tldp.org/>
10. Docker Project Home: <http://www.docker.com3>.
11. Linux Documentation Project: <http://www.tldp.org/>
12. Wikipedia:<https://en.wikipedia.org/7>.[https://en.wikipedia.org/wiki/Wikipedia:Contributing\\_to\\_Wikipedia](https://en.wikipedia.org/wiki/Wikipedia:Contributing_to_Wikipedia)
13. GitHub: <https://help.github.com/>
14. The Linux Foundation: <http://www.linuxfoundation.org/>

Total Number of Topics Present in the course: 37

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	6	16.2
2.	National	8	21.6
3.	Regional	8	21.6
4.	Global	15	40.5

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			
III	22PIT3CCC3:1	Open Source 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	✓	✓	✓	✓	65✓	✓		✓	✓	✓	

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 – III

Course Code: 20PIT3CCC3:2  
Instruction Hours: 6  
Credits: 4

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

### CORE CHOICE COURSE III(2) – J2EE TECHNOLOGIES

#### Course Objectives:

- To design and develop web based and enterprise applications using J2EE.
- Understand the concepts such as JDBC, JSP
- To develop a concept of JNDI and Struts framework.

#### Course Outcomes:

CO1: Understand the architecture of client/server systems and able to develop applications using client/server communication.

CO2: you will learn the basics and history of XML,CORBA,RMI,JMS and how to write your own XML documents.

CO3: Develop JSP applications using JSP Tags, JSP Scriptlets and JavaBeans

CO4: Understand the role of EJB in the broader Java EE platform.

CO5: To learn basics of programming with a modern programming language, Java.

#### UNIT I

Client – Server Architecture: Two Tier Model – 3 Tier Model – n Tier Model – J2EE Architecture –net Architecture – MPC Architecture.

#### UNIT II

Interaction Services: RMI – CORBA – XML – Generating an XML Documents – Parsing XML – JMS – Fundamentals of JMS – Components of JMS Program.

#### UNIT III

Presentation Services: JSP – Javamail – Servlet.

#### UNIT IV

Component Model: EJB: Session beans: Stateless and Statefull – Entity beans – CMP and BMP – Message Driven Beans.–Redirection and forwarding Handling Errors and Exceptions in Servlets.

#### UNIT V

Struts Framework: Introduction – Building a simple struts – Model layers –View layer – controller layer – Validator – Tiles –Declarative Exception Handling –Struts Modules.–Working with Servlet Threads and Filters.

#### Text Books:

1. Jim Keogh “The Complete Reference J2EE “Tata McGraw – Hill Edition 2002.
2. James Holmes “The Complete References Struts Second Edition “Tata McGraw Hill Edition–2007.

#### Reference Books:

1. Jusin Couch, Daniel H. Steinberg, “J2EE Bible” Wily India (P) Ltd, New Delhi 2002.

2. Paul Tremblett, “Instant Enterprise Java Y–Beans”, Tata McGraw Hill Publishing Company, New Delhi, 2001.

Total Number of Topics Present in the course: 32

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	3	9.3
2.	National	2	6.2
3.	Regional	2	6.2
4.	Global	25	78.1

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	22PIT3CCC3:2	J2EE Technologies					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 (✓) = 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 – III

Course Code: 22PIT3CP3  
Instruction Hours: 3  
Credits: 2

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

### CORE PRACTICAL III – MACHINE LEARNING LAB

- **Course Objective:**

- To introduce students to the basic concepts and techniques of Machine Learning.

- **Course Outcomes:**

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 Flatten a Matrix.
2. Write a program to count the frequency of unique values in NumPy array.
3. Write a program to calculate the Average, variance and standard deviation.
4. Write a program to convert a numpy array into CSV file.
5. Write a program to Plot a line graph from numpy array.
6. Write a Program to perform Naïve Bayes algorithm for a given dataset.
7. Write a program to perform Decision Tree algorithm for a given dataset.
8. Write a program to perform K–Nearest Neighbour algorithm for a given dataset.
9. Write a program to perform Support Vector Machine algorithm for a given dataset.
10. Write a program to perform Logistic Regression algorithm for a given dataset.
11. Write a program to perform Linear Regression algorithm for a given dataset.
- 12 Write a program to perform K–Means Clustering algorithm for a given dataset.

Total Number of Topics Present in the course: 12

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	2	16.6
2.	National	2	16.6
3.	Regional	2	16.6
4.	Global	6	50

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	22PIT3CP3	Machine Learning Practical					3	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 (✓) = 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 – III

Course Code: 20PIT3CCCP3:1  
Instruction Hours: 3  
Credits: 2

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

### **CORE CHOICES COURSE PRACTICAL III (1) – OPEN SOURCE TECHNOLOGY PRACTICAL**

- **Course Objective:**

- It will develop skill to make a significant contribution to open source community..

- **Course Outcomes:**

CO1: Understand the installation of various packages in open source operating systems  
CO2: Create simple GUI applications using PHP function to develop program.  
CO3: Understand various versions of control system  
CO4: Understand the kernel configuration and virtual environment  
CO5: Implement various applications using build systems

1. Write a server side PHP program that displays marks- total- grade of a student in tabular format by accepting user inputs for name- number and marks from a HTML form.
2. Write a PHP program that adds products that are selected from a web page to a shopping cart.
3. Write a PHP program to access the data stored in a mysql table.
4. Write a PHP program interface to create a database and to insert a table into it.
  - i). Write a PHP program using classes to create a table.
  - ii). Write a PHP program to upload a file to the server.
5. Write a PHP program to create a directory- and to read contents from the directory.
6. Write a shell program to find the details of an user session.
7. Write a shell program to change the extension of a given file.
8. Create a mysql table and execute queries to read- add- remove and modify a record from that table.
9. Write a shell program to change the extension of a given file.
10. Create a mysql table and execute queries to read, add, remove and modify a record from that table-

Total Number of Topics Present in the course: 10

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	1	10
2.	National	1	10
3.	Regional	1	10
4.	Global	7	70

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	22PIT3CCCP3: 1	Open Source Technologies Practical					3	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 (✓) = 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 – III

Course Code: 20PIT3CCC3:2  
Instruction Hours: 3  
Credits: 2

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

### CORE CHOICE COURSE PRACTICAL III(2) – **J2EE TECHNOLOGIES PRACTICAL**

#### • **Course Objective:**

- The objective of this course is to provide the necessary knowledge to design and develop dynamic, database-driven application using J2EE.

#### **Course Outcomes:**

- CO1: Understand the students how to create dynamic web pages, using Servlets and JSP.
- CO2: understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB).
- CO3: invoke the remote methods in an application using Remote Method Invocation (RMI)
- CO4: learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
- CO5: make a reusable software component, using Java Bean.

1. To find the marks of the students using Remote Method Invocations.
2. To write a Servlet program to calculate the bonus of an employee
3. To write a Servlet program to implement Session Tracking.
4. To write a Servlet program to check authentication for user using Cookies.
5. To write a Servlet program and use JDBC in it.
6. To write a simple program for JSP.
7. To write a JSP program that works with JDBC.
8. To write a JSP Program with Bean Class.
9. To write a EJB Stateless Program to create bonus of an employee.
10. Implement a JAVA Servlet Program to implement sessions using HTTP Session Interface.

Total Number of Topics Present in the course: 10

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	1	10
2.	National	1	10
3.	Regional	1	10
4.	Global	7	10

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	22PIT3CCCP3: 2	J2EE Technologies Practical					3	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 (✓) = 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 – III

Course Code: 22PIT3CE3:1  
Instruction Hours: 6  
Credits: 4

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

### CORE ELECTIVE III (1)– SOFTWARE ENGINEERING

#### • **Course Objective:**

- To provide a professionally guided education in software engineering that prepares graduates to transition into a broad range of career options: industry, government, computing graduate program, and professional education.T

#### • **Course Outcomes:**

- CO1: Understanding Basic knowledge of the analysis and design of complex systems.
- CO2: Ability to apply software engineering principles and techniques.
- CO3: Ability to develop, maintain and evaluate large–scale software systems.
- CO4: To produce efficient, reliable, robust and cost–effective software solutions.
- CO5: Ability to perform independent research and analysis.

#### • **Unit I**

- Need for S/w Engineering: Need for S/w engineering – About software and S/w engineering – A systems approach– Engineering approach – Members of the development team – Change in S/w engineering. – Modeling the process and Life cycle: The meaning of process – S/w process models – Tools and techniques for processional modeling – Practical process modeling

#### • **Unit II**

- Planning and Managing the project:  
Tracking progress – Project personnel – Effort estimation – Risk management – The project plan – Process models and project management

#### • **Unit III**

Capturing the requirements : The requirement process – Types of Requirements – Characteristics of requirements – Expressing requirements – Additional requirements notations – Prototyping requirements – Requirements Documentation – Participants in the requirements process – Requirements validation – Measuring requirements – Choosing a requirements specification Techniques.

#### • **Unit IV**

Designing the system : Design Introduction – Decomposition and Modularity – Architectural styles and strategies – Architectural Design Decisions – Architectural Views – Architectural Patterns –Application Architectures – Characteristics of good design – Techniques for improving design – Design evaluation and validation – Documenting the design – Programming standards and procedures – Programming guidelines – Documentation.

#### • **Unit V**

Testing Strategies : Testing strategic issues 75 Test strategies for conventional S/w – Test strategies for object oriented S/w – Validation testing – system testing – S/w testing. Fundamentals – Black-box and

White-box testing – White box testing – Black box testing – McCall’s Quality factors – ISO 9126 –QF – S/w Engineering – S/w Maintenance – S/w engineering process model.

**Text Books:**

- 1.Shari Lawrence P. Fleeger, “Software Engineering Theory and Practice”, 2<sup>nd</sup> Edition, Pearson Education, Delhi, 2001. [(for Units 1–4) Chapters 1, 2, 3, 4, 5, 7]
2. Roger S. Pressman, “Software Engineering A Practitioner’s Approach”, 6<sup>th</sup> Edition, Tata McGraw Hill Publication, [(for Unit 5) Chapters : 13, 14, 15, 31]

**Reference Books:**

- 1.Ian Sommerville, “Software Engineering”, 6<sup>th</sup> Edition, Pearson Education, Delhi, 2005.
- 2.Douglas Bell, “Software Engineering for Students–A Programming Approach”, 4<sup>th</sup> Edition, Pearson Education, Delhi 2007.

**Web Reference:**

<https://ug.its.edu.in/sites/default/files/SOFTWARE%20ENGINEERING.pdf>

Total Number of Topics Present in the course: 56

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	2	3.5
2.	National	5	8.9
3.	Regional	4	7.1
4.	Global	45	80.3

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			
III	22PIT3CE3:1	Software Engineering					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 (✓) = 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 – III

Course Code: 22PIT3CE3:2  
Instruction Hours: 6  
Credits: 4

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

### CORE ELECTIVE III (2) – HUMAN COMPUTER INTERACTION

#### • **Course Objective:**

- Provide an overview of the concepts relating to the design of human-computer interfaces in ways making computer-based systems comprehensive, friendly and usable.

#### • **Course Outcomes:**

- CO1: Identify the basic concepts of HCI and evolution of HCI
- CO2: Discuss the design issues and interaction design processes
- CO3: Use different models of interaction design principles /rules
- CO4: To understand the concepts and techniques for effective interaction between Human and Computers
- CO5: Ability to develop HCI technique based applications.

#### • **Unit I**

Cognitive Psychology and Computer Science – Capabilities of Human-Computer Interaction–Goals of Human-Computer Interaction–Roles of Human- Computer and Interaction in HCI–Basic User Interfaces – Advanced User Interfaces – Justification of Interdisciplinary Nature– Standard Framework of HCI – HCI Design Principles– Interface Levels in HCI – Steps in Designing HCI Applications – Graphical User Interface Design – Popular HCI Tools – Architecture of HCI Systems– Advances in HCI– Overview – HCI Sample Exercises – HCI and Usability Engineering– Usability Engineering Attributes – Process of Usability– Need for Prototyping.

#### • **Unit II**

Understanding Process Modelling:Goals– Operators– Methods– Selection Rules– Cognitive Complexity Theory– Adaptive Control of Thought– Rational– State– Operator– and Result– Belief– Desire– Intention– ICARUS– Connectionist Learning with Adaptive Rule Induction On– line (CLARION) – Subsumption Architecture– Spoken Dialogue System– Factors Defining Dialogue System – General Architecture of Spoken Dialogue System– Dialogue Management Strategies– Computational Models for Dialogue Management– Statistical Approaches to Dialogue Management– Learning Automata as Reinforcement Learners.

#### • **Unit III**

Recommender Systems: HCI Study Based on Personalisation – Personalisation in Recommender Systems – Application Areas of Recommender Systems– Recommender System Field as an Interdisciplinary Area of Research – Phases of Recommender Systems – User Profiling Approaches– Classification of Recommendation Techniques – Advantages and Disadvantages of Recommender System Approaches – Need of Software Agent– based Approach in Recommender Systems – Evaluating Recommender Systems– Integrated Framework for Recommender Systems – Case Study

• **Unit IV**

Advanced Visualisation Methods: Ontology Definition – Need of Ontology Analysis – Types of Ontology – Components of Ontology – Ontology Life Cycle – Ontology Development Process – Multiple Inheritance Ontology – Ontology Visualisation Method – Space Dimensions of Ontology Visualisation – Ontology Languages – Microformats – RDF/A– RDF – RDF Schema– OIL – Ontology Visualisation Tools – Ontology Reasoning –Reasoner.

• **Unit V**

Ambient Intelligence: The New Dimension of Human–Computer Interaction – Ambient Intelligence Definition–Context aware Systems and Human–Computer Interaction –Middleware – Modelling Data for Aml Environment –Development of Context–awareness Feature in Smart Class Room– A Case Study –Context– aware Agents for Developing AmI Applications–A Case Study.

**Text Book:**

1. K. Meena, R. Sivakumar, “Human–Computer Interaction”, PHP Learning Private limited Delhi–110092, 2015.

**Reference Books:**

1. JohnM. Carroll, “HumanComputerInteraction–intheNew Millennium”, Pearson Education, 2007.
2. Lan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale, “Human–Computer Interaction”, Pearson Education, 2009.

**Web Reference:**

[https://engineering.futureuniversity.com/BOOKS%20FOR%20IT/Dix\\_HumanComputerInteraction.pdf](https://engineering.futureuniversity.com/BOOKS%20FOR%20IT/Dix_HumanComputerInteraction.pdf)

Total Number of Topics Present in the course: 92

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	5	5.4
2.	National	8	8.6
3.	Regional	13	14.1
4.	Global	66	71.7

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			
III	22PIT3CE3:2	Human Computer Interaction					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		✓	✓	✓	78	✓	✓	✓	✓		

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 – III

Course Code: 22PIT3CE3:3  
Instruction Hours: 6  
Credits: 4

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

### CORE ELECTIVE III (3) – **SOFTWARE PROJECT MANAGEMENT**

#### • **Course Objective:**

- This course is aimed at introducing the primary important concepts of project management related to managing software development projects.

#### • **Course Outcomes:**

- 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 project 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, Fifth Edition, 2011.
3. Emerson, “Agile Handbook,” Philosophy

**Reference Book(s):**

1. Futrell, “Quality Software Project Management”, Pearson Education India.
2. Royce, “Software Project Management”, Pearson Education India.
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.

**Web Reference:**

<https://www.kopykitab.com/Software-Project-Management-eBook-By-isbn-9789382122005>

Total Number of Topics Present in the course: 65

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	4	6.1
2.	National	14	21.5
3.	Regional	10	15.3
4.	Global	37	56.9

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			
III	22PIT3CE3:3	Software Project Management					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 (✓) = 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 – IV

Course Code: 22PIT4CC7  
Instruction Hours: 6  
Credits: 5

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

### CORE COURSE VII – INTERNET OF THINGS

#### • *Course Objective:*

- 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:*

- CO1: Gain the basic knowledge about IoT
- CO2: Able to use IoT related products in real life
- CO3: It helps to rely less on physical resources
- CO4: To start their work smarter
- CO5: Able to understand building blocks of Internet of Things

#### UNIT I

Requirements of IoT: The definition of the Internet of Things, main assumptions and perspectives–Functional Requirements – Platform for IoT devices. Economics and Technology of the IoT –Issues in IoT and solutions– Architecture of IoT. Anatomy of IoT: Traditional Internet Protocol Vs Chirps –Applying network intelligence at propagator nodes–Transport and functional architectures–Features of IOT.

#### UNIT II

IoT Devices–Temporary and Adhoc devices–Addressing issues–End devices in dedicated networks– Converting states to chirps–RFID integration in the IoT–End devices with higher demands– Small data Building a web of things– Autonomy and co ordination–Structuring a tree–Housekeeping message–Role of integrator function–Degrees of functionality- Aggregating end points–Packaging options– IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components – Interfacing of Actuators with Arduino –Analog and Digital Sensors.

#### UNIT III

Data and Human Interaction: Functions of IoT–Analysis and control–Neighborhood and affinities– Public private and other kinds of data– Publishing agent– Searching for and managing agents– High and low level loops– Human interface and control points–Collaborative scheduling tools–Packaging and provisioning– Distributed integrator functions, Filtering the streams – IP Alternative–Protocol based on category classification–Skeletal architecture of chirp packets–Pattern driven–Propagator node networks and operation–Power of local agents and integrator functions– High level interchange.

#### UNIT IV

Moore's Law –Intelligence near the edge– Incorporating legacy devices– Staying in the loop –Social machines– Applications of IoT–Agriculture– IoT in Education– Home healthcare–Efficient process control–Factory application– Home automation– Natural sciences –Living applications– Origin of IoT– Open source networking solutions–Shared software and business process vocabularies.

#### UNIT V

Creating the IoT projects: Examples and working principles of sensors and actuators –Sensor project–Actuator project – Controller Camera,Using an IoT service platform– Selecting an IoT. Platform– The claysterplatform– Interfacing our devices using XMPP– Creating control application– Arduino device in IoT– Federating for Global Scalability – Providing a Global Identity – Authorizing Communication –Sensing Online Presence – Creating

control application.

Setup the IDE– Writing Arduino Software.

**Text Books:**

1. “Rethinking the Internet of Things–A scalable approach to connecting everything”, by Francis DaCosta, Apress open publication, 2013.

**Reference Books:**

1. “Learning Internet of Things” by Peter Waher, PACKT Publishing–Birmingham–mumbai–2015.

Web Reference: (<http://www.internet-of-things-book.com/>).

Total Number of Topics Present in the course: 74

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	3	4.0
2.	National	13	17.5
3.	Regional	9	12.1
4.	Global	48	64.8

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	22PIT4CC7	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 (✓) = 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

Course Code: 22PIT4CC8  
Instruction Hours: 6  
Credits: 5

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

## CORE COURSE VIII – CLOUD COMPUTING

### • *Course Objectives:*

- To understand the concept of various cloud services and Deployments

### • *Course Outcomes:*

- 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**

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 & Applications – Cloud concepts and Technologies.

### • *Unit II*

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**

Design consideration– Reference Architecture for Cloud Application – Cloud Application Design Methodologies – Data Storage Approaches– Development in Python: Design Approaches – Application: Image Processing – Document Storage – Map Reduce – Social Media Analytics.

- **Unit IV**

Introduction– Installing Python– Data types & Data Structures– Control Flow– Functions– Modules– Packages– File Handling– Date/Time Operations – Classes– Python for Cloud: Amazon Web Services –Google Cloud Platform – Windows Azure –Map Reduced – Packages of Interest – Designing a RESTful Web API.

- **Unit V**

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 Trans coding App–Cloud Security: CSA Cloud Security Architecture – Authentication– Authorization – Identity and Access management – Data Security – Key Management–Auditing– Cloud for Industry, Healthcare & Education.

**Text Books:**

1. Buyya, Vecciola and Selvi, Mastering Cloud Computing: Foundations and Applications Programming, Tata McGraw Hill, 2013.
2. ArshdeepBahga, Vijay Madiseti, “Cloud Computing: A Hands – On Approach” Universities press (India) Pvt. limited 2016.

**Reference Books:**

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”. Pearson edition, 2008.

Total Number of Topics Present in the course: 71

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	5	7
2.	National	12	16.9
3.	Regional	9	12.6
4.	Global	45	63.3

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			
IV	22PIT4CC8	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											

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: 22PIT21BC  
Instruction Hours: 6  
Credits: 5

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

### CORE /INDUSTRIAL BASED CORE – **DIGITAL MARKETING**

- **Course Objectives:**

- To understand the concept of various Marketing Fields.

- **Course Outcomes:**

CO1: Understand the role of digital marketing in marketing strategy

CO2: Identify the key elements of a digital marketing strategy

CO3: Analyze the role that social marketing plays in the digital marketing

CO4: Demonstrate common digital marketing tools such as SEO and Social media

CO5: Apply conceptual frame works of digital marketing

#### **Unit – I**

Introduction to Digital Marketing: Introduction – Original and Development of Digital Marketing – Internet Users: Penetration and Kind of Internet Use – Digital Marketing strategy – Digital Advertising Marketing Plan – Ethical and legal of framework of Digital Marketing – Skills Required in Digital Marketing.

#### **Unit – II**

Digital Advertising: Introduction – Concept of display advertising – Digital Metrics – Types of Digital Ad – Targeting in digital marketing – Challenges faced by display marketing.

#### **Unit – III**

Search Engine Advertising: Introduction – Why pay for search advertising? – Understanding Ad Placement – Understanding Ad Ranks – Why is the Ad rank important? – Create your first Ad Campaign – Google Ads Account – Best practices for creating effective Ads – Enhance your Ad Campaign – Performance Reports.

#### **Unit – IV**

Face book Marketing : Introduction – Organic Marketing – Paid Marketing – Facebook Insights LinkedIn: Introduction – LinkedIn Strategy – Content Strategy – LinkedIn Native Videos – LinkedIn Analytics – Asset Copying – LinkedIn Sales Navigator – Adcampaign – Emerging Platforms: Instagram – Pinterest.

#### **Unit – V**

Search Engine Optimization: Introduction – Search Engine – The Concept of SEO – SEO Phases – Website Audit – Content – On Page Optimization – Off Page Optimization – Social Media Reach – Website Navigation – Social Media Icons – External Links – Pop ups – Advanced Website Features.

**Text Books:**

1. Seema Gupta , Digital Marketing– McGraw Hill Education 2<sup>nd</sup> Edition, 2018.

**Reference Books:**

1. Simon Kingsnorth, Digital Marketing Strategy: An Integrated Approach to Online Marketing 2nd Edition– Kogan Page, 2<sup>nd</sup> Edition, 2019
2. Dave Chaffey , Digital Marketing– Pearson 7<sup>th</sup> Edition, 2019.
3. Stephanie Diamond, Digital Marketing All-in-One For Dummies For Dummies 1<sup>st</sup> Edition, 2019. 4. Kevin Hartman, Digital Marketing Analytics: In Theory And In Practice– Ostmen Bennett Bridge Publishing , Services 2<sup>nd</sup> Edition, 2020.

Total Number of Topics Present in the course: 50

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	5	10
2.	National	11	22
3.	Regional	7	14
4.	Global	28	56

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	22PIT21BC	Digital Marketing					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 – IV

Course Code: 22PIT4NME2:1  
Instruction Hours: 3  
Credits: 2

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

### NON-MAJOR ELECTIVE-I (2) –**SECURITY IN COMPUTING**

#### **COURSE OBJECTIVES:**

- This course provides a broad introduction to a variety of topics in applied computer, network, and system security.

#### **Course Outcomes:**

CO1: Formulate information security governance, and related legal and regulatory issues.  
CO2: Devices how threats to an organization are discovered, analyzed, and dealt with.  
CO3: Evaluate network security threats and countermeasures.  
CO4: Construct network security designs using available secure solutions  
CO5: Acquire the knowledge of advanced security issues and technologies

#### **1. Introduction to computer security**

- Overview of Computer Security Concepts and Foundations–
- Threats– Attacks– and Assets

#### **2. Computer Security Technology and Principles**

- User Identification and Authentication–
- Access Control–
- Database and Cloud Security–
- Malicious Software–
- Denial-of-Service Attacks–
- Intrusion Detection–
- Firewalls and Intrusion Prevention Systems–

#### **3. Software Security and Trusted Systems**

- Buffer Overflow–
- Software Security–
- Operating System Security–
- Database Security–
- Trusted Computing and Multilevel Security–

#### **4. Management Issues**

- Security Management and Risk Assessment–
- Human Resources Security–

- o Legal and Ethical Aspects–

## 5. Cryptographic Algorithms

- o Symmetric Encryption and Message Confidentiality–
- o Public-Key Cryptography and Message Authentication

Total Number of Topics Present in the course: 5

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	0	0
2.	National	1	10
3.	Regional	1	10
4.	Global	3	30

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	22PIT4NME2:1	Security in Computing					3	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 (✓) = 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 – IV

Course Code: 22PIT4NME2:2  
 Instruction Hours: 3  
 Credits: 2

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

## NON-MAJOR ELECTIVE-I (2) –SOCIAL MEDIA ANALYTICS

### COURSE OBJECTIVES:

- To understand the revolution in Social media concepts.

### Course Outcomes:

- CO1: Understand sources and limitations of web-based data
- CO2: Understand the different social media platforms and their associated metrics
- CO3: Implement social network analysis to identify important social actors
- CO4: Apply appropriate information visualization technique to gain insights into large datasets
- CO5: Formulate effective actions based on the analytics

- **UNIT I**  
The Conundrum of social media – Targeting your customers
- **UNIT II**  
Tracking international – Online social intelligence
- **UNIT III**  
Friends, fans, followers – Influence
- **UNIT IV**  
Score carding – Advanced social analytics
- **UNIT V**  
Use Cases: Movie Review– Election Result Analysis– Community analysis in social media

### Text Book:

1. Marshall Sponder (2012). Social Media Analytics: Effective Tools for Building, Interpreting, and Using Metrics (Marketing/Sales/Advertising & Promotion), Mcgraw hill

### Reference Book:

1. Ganis, Kohirkar (2016). Social media Analytics, IBM Press PTG, 1st Edition
2. Nancy Flynn (2012). The Social Media Hand book Policies, and Best Practices, Wiley

Total Number of Topics Present in the course: 11

S.No	Category (Local/ Regional/ National/ Global)	No. of Topics covered	Percentage
1.	Local	1	9
2.	National	1	9
3.	Regional	1	9
4.	Global	8	72

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	22PIT4NME4:2	Social Media Analytics					3	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 (✓) = 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

### MANET APPLICATIONS

Course Code: 22PVAIT1:1

Instruction Hours: 30

Exam Hours: 2

Internal Marks: 50

External Marks: 50

#### UNIT - 1

**INTRODUCTION:** Introduction to ad-hoc networks – definition, characteristics features, applications.

Characteristics of wireless channel, ad-hoc mobility models: indoor and outdoormodels.

#### UNIT - 2

##### MEDIUM ACCESS PROTOCOLS:

**MAC Protocols:** Design issues, goals and classification. Contention based protocols – with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

### **UNIT - 3**

#### **NETWORK PROTOCOLS:**

**Routing Protocols:** Design issues, goals and classification. Proactive Vs reactive routing, unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, energy aware routing algorithm, hierarchical routing, QoS aware routing.

### **UNIT - 4**

#### **END – END DELIVERY AND SECURITY:**

**Transport Layer:** Issues in designing – Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.

### **UNIT – 5**

#### **CROSS LAYER DESIGN:**

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, cross layer cautionary perspective. Integration of adhoc with Mobile IP networks.

#### **TEXT BOOKS:**

1. C. Siva Ram Murthy and B. S. Manoj, Ad hoc Wireless Networks Architecture and Protocols, 2<sup>nd</sup> edition, Pearson Edition, 2007.

Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000

## ANGULAR JS

Course Code: 22PVAIT1:2  
Instruction Hours: 30

Exam Hours: 2  
Internal Marks: 50  
External Marks: 50

### Course Outcomes

After completing the course, the students are able to

- CO1: Understand the concept of Angular JS
- CO2: Understand expressions and Directives of Angular JS
- CO3: Impart the knowledge on Controllers and Modules
- CO4: Learn the concept of scopes in Angular JS
- CO5: Understand the concept of Forms in Angular JS

### UNIT – I:

Introduction to Angular JS – Need for Angular JS – Angular JS MVC – Angular JS First app – Angular JS Data Binding

### UNIT – II:

Expressions – Numbers, Strings, Objects, Arrays – Examples – Directives – ng-app, ng-init, ng-model, ng-repeat – Examples

### UNIT – III:

Controllers – Examples – Modules – Module Creation – Adding controller to a module – Adding directive to a module – Examples

### UNIT – IV:

Scopes – Examples – Filters – Adding filters to expressions – Adding filters to directives –

Examples

## **UNIT – V:**

Forms – Check Box – Radio Buttons – Select Box – Examples – Animations – Examples

## **Text Book**

1. ValeriKarpov, Diego Netto, “*Professional AngularJS*”, Wrox Publication, FirstEdition, 2015

## **ACADEMIC RESEARCH & REPORT WRITING**

Course Code: 22PVAIT2:1

Instruction Hours: 30

Exam Hours: 2

Internal Marks: 50

External Marks: 50

### **Course objectives:**

After completion of the course students will be able: -

- To become knowledgeable
- To explore and achieve academic and research goals

### **UNIT I:**

Research Paper Writing: Types of Research Papers - Structure of Research Papers - Research Paper Formats - Abstract Writing – Methodology .

### **UNIT II:**

Results and Discussions - Different Formats for Referencing - Ways of Communicating a Research Paper.

### **UNIT III:**

Thesis Writing: Structure of a Thesis - Scope of the Work - Literature Review - Experimental / Computational Details - Preliminary Studies - Results and Discussions.

### **UNIT IV:**

Figures and Tables Preparation - Conclusions and Future Works – Bibliography - Appendices.

### **UNIT III:**

Tools and Techniques: Various Word Processors - MS Word, Libre-Office, Latex - Making Effective Presentations Using Power Point and Beamer - Uses of Plagiarism Detection Tools.

### **REFERENCE BOOKS:**

1. A Step-by-Step Guide to Writing Academic Papers, by Anne Whitaker September 2009
2. On Writing a Thesis by C P Ravikumar, IETE Journal of Education, 2000

## CONTENT MANAGEMENT TOOLS

Course Code: 22PVAIT2:2  
Instruction Hours: 30

Exam Hours: 2  
Internal Marks: 50  
External Marks: 50

### COURSE OBJECTIVES

- To create and publish content using word press
- To understand the basics of Content management
- To design a website using Word press
- To develop and publish simple content using Word Press

#### UNIT I:

Introduction to Content management System: What is Content Management System (CMS) - Features-Advantages – Disadvantages.

#### UNIT II:

Word Press Basics: Overview - Installation-Dashboard - Create a Permanent link for user website and make it as public site - Set your website title and tagline.

#### UNIT III:

Designing a Website: Pick a theme and design a website - Create categories for website post - Write a blog and post - Customize word press theme

#### UNIT IV:

Creatin Links and Comments: Create and Manage links in word press pages - Add and mange comments in blog posts - WordPress Tags - Links-Add plugins to websites abilities

#### UNIT V:

Word Press Add-Ons: Access word press media libraries - Create and publish pages in website - Adjust site navigation using menus and widgets

### REFERENCE BOOKS:

1. Stephen Burge, “WordPress Explained: Your Step-by-Step Guide to WordPress: 3”, Prentice Hall, 2020.
2. Martin Fowler, “Teach Yourself VISUALLY WordPress”, John Wiley & Sons, 2015.
3. Kevin Wilson, “Using PowerPoint 2019: The Step-by-step Guide to Using Microsoft PowerPoint 2019 (Using Microsoft Office Book 3)”, Elluminet Press, 2020.

### WEB REFERENCES :

1. <https://www.tutorialspoint.com/wordpress/index.htm>

