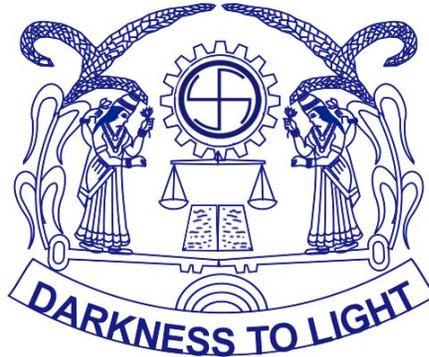


DHANRAJ BAID JAIN COLLEGE (Autonomous)

Co-Educational Minority Institution
Owned & Managed by Tamilnadu Educational and Medical Trust
Approved by Government of Tamil Nadu & Affiliated to University of Madras
Re-Accredited by NAAC with “B+” Grade
Thoraipakkam, Chennai – 600 097.

DEPARTMENT OF COMPUTER SCIENCE M.Sc. (Information Technology)



**SYLLABUS
(Choice Based Credit System)
(Effective from the academic year
2025-26)**

**No. of Semesters-04
Total No. of Credits: 91**

M.Sc. DEGREE COURSE IN INFORMATION TECHNOLOGY

REVISED REGULATIONS Choice Based Credit System

Programme Outcomes:

- The broad objective of the programme is to prepare students for challenging careers in academia and/or computing industry by providing healthy environment for teaching, learning and research in the core and applied areas of the discipline.
- The programme aims to provide an understanding of advanced Information and Computing Technologies.
 - To keep a balance between fundamental concepts, core areas of information technology and specialized skills required to adapt to the needs of the dynamically evolving industry.
 - The intent is on providing a strong foundation in theory along with a clear technology focus.
 - To learn and evaluate a range of computing technologies, systems and application services.
 - To design, analyze, develop and evaluate high-end systems.
 - To undertake challenging projects and work as active researchers.
 - To identify and learn about recent research and industry trends.
 - To equip the student with a basic knowledge of other domains, disciplines and skills, a social and environmental consciousness and a strong value base.

Programme Specific Outcomes:

- Implement the concept of theory and technology with the design and analysis techniques for solving the complex problems in Information Technology.
- Be curious towards learning new and emerging technologies and adapt quickly to changes.
- Design, execute and evaluate computing projects in academia and industry using current technologies.
- Know the contextual knowledge in information technology and communicate effectively with stakeholders and with the society at large for enhancing the quality of life.
- Be honest in upholding the ethical principles and social responsibilities along with socio- economic innovations.

**MASTER DEGREE COURSE
M.Sc. - Information Technology
SEMESTER SYSTEM WITH CREDITS
(Effective from the academic year 2025-2026)**

REGULATIONS

1. ELIGIBILITY FOR ADMISSION

Pass in B.Sc. degree program with Mathematics or Statistics or Business Mathematics or Business Statistics or Mathematical Physics as main or Allied or any other degree course from any other University accepted as equivalent thereto.

2. ELIGIBILITY FOR THE AWARD OF DEGREE

A Candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in our College which is affiliated to the University of Madras for a period of not less than two academic years, passed the examinations of all the Four Semesters prescribed earning 90 credits and fulfilled such conditions as have been prescribed therefor.

3. DURATION

- a) Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year comprise of the third and fourth semesters. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester.

4. COURSE OF STUDY

The Main Subject of study for Bachelor Degree shall consist of the following

PART-I: CORE COURSES Consisting of (a) Core Course

(b) Elective Course (c) Extra –Disciplinary Course (d) Application Lab and (e) Team Project.

PART-II: Soft skill courses and Internship program.

5. SCHEME OF EXAMINATION

Scheme of Examination shall be enclosed in APPENDIX - I

6. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

- I. Candidates shall register their names for the First Semester Examination after the admission in the PG Courses.
- II. Candidates shall be permitted to proceed from the First Semester up to final semester irrespective of their failure in any of the semester examinations subject to the condition that the candidates should register for all the arrear subjects of earlier semesters along with current (subsequent) Semester Subjects.
- III. Candidates shall be eligible to go to subsequent semester, only if they earn, sufficient attendance as prescribed therefore by the college from time to time, provided in case of a candidate earning less than

50% of attendance in any one of the Semesters due to any extraordinary circumstance such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorised Medical Attendant (AMA), duly certified by the Principal of the College, shall be permitted to proceed to the next semester and to complete the Course of Study. Such candidates shall have to repeat the missed semester by re-joining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the college from time to time.

7. PASSING MINIMUM

A candidate shall be declared to have passed in each paper/practical of the Main Subject of study wherever prescribed, if he/she secures NOT LESS THAN 50% of the marks prescribed for the examination. He/she shall be declared to have passed the whole examination, if he/she passes in all the papers and practicals wherever prescribed as per the scheme of examinations earning 90 CREDITS.

8. CLASSIFICATION OF SUCCESSFUL CANDIDATES

i) PART-I: CORE COURSES Consisting of (a) Core Course (b) Elective Course (c) Extra –Disciplinary Course (d) Application Lab and (e) Team Project.

Successful candidates passing the examinations for Core Courses together and securing the marks 1)60 percent and above (2) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core Courses together shall be declared to have passed the examination in the FIRST CLASS (EXEMPLARY/DISTINCTION/FIRST CLASS) and SECOND CLASS respectively.

9. RANKING

Candidates who pass all the examinations prescribed for the course in the FIRST APPEARANCE ITSELF ALONE are eligible for Classification/Ranking/Distinction.

M.Sc.Computer Science
(Effective from the academic year 2025-2026)
ALLOCATION OF CREDITS

Part	Course Component	No. of Papers	Credits per paper	CIA/ IA Marks	ESE Marks	CIA+ESE= Aggregate Marks	Total Marks = No. of papers x Aggregate Marks	Credits
Part-I	Core-Theory	3+2+3=8	4	25	75	100	8x 100 =800	12+8+12=32
Part-I	Core-Practical	2+2+1=5	2	25	75	100	5x 100 =500	4+4+2=10
Part I	Extra Disciplinary	1+1=2	3	25	75	100	2x 100 =200	3+3=6
Part I	Elective	4	3	25	75	100	4X100=400	12
Part I	Internship	1	2	25	75	100	1X100=100	2
Part I	Project and Viva-Voce	1	20	25	75	100	1X 100=100	20
Part II	Soft skill	3	2	25	75	100	4 X 100=400	6
Part I	Mini Project	1	2	25	75	100	1x 100=100	2
Part II	Extension services	1	1					1
	TOTAL	26				PART-I	2100	90
	Total	26				PART-II	400	91

APPENDIX-I-Course of Study and scheme of examinations:

FIRST YEAR FIRST SEMESTER

Course components	Name of the Course	Ins. Hour	credits	Exa m.	Max. Marks	
					IA	UE
Core -1	Object Oriented Programming with C++	5	4	3	25	75
Core -2	Advanced python Programming	5	4	3	25	75
Core -3	Data Structures	5	4	3	25	75
Elective-1	Elective-I: Choose any one					
	(a) Data warehousing and Data Mining	4	3	3	25	75
	(b) E-Commerce					
	(c) Agile software Engineering					
Core – 4	Practical – I: C++ Lab	4	2	3	25	75
Core – 5	Practical – II: Python Programming Lab.	4	2	3	25	75
SoftSkill-1	Communication Skills for Software Engineers	2	2	3	25	75
	Total	29	21			

FIRST YEAR SECOND SEMESTER

Course components	Name of Course				Max. Marks		
					CIA	UE	Tot
Core-6	Design & Analysis of Algorithms	5	4	3	25	75	100
Core-7	Programming in Java	5	4	3	25	75	100
Elective -II	Elective – II : Choose any one						
	(a) Cloud Computing	4	3	3	25	75	100
	(a) Software testing						
	© Soft Computing						
Elective -III	Elective – III : Choose any one	4	3	3	25	75	100
	(a) Web Technology						

	(b) Relational database Management system						
	© Mobile Application Development						
Core-8	Practical – III : Java Programming Lab	4	2	3	25	75	100
Core -9	Practical – IV : Based on Elective III Lab.	4	2	3	25	75	100
Core-9A	Practical –Web Technology Lab						
Core-9B	Practical RDBMS Lab						
Core-9C	Practical – Mobile Application Development Lab.						
SoftSkill-2	General aptitude for competitive Examinations	2	2	3	25	75	100
SoftSkill-3	Team Project	2	2	3	25	75	100
	Internship Training						
	Total	30	22				

SECOND YEAR– THIRD SEMESTER

Course components	Name of Course	Ins.	Cre dit Hour	m.	Max. Marks		Tot
					CIA	UE	
Core-10	Advanced Computing Networks	4	4	3	25	75	100
Core-11	Operating Systems	4	4	3	25	75	100
Core -12	Machine Learning	4	4	3	25	75	100
Extra-Disciplinary	Information Security	4	4	3	25	75	100
Elective-IV	Elective – IV Choose any One	4	3	3	25	75	100
	(a) Internet of Things						
	(b) Computer vision						
	(c) Data visualization						
Core-13	Practical – V: Machine Learning Lab.	4	2	3	25	75	100
Core -14	Mini Project	4	2	3	25	75	100
Soft Skill-4	Document Preparation Skills for Software Engineers	2	2	3	25	75	100
Internship* *	During summer vacation 4 to 6 weeks of I Year		2		25	75	100
	Total		27				

** Internship will be carried out during the summer vacation of the first year and marks Should be sent to the University by the College and the same will be included in the Third Semester Marks Statement.

SECOND YEAR-FOURTH SEMESTER

Course components	Name of Course	Ins.	Credit	m.	Max. Marks		
					CI A	UE	Tot
Core-15	Project and Viva Voce		20	3	25	75	100
	Extension services		1				

Elective – I-Data Warehousing & Data Mining/E-Commerce /Agile Software Engineering

Elective – II-Cloud Computing /Software Testing/Soft computing

Elective – III Web Technology / Relational database Management system/ Mobile Application Development

Elective – IV Internet of Things / Computer Vision/ Data Visualization

QUESTION PAPER PATTERN**SECTION – A (30 words) Answer All Questions**

10 X 2 = 20 marks

SECTION – B (200 words) -Answer ALL Questions (Either or Pattern)

5 x 5 = 25 marks

SECTION – C (500 words)-Answer any THREE Questions out of FIVE

3x 10 = 30 marks

TOTAL = 75 marks

M.Sc.,INFORMATION TECHNOLOGY

Title of the Course/ Paper	Object Oriented Programming with C++		
Core – 1	I Year & I Semester	Credit: 4	

Objectives:

- Object oriented concepts, C++ language.
- Classes & Objects, Inheritance, Polymorphism.
- Templates, Streams, Files.
- Able to Design & implement various forms of inheritance, String class.

Outcomes:

- learn Object Oriented concepts, C++ language.
- Learn and analyze various problems using C++ program.

Unit 1: Introduction to C++; Tokens, Keywords, Identifiers, Variables, Operators, Manipulators, Expressions and Control Structures in C++; Pointers

Unit -2: Functions in C++ - Main Function -Function Prototyping - Parameters Passing in Functions - Values Return by Functions - Inline Functions - Friend and Virtual Functions- Classes and Objects; Constructors and Destructors; and Operator Overloading and Type Conversions - Type of Constructors - Function overloading

Unit-3: Inheritance : Single Inheritance - Multilevel Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance.

Unit 4: Pointers, V Pointers – Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, virtual Functions and Polymorphism; Managing Console I/O operations.

Unit-5 : Working with Files: Classes for File Stream Operations - Opening and Closing a File - End-of-File Deduction - File Pointers - Updating a File - Error Handling during File Operations - Command-line Arguments

QUESTION PAPER PATTERN

SECTION	UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V	TOTAL
	THEORY	THEORY	THEORY	THEORY	THEORY	
SECTION A (2 MARKS) ANSWER ANY 10 OUT OF 12	3	2	2	3	2	12
SECTION B (5 MARKS) ANSWER ANY 5 OUT OF 8	1	2	2	1	2	08
SECTION C (10 MARKS) ANSWER ANY 3 OUT OF 5	1	1	1	1	1	05
TOTAL	5	5	5	5	5	25

Recommended Texts :

1. Herbert Schildt, 2017, C++ - The complete Reference, Fourth Edition, Tata McGraw –Hill.

Reference Books:

1. Ashok N Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education 2003.
2. Maria Litvin& Gray Litvin, “C++ for you”, Vikas publication 2002.

E-learning resources:

- 1) <https://nptel.ac.in/courses/106105151>
- 2) https://onlinecourses.nptel.ac.in/noc21_cs02/preview
- 3) <https://nptel.ac.in/courses/106101208>
- 4) <https://nptel.ac.in/courses/106102064>
- 5) <https://nptel.ac.in/courses/106106127>

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	S	S	S	M	M	M	M	M	M	L
CO 2	S	M	S	S	L	S	S	L	M	M
CO 3	S	S	S	S	S	L	S	M	L	M
CO 4	S	S	M	S	L	S	S	M	M	S
CO 5	S	S	M	L	S	M	S	S	L	S

S-Strong

M-Medium

L-Low

Title of the Course/ Paper	Advanced python Programming		
Core – 1	I Year & I Semester	Credit: 4	

Course Objectives

To learn how to use lists, tuples, and dictionaries in Python programs.

To learn how to identify Python object types.

To learn how to use files and exception handling in Python programs.

Course Outcomes:

Design and implement Python programs: Develop the ability to design, code, test, and debug Python programs effectively.

Apply OOP principles: Demonstrate the ability to use object-oriented programming concepts to solve complex problems.

Utilize the Python standard library: Become proficient in using the Python standard library and other modules.

Unit-1 - Introduction - History of Python-Getting Started with Python-Programming style and Documentation-Identifiers-Variables-Assignment statements-Expressions- Data Types-Operators-Precedence-Comments-Type Conversions-Common Python Functions-Introduction to Methods and Strings

Unit-2 - Loops and Functions Introduction-Scope-IF Statements-Types of IF Statements-Conditional Expressions-Loops -While Loops-For Loop-Nested Loops-Functions-Definitions-Default Arguments-Calling a Function- Functions with or without returning values-Passings arguments to a function-Call by

Value - Call by Reference-Recursion

Unit-3 - Classes and Objects

Introduction to Object oriented Programming-Need of class and objects-Defining classes-Constructing Objects-Abstraction and Encapsulation-Overriding Methods - Inheritance and Polymorphism-Modules and Packages-Introduction to String Class-String Functions-Formatting Strings

Unit-4 - Lists -Tuples-Sets

Introduction to Lists-Creation of List-Functions for Lists-Passing List to Functions-Operation on Lists-Searching and Sorting-Multidimensional Lists-Advanced List Processing - Sample programs on Lists-Lotto number and Deck of Cards-Introduction to Tuples-Sets - Creation and Accessing Sets-Dictionary Operations and Methods

Unit-5 - Files and Exception Handling

Introduction - Structure of File - Opening and Writing Data-Accessing Files-File Dialogs-Retrieving data from web-Introduction to Exceptions-Errors and Exceptions-Command line arguments-Need for Exception- Handling Exceptions-Raising Exceptions-Exception Objects-Custom Exception Classes

Recommended Texts :

1. Y.Daniel Liang, "Introduction to Programming using Python" 1st edition, Pearson,2021,
2. Karl Beecher, "Computational Thinking-A beginners guide to problem solving and programming, 2017
3. Allen Downey, "Think Python - How to Think Like a Computer Scientist, Green Tea Press, 2021

Reference Books

1. Mark Lutz, “Learning Python Powerful Object Oriented Programming”, O’reilly Media 2018, 5th Edition.
2. Timothy A. Budd, “Exploring Python”, Tata MCGraw Hill Education Private Limited 2011, 1 st Edition.
3. John Zelle, “Python Programming: An Introduction to Computer Science”, Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410
4. Michel Dawson, “Python Programming for Absolute Beginners” , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009

- **Web resources**

https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

Title of the Course/ Paper	Data Structures		
Core – 1	I Year & I Semester	Credit: 4	

Course Objective

Ability to choose appropriate data structure as applied to specified problem definition.

To learn linear data structures-lists, stacks, queues

To learn Linked list structures and its application

To learn Tree and graph structures and application of graphs

Unit 1:-Data Structures: Definition- Time & Space Complexity,Arrays: Representation of arrays, Applications of arrays, sparse matrix and its representation,

Unit 2-Linear list: Singly linked list implementation, insertion, deletion and searching operations on linear list

Circular linked list: implementation, Double linked list implementation, insertion, deletion and searching operations.

Applications of linked lists- Dynamic Storage management

Unit 3- **STACKS**: Operations, array and linked representations of stack, stack applications, infix to postfix

conversion, postfix expression evaluation, recursion implementation. **Queues**: operations on queues, array and

linked representations. **Circular Queue**: operations,, applications of queues.

Unit 4- **Trees**: Definitions and Concepts- Representation of binary tree, Binary tree traversals (Inorder,

Postorder , preorder), Binary search trees.

Unit 5- **Graphs** : Representation of Graphs- Types of graphs -Breadth first traversal – Depth first traversal- - Applications of graphs.

Outcomes:

On completion of this course, students will

Understand the concept of Dynamic memory management, data types, algorithms, Big O notation

Understand basic data structures such as arrays , linked lists, stacks and queues.

Recommended Texts :

1.MarkAllen Weiss,—Data Structures and Algorithm Analysis in C++ll, Pearson Education 2014, 4th Edition.

2.Reema Thareja,—Data Structures Using Cll, Oxford Universities Press 2014, 2nd Edition.

Reference Books

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, —Introduction to Algorithms, McGraw-Hill 2009, and 3rd Edition.

Aho, Hopcroft and Ullman, —Data Structures and Algorithms, Pearson Education 2003

Web Resources

NPTEL & MOOC courses titled Data Structures

<https://nptel.ac.in/courses/106106127/>

Mapping with Programme Outcomes:

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	-	1	-
CO2	1	2	1	-	-	-
CO3	3	1	2	1	-	-
CO4	2	2	1	-	-	1
CO5	3	1	1	-	-	-
Weightage of course Contributed to each PSO	12	9	8	1	1	1

S-Strong-3 M-Medium-2L-Low-1

Title of the Course/ Paper	Practical – I: C++ Lab		
Core – 4	I Year & I Semester	Credit: 2	

Objectives:

1. Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
2. Understand dynamic memory management techniques using pointers, constructors, destructors, etc
3. Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
4. Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
5. Demonstrate the use of various OOPs concepts with the help of programs

Outcomes:

Upon successful completion of the course, students will be able to:

Program in C++: Write, compile, debug, and execute C++ programs to solve various problems.

Apply OOP Concepts: Utilize OOP principles to design and implement object-oriented solutions.

- 1 Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.
- 2 Write a C++ program to demonstrate Class and Objects.
- 3 Write a C++ program to demonstrate the concept of Passing Objects to Functions.
- 4 Write a C++ program to demonstrate the Friend Functions.
- 5 Write a C++ program to demonstrate the concept of Passing Objects to Functions
- 6 Write a C++ program to demonstrate Constructor and Destructor
- 7 Write a C++ program to demonstrate Unary Operator Overloading
- 8 Write a C++ program to demonstrate Binary Operator Overloading
- 9 Write a C++ program to demonstrate:
 - Single Inheritance
 - Multilevel Inheritance
 - Multiple Inheritance
 - Hierarchical Inheritance
 - Hybrid Inheritance
- 10 Write a C++ program to demonstrate Virtual Functions.

- 11 Write a C++ program to manipulate a Text File.
- 12 Write a C++ program to perform Sequential I/O Operations on a file.
- 13 Write a C++ program to find the Biggest Number using Command Line Arguments.

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	M	S	L	M	L	L
CO2	S	S	M	S	M	L	L	L	M	L
CO3	L	M	S	L	M	S	S	L	S	M
CO4	S	L	L	M	L	L	M	S	M	S
CO5	M	S	M	L	S	S	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/ Paper	Practical – IV : Based on Elective III Lab. Python Programming Lab		
Core – 9B	I Year & II Semester	Credit: 2	

OBJECTIVE:

- To implement the python programming features in practical applications.
- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries, turtles, Files and modules.

OUTCOMES:

- Understand the numeric or real life application problems and solve them
- Apply a solution clearly and accurately in a program using Python.
- Apply the best features available in Python to solve the situational problems

List of Exercise:

1. Design a script in Scratch to make a sprite to draw geometrical shapes such as Circle, Triangle, Square, and Pentagon.
2. Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result
3. Design a Python Script to convert a given number to words
4. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
5. Design a Python script to sort numbers specified in a text file using lists.
6. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format $0 \leq YYYY \leq 9999$, $1 \leq MM \leq 12$, $1 \leq DD \leq 31$ following the leap year rules.
7. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python
8. Design a Python Script to generate the frequency count of words in a text file.
9. Design a Python Script to print a spiral pattern for a 2 dimensional matrix
10. Write a Python program to create a dictionary grouping a sequence of key-value pairs into a dictionary of lists. Original list: [('yellow', 1), ('blue', 2), ('yellow', 3), ('blue', 4), ('red', 1)]
Grouping a sequence of key-value pairs into a dictionary of lists: {'yellow': [1, 3], 'blue': [2, 4], 'red': [1]}
11. Design a Python script to generate statistical reports (Minimum, Maximum, Count, Average

& Sum) on public datasets

12. Write a Python program to check that a string contains only a certain set of characters in this case a-z, A-Z and 0-9
13. Write a Python program to find the occurrence and position of the substrings within a string.

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	L	M	L	L
CO2	S	S	M	S	S	M	L	L	M	L
CO3	M	M	S	L	L	S	S	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	M	S	M	L	S	M	M	L	M	L

S-Strong

M-Medium

L-Low

Syllabus of Soft Skill Courses

Title of the Course/Paper	Communication Skills for Software Engineers - I		
Soft Skill -	First Year – F i r s t Semester		Credit:2

Objectives:

- Understand the need of current soft skills
- Generalize self development and implementation procedures
- Demonstrate narration skills
- Design simple comprehension with given requirements
- Develop implementations in latest technologies
- Demonstrate the applications with varied soft skills like debate, oration, tell about yourself etc.

Outcomes:

- Enumerate varied soft skills needed for employment
- Identify the lack in oneself and improve it
- Learn the current technical implementations
- Summarize the different requirements for employability
- Calculate self performance ,Generalize narration , oration and debate skills
- Conceptualize the representation of current technologies

1 Basics of Communication

Definition and process of communication

Types of communication - formal and informal, oral and written, verbal and non-verbal

Communications barriers and how to overcome them

Barriers to Communication, Tools of Communication

2 Application of Grammar

Parts of Speech (Noun, verb, adjective, adverb) and modals

Sentences and its types

Tenses

Active and Passive Voice

Punctuation

Direct and Indirect Speech

3 Reading Skill

Unseen passage for comprehension (one word substitution, prefixes, suffixes, antonyms, synonyms etc. based upon the passage to be covered under this topic)

4 Writing Skill

Picture composition

Writing paragraph

Notice writing

5 Listening and Speaking Exercises

1. Self and peer introduction
2. Newspaper reading
3. Just a minute session-Extempore
4. Greeting and starting a conversation
5. Leave taking
6. Thanking
7. Wishing well
8. Talking about likes and dislikes
9. Group Discussion
10. Listening Exercises.

- Student should be encouraged to participate in role play and other student centred activities in class room and actively participate in listening exercises
- Assignments and quiz/class tests, mid-semester and end-semester written tests – Actual practical work, exercises and viva-voce – Presentation and viva-voce

QUESTION PAPER PATTERN

SECTION	UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V	TOTAL
	THEORY	THEORY	THEORY	THEORY	THEORY	
SECTION A (2 MARKS) ANSWER ANY 10 OUT OF 12	3	2	2	3	2	12
SECTION B (5 MARKS) ANSWER ANY 5 OUT OF 8	1	2	2	1	2	08
SECTION C (10 MARKS) ANSWER ANY 3 OUT OF 5	1	1	1	1	1	05
TOTAL	5	5	5	5	5	25

Recommended Texts:

1. Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.
2. Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.

Reference Books:

1. High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
2. Excellent General English-R.B.Varshnay, R.K. Bansal, Mittal Book Depot, Malhotra
3. The Functional aspects of Communication Skills – Dr. P. Prasad, S.K. Katria & Sons, New Delhi

4. Q. Skills for success – Level & Margaret Books, Oxford University Press.
5. e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

Web References:

1. <http://www.mindtools.com>
2. <http://www.letstalk.com.in>
3. <http://www.englishlearning.com>
4. <http://learnenglish.britishcouncil.org/en/>
5. <http://swayam.gov.in>

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	M	S	M	S	L	S	S	M
CO2	S	M	L	M	L	S	M	L	M	S
CO3	M	S	S	L	M	S	L	M	S	M
CO4	S	L	S	M	S	L	L	M	M	S
CO5	S	M	L	S	L	M	S	L	M	S

S-Strong

M-Medium

L-Low

FIRST YEAR SECOND SEMESTER

Title of the Course/ Paper	Design and Analysis of Algorithms		
Core – 6	I Year & II Semester	Credit: 4	

Outcomes:

- Learn about simple problems and complexity of their solutions.
- To understand the role of algorithms in problem solving. Learn and understand the asymptotic analysis of algorithms.
- Learn and analyze various algorithm design methods through general principles and with selected set of example problems.
- Conceptualize and use these methods to solve complex real world problems particularly problems involved in industrial projects.
- Critically analyze and compare the algorithms for a set of selected example problems which are hard in nature with design approaches like greedy, dynamic programming and branch and bound etc.

Objectives:

- To define the term Algorithm in the context of problem solving. To make students understand the design and analysis process of algorithms for simple problems.
- Understand various algorithm design methods, apply them for problem solving and analyze the complexity for simple problems.
- Study algorithm design methods for complex problems and compare and analyze the complexity of approximate and exact algorithms.
- Calculate and measure the performance of algorithms and compare the results. Critically assess the performance.
- Differentiate the concepts studied with certain selected examples and compare and generalize.

Unit 1: Introduction - Definition of Algorithm – pseudocode conventions – recursive algorithms – time and space complexity – big-“oh” notation – exponentiation - practical complexities – randomized algorithms – repeated element – primality testing - Disjoint Sets- disjoint set operations, union and find algorithms,

Unit-2: Divide and Conquer: General Method - Finding maximum and minimum – merge sort - Quicksort, Selection, Strassen's matrix multiplication.

Unit 3: – Greedy Method: General Method – knapsack problem - Tree vertex splitting - minimum cost spanning trees - Job sequencing with deadlines – single source shortest paths. Dynamic Programming: General Method - multistage graphs – all pairs shortest paths — 0/1 knapsack .

Unit 4: Search techniques for graphs –DFS-BFS-connected components – Spanning trees– biconnected components. Back Tracking: General Method – 8-queens - Sum of subsets – Graph Coloring – Hamiltonian cycles.

Unit 5: Branch and Bound: General Method - Job sequencing with deadlines – 0/1 knapsack

problem - Traveling Salesperson problem. - Basic Concepts of NP-Hard and NP-Complete problems.

QUESTION PAPER PATTERN

SECTION	UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V	TOTAL
	THEORY	THEORY	THEORY	THEORY	THEORY	
SECTION A (2 MARKS) ANSWER ANY 10 OUT OF 12	3	2	2	3	2	12
SECTION B (5 MARKS) ANSWER ANY 5 OUT OF 8	1	2	2	1	2	08
SECTION C (10 MARKS) ANSWER ANY 3 OUT OF 5	1	1	1	1	1	05
TOTAL	5	5	5	5	5	25

Recommended Texts:

- 1) E. Horowitz, S. Sahni and S. Rajasekaran, 2008, Computer Algorithms, 2nd Edition, Universities Press, India.

Reference Books

- 1) G. Brassard and P. Bratley, 1997, Fundamentals of Algorithms, PHI, New Delhi.
- 2) A.V. Aho, J.E. Hopcroft, J.D. Ullmann, 1974, The Design and Analysis of Computer Algorithms, Addison Wesley, Boston.
- 3) S.E. Goodman and S.T. Hedetniemi, 1977, Introduction to the Design and Analysis of algorithms, Tata McGraw Hill Int. Edn, New Delhi.

E-learning resources

- 1) <http://www.cise.ufl.edu/~raj/BOOK.html>

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	L	M	L	L
CO2	S	S	M	S	M	M	L	L	M	L
CO3	L	M	S	L	M	S	S	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	M	S	M	L	S	M	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/ Paper	Programming in Java		
Core – 7	I Year & II Semester	Credit: 4	

OBJECTIVES:

- To understand the concepts of Object Oriented Programming.
- To learn about the control structures, class with attributes and methods used in Java

OUTCOMES:

- Knowledge of the structure and model of the Java programming language.
- Understand the basic principles of creating Java applications with GUI.
- Demonstrate use of string and String Buffers, develop multithreaded programs in Java

Unit – I

The History and Evolution of Java – Object Oriented Programming - Data Types, Variables and Arrays - Operators – Control Statements.

Unit – II

Introducing Classes - Class Fundamentals – Declaring Objects –Introducing Methods - Constructors – this Keyword - Garbage Collection – Finalize() Method – Methods and Classes – Inheritance – Packages and Interfaces.

Unit – III

Exception Handling – The Java Thread Model – Enumeration Fundamentals – String Handling – The Stream Classes – Byte Stream – Character Streams.

unit – IV

The Applet Class – Event Handling - Introducing the AWT: Working with Windows, Graphics and Text – AWT Controls, Layout Managers and Menus- Networking.

Unit – V

Java Beans – Advantages of Java Bean – Introducing Swing – Swing Buttons – Servlets – JDBC – Applications on databases - Multimedia streaming applications – Java Media Framework.

– QUESTION PAPER PATTERN

SECTION	UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V	TOTAL
	THEORY	THEORY	THEORY	THEORY	THEORY	
SECTION A (2 MARKS) ANSWER ANY 10 OUT OF 12	3	2	2	3	2	12
SECTION B (5 MARKS) ANSWER ANY 5 OUT OF 8	1	2	2	1	2	08
SECTION C (10 MARKS) ANSWER ANY 3 OUT OF 5	1	1	1	1	1	05

TOTAL	5	5	5	5	5	25
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Text Book

1. The Complete Reference - Java – Seventh Edition , Herbt Schildt- ISBN 978-0-07-163177-8

Reference Book

2. Hortsman & Cornell, “Core Java2 Advanced Features, Vol II”, Pearson Education, 2002.

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	L	M	L	L
CO2	S	S	M	S	S	M	L	L	M	L
CO3	L	M	S	L	M	S	S	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	M	S	M	L	S	M	M	L	M	L

S-Strong M-Medium L-Low

Title of the Course/ Paper	Practical – III : Java Programming Lab.		
Core – 8	I Year & II Semester	Credit: 2	

Objectives:

- To write programs using abstract classes.
- To write programs that connects database using JDBC
- To write multithreaded programs.
- To write GUI programs using AWT controls in Java.
- To impart hands on experience with java programming.

Outcomes:

- Develop program using OOPS concept of Java
- Develop program using GUI framework (AWT and Swing)
- Handle events of AWT and Swing Components.
- Develop programs to handle events in Java Programming.
- Develop Java Programs using Networking Concepts.
- Develop programs using Database.
- Develop programs using Servlets.

List of Exercise:

1. Write a Java program to find area and perimeter of different shapes.
2. Write a java Program to find sum of n prime numbers.
3. Write a java program to find simple and compound Interest using this keyword.
4. Write a Java program to create a class account using the inheritance and static that show all function of the bank(Withdrawal, Deposit) .
5. Write a Java program to perform different string manipulation.
6. Write a Java program to handle exception using try and multiple catch block.
7. Write a java program that connects to a database using JDBC and perform add, deletes, modify and retrieve operations
8. Write a program to demonstrate the use of AWT components like Label, Textfield, TextArea, Button, Checkbox, RadioButtonetc
9. Write a program using AWT to create a menubar where menubar contains menu items such as File, Edit, View and create a submenu under the File menu: New and Open.
10. Develop an Applet that receives an integer in one text field & compute its factorial value & returns it in another text filed when the button “Compute” is clicked.
11. Write a program to demonstrate status of key on Applet window such as KeyPressed, KeyReleased, KeyUp, KeyDown

12. Write a program to demonstrate various mouse events using MouseListener and MouseMotionListener interface
13. Write a Servlet program to send username and password using HTML forms and authenticate the user

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	S	M	L	M	L	L
CO2	S	S	M	S	S	M	L	L	M	L
CO3	L	M	S	L	M	S	S	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	M	S	M	L	S	M	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/ Paper	Practical – II: RDBMS Lab.		
Core – 5	I Year & II Semester	Credit: 2	

OBJECTIVES:

- To understand data definitions and data manipulation commands • To learn the use of nested and join queries
- To understand functions, procedures and procedural extensions of data bases • To be familiar with the use of a front end tool

• To understand design and implementation of typical database applications

OUTCOMES: Upon completion of the course, the students will be able to:

- Use typical data definitions and manipulation commands.
- Design applications to test Nested and Join Queries
- Implement simple applications that use Views
- Implement applications that require a Front-end Tool
- Critically analyze the use of Tables, Views, Functions and Procedures

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
2. Database Querying – Simple queries, Nested queries, Sub queries and Joins
3. Views, Sequences, Synonyms 4. Database Programming: Implicit and Explicit Cursors
5. Procedures and Functions
6. Triggers
7. Exception Handling
8. Database Design using ER modeling, normalization and Implementation for any application
9. Database Connectivity with Front End Tools
10. Case Study using real life database applications.
 - i. Library Information Processing.
 - ii. Students Mark sheet processing using images.
 - iii. Bank Transactions (SB).
 - iv. Pay roll processing.
 - v. Inventory
 - vi. Purchase order processing.

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	M	S	L	M	L	L
CO2	S	S	M	S	M	M	L	L	M	L
CO3	L	M	S	L	M	S	S	L	S	M
CO4	S	L	L	M	M	L	M	S	M	S
CO5	M	S	M	L	S	S	M	L	M	L

S-Strong M-Medium L-Low

Title of the Course/ Paper	Practical – IV : Based on Elective III Lab. Web Technology Lab		
Core – 9A	I Year & II Semester	Credit: 2	

OBJECTIVES

- To explore about JavaScript objects
- To implement XML and Web services
- Explain how to create dynamic Web pages by using ASP.NET.
- Create a user interface on an ASP.NET page by using standard Web server controls.
- Create a user control and a custom server control and add them to an ASP.NET page.
- Display dynamic data from a data source by using ADO.Net

OUTCOMES:

At the end of this Lab course students will be able to

- Create Web Pages using Javascript object
- Design web pages using xml and webservice
- Create user interactive web pages using ASP.Net.
- Create simple data binding applications using ADO.Net connectivity.

LIST OF PROGRAMS:

1. Validate the Registration, user login and payment by credit card pages using JavaScript.
2. Write a JavaScript to design a simple calculator to perform the following operations:
sum, product, difference and quotient
3. Write a program to implement XML Document Creation
4. Write a program to implement Internal DTD Creation
5. Write a program to implement External DTD Creation
6. Write a program to implement XML Schema Creation
7. Write a program to implement WSDL Service (HelloService.WSDL File)

8. Write a program the service provider can be implement a single get price (), static
9. Write a program to implement to create a simple web service that converts the temperature from Fahrenheit to Celsius (using HTTP Post Protocol)
10. Write a program to study the Validation controls in asp.net.
11. Write a program to study the grid view control in asp.net.
12. Write a program to study the ADO.net and Stored procedure in asp.net.
13. Write a program to access data sources through ADO.NET

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	L	M	L	L
CO2	S	S	M	S	S	M	L	L	M	L
CO3	L	M	S	L	M	S	S	L	S	M
CO4	S	M	S	M	M	L	L	S	L	S
CO5	M	S	M	L	S	M	M	L	M	L

S-Strong M-Medium L-Low

Title of the Course/ Paper	Practical – IV : Based on Elective III Lab. Mobile Application Development Lab.		
Core – 9C	I Year & II Semester	Credit: 2	

Objective:

The objective of this lab is to get an overview of the various application techniques and can able to demonstrate them using android.

Outcomes:

After the completion of the course the student can able to:

- Understand complexity of android application and techniques and their limitations.
- Capable of confidently applying common android application in practice and implementing their own.
- Capable of performing experiments in android application using virtual games.

List of Exercise:

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Implement an application that implements Multithreading.
7. Develop a native application that uses GPS location information.
8. Implement an application that writes data to the SD card.
9. Implement an application that creates an alert upon receiving a message.
10. Write a mobile application that creates alarm clock.

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	L	M	L	L
CO2	S	S	M	S	S	M	L	L	M	L
CO3	M	M	S	L	L	S	S	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	M	S	M	L	S	M	M	L	M	L

S-Strong M-Medium L-Low

Title of the Course/ Paper	Advanced Computing Networks		
Core – 10	II Year & III Semester	Credit: 4	

Course Objectives

- 1 To define the computer networks and identify the taxonomy of computer networks in terms of its transmission technology and scalability. Outline the features of the OSI and TCP/IP network architectures
- 2 Critically understand and assess various transmission media and algorithms for modulation and multiplexing.
- 3 Understand , apply and analyze various algorithms used for error correction and detection and transmission protocols in point to point for broad cast communication systems.
- 4 Understand and evaluate well known algorithms used for routing packets and avoid congestion in complex internet networks.
- 5 Conceptually understand the protocols used in end to end communication to establish, and release connection and segment transmission to provide reliable service to applications. Create sample protocols and evaluate the performance.

Course Outcomes:

- 1 Learn and understand the basic concepts of networking and its applications. To understand well established layered architectures in computer networks
- 2 Understand the concepts of the transmission medium, modulation and multiplexing techniques
- 3 Learn and understand well established error detection and correction codes and various protocols used in dealing with point to point and broad cast communications systems data link layer.
- 4 Comprehend the design issues and to assess the routing and congestion control algorithms.
- 5 Enumerate the transport layer service, conceptualize the internet transport protocols and the network security.

Unit 1: Introduction - Uses of networks - Network architectures - OSI and TCP/IP reference model and services – Example Networks.

Unit 2: Physical layer - Transmission media - Guided and wireless – Digital Modulation and multiplexing – Public switched Telephone network.

Unit 3: Data link layer Design issues - error detection and correction - elementary data link

protocols - sliding window protocols - Packet over SONET- ADSL. MAC sublayer protocols.

Unit 4: Network layer-design issues – Routing and congestion control algorithms, Quality of service, internetworking – Network layer in the INTERNET.

Unit 5: Transport layer – transport service - Addressing, Establishing & Releasing a connection, Multiplexing, Crash Recovery, Internet transport protocol TCP, Network security-cryptography.

Text book: 1. A. S. Tanenbaum, N. Feamster and D.J. Wetherall, 2021, Computer Networks, 6th Edition, Pearson Education.

Reference books:

1. D. Bertsekas and R. Gallager, 1992, Data Networks, Prentice hall of India, New Delhi.
2. L. L Peterson and B. S Davie, “Computer Networks – A Systems Approach”, MK Publishers, Fifth Edition, 2012
3. J. F Kurose and K. W Ross, “Computer Networking – A Top Down Approach”, Eighth Edition, Pearson Education, 2021.

E-learning resources

- 1 <https://nptel.ac.in/courses/106/105/106105183/>
- 2 <https://nptel.ac.in/courses/106/105/106105081/>
- 3. <https://nptel.ac.in/courses/106/105/106105080/>
- 4. <http://intronetworks.cs.luc.edu/current/ComputerNetworks.pdf>
- 5. Linux Network Administrators Guide, <http://tldp.org/LDP/nag2/index.html>

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	M	S	L	M	L	L
CO2	S	M	S	M	M	L	S	L	M	L
CO3	L	M	S	L	M	S	M	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	S	S	M	L	S	M	M	L	M	L
	S-Strong		M-Medium		L-Low					

Title of the Course/ Paper	Operating Systems		
Core – 11	II Year & III Semester	Credit: 4	

OBJECTIVES

- To understand the basic concepts and functions of operating systems
- To understand Processes and Threads
- To analyze Scheduling algorithms.
- To understand the concept of Deadlocks.
- To analyze various memory management schemes.
- To understand I/O management and File systems.

OUTCOMES

At the end of the course, the students should be able to:

- Analyze various scheduling algorithms.
- Understand deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Understand the functionality of file systems.

Unit I: Introduction- Operating Systems- Computer System Architecture- Operating System Structure- Operating System Services- User and Operating System Interface- System Calls- Types of System Calls- System Programs- Operating System Debugging –Operating System Generation- System Boot- Process - Process Scheduling- Interprocess Communication- Examples of IPC Systems- Communication in Client– Server Systems.

Unit II: Threads- Multicore Programming- Multithreading Model- Threading Issues- Process Synchronization- The Critical-Section Problem- Peterson’s Solution- Synchronization Hardware - Mutex Locks- Semaphores- Monitors- CPU Scheduling- Scheduling Criteria- Scheduling Algorithm- Thread Scheduling- Multiple Processor Scheduling- System Model- Methods for Handling Deadlocks- Deadlock Prevention- Deadlock Avoidance- Deadlock Detection.

Unit III:Main Memory- Swapping- Contiguous Memory Allocation- Segmentation- Paging- Structure of the Page Table- Example: ARM Architecture- Virtual Memory- Demand Paging- Page Replacement- Thrashing- Memory-Mapped Files- Allocating Kernel Memory

Unit IV: Mass-Storage Structure- Disk Structure-Disk Attachment-Disk Scheduling -Disk Management –Swap Space Management RAID Structure – Stable Storage Implementation- File Concept -Access Methods -Directory and Disk Structure - File-System Mounting - File Sharing – Protection- File-System Structure File System Implementation-Directory Implementation-

Allocation Methods - Free Space Management Efficiency and Performance - Recovery – NFS-I/O Hardware -Application I/O Interface- Kernel I/O Subsystem - Transforming I/O Requests to Hardware Operations.

Unit V: Protection- Goals of Protection-Principles of Protection-Domain of Protection-Access Matrix- Implementation of the Access Matrix-Access Control -Revocation of Access Rights-Capability-Based Systems-Language Based Protection- The Security Problem-Program Threats-System and Network Threats -Cryptography as a Security Tool -User Authentication-Implementing Security Defenses-Firewalling to Protect Systems and Networks -Computer Security Classifications

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, —Operating System Conceptsll,9th Edition, John Wiley and Sons Inc., 2012.

REFERENCES :

1. RamazElmasri, A. Gil Carrick, David Levine, —Operating Systems – A Spiral Approachll,Tata McGraw Hill Edition, 2010. os Notes
2. AchyutS.Godbole, AtulKahate, —Operating Systemsll, McGraw Hill Education, 2016.
3. Andrew S. Tanenbaum, —Modern Operating Systemsll, Second Edition, Pearson Education,2004. CS8493 Notes Operating Systems
4. Gary Nutt, —Operating Systemsll, Third Edition, Pearson Education, 2004.

E-Resources:

<https://applied-programming.github.io/Operating-Systems-Notes/>

<https://ecomputernotes.com/fundamental/disk-operating-system/what-is-operating-system>

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	M	L	M	L	L
CO2	S	M	S	M	S	L	S	L	M	L
CO3	L	M	S	M	M	S	L	L	S	M
CO4	S	L	L	M	M	L	M	S	M	S
CO5	S	S	M	L	S	M	M	L	M	L
	S-Strong		M-Medium		L-Low					

Title of the Course/ Paper	Machine Learning		
Core – 12	II Year & III Semester	Credit: 4	

Objectives:

- To provide mathematical base for Machine learning
- To provide theoretical knowledge on setting hypothesis for pattern recognition.
- To impart Knowledge of machine learning techniques for data handling
- To provide the skill to evaluate the performance of algorithms and to provide solution for various real-world applications.
- To impart the knowledge of identifying similarities and differences in various patterns of data

Outcomes:

- Recognize the characteristics of machine learning strategies.
- Apply various supervised learning methods to appropriate problems.
- Identify and integrate more than one technique to enhance the performance of learning.
- Create probabilistic and unsupervised learning models for handling unknown pattern.
- Analyze the co-occurrence of data to find interesting frequent patterns.
- Preprocess the data before applying to any real-world problem and can evaluate its performance.

Unit 1: The Fundamentals of Machine Learning: The Machine Learning Landscape - Types of Machine Learning Systems - Main Challenges of Machine Learning - Testing and Validating. End-to-End Machine Learning Project - Look at the Big Picture - Get the Data - Discover and Visualize the Data to Gain Insights - Prepare the Data for Machine Learning Algorithms - Select and Train a Model - Fine-Tune Your Model - Launch, Monitor, and Maintain Your System.

Unit 2: Ingredients of machine learning: Tasks – Models – Features. Supervised Learning: Classification – Binary classification and related tasks – Scoring and ranking – class probability estimation – Multi-class classification. Unsupervised Learning: Regression – Unsupervised and descriptive learning. Concept Learning: The hypothesis space – paths through the hypothesis space – beyond conjunctive concepts – learnability.

Unit 3: Tree Models: Decision trees – Ranking and probability estimation trees – tree learning as variance reduction. Rule Models: Learning ordered rule lists – learning unordered rule sets – descriptive rule learning – first-order rule learning. Linear Models: The least-squares method – The perceptron – Support vector machines.

Unit 4: Distance-based Models: Neighbours and exemplars – Nearest-neighbour classification –

Distance-based clustering – K-Means algorithm – Hierarchical clustering. Probabilistic Models: The normal distribution and its geometric interpretations – probabilistic models for categorical data – Naïve Bayes model for classification – probabilistic models with hidden values – Expectation-Maximization.

Unit 5: Features: Kinds of features – Feature transformations – Feature construction and selection. Model ensembles: Bagging and random forests – Boosting – Mapping the ensemble landscape. Machine Learning experiments: What to measure – How to measure it – How to interpret it.

Text Books:

1. Flach, P, “Machine Learning: The Art and Science of Algorithms that Make Sense of Data”, Cambridge University Press, 2012
2. Aurélien Géron, “Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems”, First Edition, 2017 (Chapters 1 and 2)

References

1. John D. Kelleher, Brian Mac Namee, Aoife D'Arcy, “Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies”, The MIT Press, First Edition, 2012
2. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012
3. Ethem Alpaydin, “Introduction to Machine Learning”, MIT Press, Third Edition, 2014
4. Tom Mitchell, "Machine Learning", McGraw-Hill, 1997
5. Stephen Marsland, “Machine Learning - An Algorithmic Perspective”, Chapman and Hall/CRC Press, Second Edition, 2014.

Web References:

- https://www.youtube.com/watch?v=r4sgKrRL2Ys&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	L	S	M	L	M	L	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	M	S	M	M	S	S	L	L	L	M
CO4	S	L	L	M	M	L	M	S	M	S
CO5	S	S	M	S	S	M	M	L	M	L
	S-Strong		M-Medium		L-Low					

Title of the Course/ Paper	Information Security		
Extra-Disciplinary	II Year & III Semester	Credit: 4	

Objectives:

- To acquire knowledge of cryptography and network security
- To acquire knowledge of security management and incident response
- To acquire knowledge of security in software and operating systems
- To acquire knowledge of data security and secure system development
- To acquire knowledge of privacy and data protection
- To provide the ability to examine and analyze real-life security cases.

Outcomes:

- Test and evaluate security in systems and networks
- Use methods for planning and designing secure systems
- Apply techniques and tools for secure system deployment and operation
- Perform continuous testing, assessment and updating of system security
- Evaluate vulnerability of an information system and establish a plan for risk management.
- Demonstrate how to secure a network. Evaluate a company's security policies and procedures.

Unit 1: Introduction: Security- Attacks- Computer criminals- Method of defense Program Security: Secure programs- Non-malicious program errors- Viruses and other malicious code- Targeted malicious code- Controls against program threats

Unit 2: Operating System Security: Protected objects and methods of protection- Memory address protection- Control of access to general objects- File protection mechanism- Authentication: Authentication basics- Password- Challenge-response- Biometrics.

Unit 3: Database Security: Security requirements- Reliability and integrity- Sensitive data- Interface- Multilevel database- Proposals for multilevel security

Unit 4: Security in Networks: Threats in networks- Network security control- Firewalls- Intrusion detection systems- Secure e-mail- Networks and cryptography- Example protocols: PEM- SSL- Ipsec.

Unit 5: Administrating Security: Security planning- Risk analysis- Organizational security policies- Physical security - Legal- Privacy- and Ethical Issues in Computer Security - Protecting programs and data- Information and law- Rights of employees and employers- Software failures- Computer crime- Privacy- Ethical issues in computer society- Case studies of ethics.

Recommended Text

- 1) C. P. Pfleeger, and S. L. Pfleeger, Security in Computing, Pearson Education, 4th Edition, 2003
- 2) Matt Bishop, Computer Security: Art and Science, Pearson Education, 2003.

Reference Books

- 1) Stallings, Cryptography & N/w Security: Principles and practice, 4th Edition, 2006
- 2) Kaufman, Perlman, Speciner, Network Security, Prentice Hall, 2nd Edition, 2003
- 3) Eric Maiwald, Network Security : A Beginner's Guide, TMH, 1999
- 4) Macro Pistoia, Java Network Security, Pearson Education, 2nd Edition, 1999
- 5) Whitman, Mattord, Principles of Information Security, Thomson, 2nd Edition, 2005

Website and e-Learning Source

- 1) <http://www.cs.gsu.edu/~cscyqz/courses/ai/aiLectures.html>
- 2) <http://www.eecs.qmul.ac.uk/~mmh/AINotes/>
- 3) <https://nptel.ac.in/courses/106106129>
- 4) <https://nptel.ac.in/courses/106106199>

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	S	M	L	M	L	L
CO2	S	M	S	M	S	M	M	L	M	L
CO3	M	S	M	M	S	S	L	L	L	M
CO4	S	L	L	M	M	L	M	S	M	S
CO5	S	S	M	S	S	M	M	L	M	L
	S-Strong		M-Medium		L-Low					

Title of the Course/ Paper	Practical – V: Machine Learning Lab.		
Core-13	II Year & III Semester	Credit: 2	

Objectives:

- Make use of Data sets in implementing the machine learning algorithms
- Implement the machine learning concepts and algorithms in any suitable language of choice.
- The programs can be implemented in either JAVA or Python.
- For Problems 1 to 6 and 10, programs are to be developed without using the builtin classes or APIs of Java/Python.
- Data sets can be taken from standard repositories (<https://archive.ics.uci.edu/ml/datasets.html>) or constructed by the students.

Outcomes:

- Understand the implementation procedures for the machine learning algorithms.
 - Design Java/Python programs for various Learning algorithms.
 - Apply appropriate data sets to the Machine Learning algorithms.
 - Identify and apply Machine Learning algorithms to solve real world problems.
 - be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file
 2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
 3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
 4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
 5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering

few test data sets.

6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

Recommended Texts:

- Lab manual of Machine Learning: Machine Learning Practicals in Python by Dr. Kamlesh Namdev, LAP LAMBERT Academic Publishing

Reference Books:

- Introduction to Machine Learning with Python by Andreas C. Müller, Sarah Guido Released October 2016 Publisher(s): O'Reilly Media, Inc. ISBN: 9781449369415

Web References:

- <https://www.youtube.com/watch?v=RnFGwxJwx-0>

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	L	S	M	L	M	L	L
CO2	S	M	S	S	S	M	M	L	M	L
CO3	M	S	M	M	S	S	L	L	L	M
CO4	S	L	M	M	M	L	M	L	M	S
CO5	S	S	M	S	L	M	M	L	M	L
S-Strong M-Medium L-Low										

Title of the Course/ Paper	Practical – X: Mini Project		
Core – 14	II Year & III Semester	Credit: 2	

Objectives:

- To provide the hands on experience in analyzing, designing and implementing various projects.
- To assign minor projects based on the languages they have learned so far.
- To comprehend technical literature and document project work
- To create test cases and implement different testing strategies
- To provide software development skill for a given problem

Outcomes:

- Apply the software engineering principles on a real software project
- Develop a software product using the methodologies applied in the industry.
- Work with different version control system.
- Apply technology tools to analyze, design, develop and test the application
- Design a system, model, component or a process to meet desired/industrial needs

Mini Project: Each student will develop and implement application software based on any emerging latest technologies.

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	S	L	S	M	L	M	L	L
CO2	S	M	S	M	S	M	M	L	S	L
CO3	M	S	M	M	S	S	L	L	L	M
CO4	S	L	M	M	M	L	M	L	M	S
CO5	S	S	M	S	L	M	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/ Paper	Project & Viva-Voce		
Core- 15	II Year & IV Semester	Credit: 20	

Objectives:

- To make the project an extended piece of individual work.
- To work on a topic that interests the student
- To have regular meetings with their supervisor and/or external project provider to discuss progress
- To produce dissertations that contain some element of original work.
- To encourage and reward individual inventiveness and application of effort

Outcomes:

- Construct a project from initial ideas;
- Plan, schedule, monitor and control their own work;
- Defend their ideas in discussions and presentations;
- Use libraries and other information resources;
- Apply tools and techniques from taught courses
- Communicate their findings through a written report.

Project: The project work is to be carried out either in a software industry or in an academic institution for the entire semester and the report of work done is to be submitted to the University.

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	L	L	S	M	L	M	S	L
CO2	S	M	S	S	S	M	M	L	M	L
CO3	M	S	M	S	M	S	L	L	L	M
CO4	S	L	M	M	S	L	M	L	M	S
CO5	S	S	M	S	L	S	M	L	M	L

S-Strong

M-Medium

L-Low

Syllabus of Elective courses.

Title of the Course / Paper	Data Mining and Data Warehousing		
Elective-1	I Year & I Semester	Credit: 3	

Objective:

- To understand the principles of Data warehousing and Data Mining.
- To be familiar with the Data warehouse architecture and its Implementation.
- To know the Architecture of a Data Mining system.
- To understand the various Data preprocessing Methods.
- To perform classification and prediction of data.

Outcomes:

- Define the scope and necessity of Data Mining & Warehousing for the society.
- Modeling and design of data warehouses.
- Comparing the design of data warehousing techniques so that it can be able to solve the root problem.
- Apply various tools of Data Mining and their techniques to solve the real time problems.
- To analyze and design various algorithms based on data mining tools.
- To evaluate research and design of new Data Mining Techniques.

Unit 1: Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse –Data Warehouse Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

Unit 2: Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation- Architecture Of A Typical Data Mining Systems- Classification Of Data Mining Systems. Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

Unit 3: Classification and Prediction: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

Unit 4: Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

Unit 5: Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

Recommended Texts:

- 1) Jiawei Han, Micheline Kamber and Jian Pei “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2011.

Reference Books:

- 1) Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, Tenth Reprint 2007.
- 2) K.P. Soman, Shyam Diwakar and V. Ajay “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
- 3) G. K. Gupta “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.
- 4) Pang-Ning Tan, Michael Steinbach and Vipin Kumar “Introduction to Data Mining”, Pearson Education, 2007.

E-learning resources:

- 1) <https://nptel.ac.in/courses/106105174>
- 2) https://onlinecourses.nptel.ac.in/noc21_cs06/preview
- 3) https://onlinecourses.swayam2.ac.in/cec20_cs12/preview

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	L	S	M	L	M	S	L
CO2	S	M	S	M	S	M	M	L	M	L
CO3	M	S	M	S	M	S	L	L	L	M
CO4	S	L	M	M	S	L	L	M	M	S
CO5	S	S	M	S	L	S	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/ Paper	E-Commerce		
Elective-1	I Year & I Semester	Credit: 3	

OBJECTIVES:

- To Learn the E-Commerce Platform and its concepts
- To Understand the Technology, infrastructure and Business in E-Commerce
- To Understand the Security and Challenges in E-Commerce
- To Build an Own E-Commerce using Open Source Frameworks

OUTCOMES: On Successful completion of the course ,Students will be able to

- Design Website using HTML CSS and JS
- Design Responsive Sites
- Manage, Maintain and Support Web Apps

UNIT I: INTRODUCTION TO E-COMMERCE AND TECHNOLOGY INFRASTRUCTURE : Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5

UNIT II: BUILDING AN E-COMMERCE WEBSITE, MOBILE SITE AND APPS
Systematic approach to build an E-Commerce: Planning, System Analysis, System Design, Building the system, Testing the system, Implementation and Maintenance, Optimize Web Performance – Choosing hardware and software – Other E-Commerce Site tools – Developing a Mobile Website and Mobile App

UNIT III E-COMMERCE SECURITY AND PAYMENT SYSTEMS

E-Commerce Security Environment – Security threats in E-Commerce – Technology Solutions: Encryption, Securing Channels of Communication, Protecting Networks, Protecting Servers and Clients – Management Policies, Business Procedure and Public Laws - Payment Systems

UNIT IV BUSINESS CONCEPTS IN E-COMMERCE

Digital Commerce Marketing and Advertising strategies and tools – Internet Marketing Technologies – Social Marketing – Mobile Marketing – Location based Marketing – Ethical, Social, Political Issues in E-Commerce

UNIT V PROJECT CASE STUDY

Case Study : Identify Key components, strategy, B2B, B2C Models of E-commerce

Business model of any e-commerce website - Mini Project : Develop E-Commerce project in any one of Platforms like Woo-Commerce, Magento or Opencart

QUESTION PAPER PATTERN

SECTION	UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V	TOTAL
	THEORY	THEORY	THEORY	THEORY	THEORY	
SECTION A (2 MARKS) ANSWER ANY 10 OUT OF 12	3	2	2	3	2	12
SECTION B (5 MARKS) ANSWER ANY 5 OUT OF 8	1	2	2	1	2	08
SECTION C (10 MARKS) ANSWER ANY 3 OUT OF 5	1	1	1	1	1	05
TOTAL	5	5	5	5	5	25

TEXT BOOK:

1. Kenneth C.Laudon, Carol Guercio Traver —E-Commercell, Pearson, 10th Edition,2016

REFERENCES

1. <http://docs.opencart.com/>
2. <http://devdocs.magento.com/>
3. <http://doc.prestashop.com/display/PS15/Developer+tutorials>
4. Robbert Ravensbergen, —Building E-Commerce Solutions with WooCommercell,PACKT, 2nd Edition

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	L	S	M	L	M	S	L
CO2	S	M	S	M	S	M	M	L	M	L
CO3	M	S	M	S	M	S	L	L	L	M
CO4	S	L	M	M	S	L	L	M	M	S
CO5	S	S	M	S	L	S	M	L	M	L

S-Strong M-Medium L-Low

Title of the Course/ Paper	E-Commerce		
Elective-1	I Year & I Semester	Credit: 3	

OBJECTIVES:

- To Learn the E-Commerce Platform and its concepts
- To Understand the Technology, infrastructure and Business in E-Commerce
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E-Commerce Security Environment – Security threats in E-Commerce – Technology Solutions: Encryption, Securing Channels of Communication, Protecting Networks, Protecting Servers and Clients – Management Policies, Business Procedure and Public Laws - Payment Systems

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UNIT V PROJECT CASE STUDY

Case Study : Identify Key components, strategy, B2B, B2C Models of E-commerce

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TEXT BOOK:

1. Kenneth C.Laudon, Carol Guercio Traver —E-Commercell, Pearson, 10th Edition,2016

REFERENCES

5. <http://docs.opencart.com/>

6. <http://devdocs.magento.com/>

7. <http://doc.prestashop.com/display/PS15/Developer+tutorials>

8. Robbert Ravensbergen, —Building E-Commerce Solutions with WooCommercell,PACKT, 2nd Edition

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	L	S	M	L	M	S	L
CO2	S	M	S	M	S	M	M	L	M	L
CO3	M	S	M	S	M	S	L	L	L	M
CO4	S	L	M	M	S	L	L	M	M	S
CO5	S	S	M	S	L	S	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/ Paper	Agile Software Engineering		
Elective-1	I Year & I Semester	Credit: 3	

Objectives:

- To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
- To provide a good understanding of software design and a set of software technologies and APIs.
- To do a detailed examination and demonstration of Agile development and testing techniques.
- To understand the benefits and pitfalls of working in an Agile team.
- To understand Agile development and testing.

Outcomes:

- Upon completion of the course, the students will be able to:
- Realize the importance of interacting with business stakeholders in determining the requirements for a software system
- Perform iterative software development processes: how to plan them, how to execute them.
- Point out the impact of social aspects on software development success.
- Develop techniques and tools for improving team collaboration and software quality.
- Perform Software process improvement as an ongoing task for development teams.
- Show how agile approaches can be scaled up to the enterprise level.

UNIT I AGILE METHODOLOGY: Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

UNIT II AGILE PROCESSES: Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT: Agile Information Systems – Agile Decision Making - Earl_ S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment, leveraging – KM in Software Engineering – Managing Software Knowledge –

Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT IV AGILITY AND REQUIREMENTS ENGINEERING: Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V AGILITY AND QUALITY ASSURANCE: Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development.

Recommended Texts:

- David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003.
- Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Science , Springer, 2009.

Reference Books:

- Craig Larman, —Agile and Iterative Development: A Manager_s Guide, Addison-Wesley, 2004.
- Kevin C. Desouza, —Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann, 2007.

Web References:

- <https://www.youtube.com/watch?v=x90kIAFGYKE&t=8s>

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	M	S	M	S	L	M	L	L
CO2	S	M	M	S	M	M	S	L	M	L
CO3	L	M	S	L	M	S	M	L	S	M
CO4	S	L	L	M	M	L	L	S	M	S
CO5	M	S	M	L	S	M	M	L	M	L
	S-Strong		M-Medium		L-Low					

Title of the Course/ Paper	Cloud Computing	
Elective-II	I Year & II Semester	Credit: 3

Objectives:

- To introduce the cloud computing concepts and map reduce programming model.
- To provide skills and knowledge about operations and management in cloud technologies so as to implement large scale systems.
- To provide skills to design suitable cloud infrastructure that meets the business services and customer needs.
- To provide Knowledge of different CPU, memory and I/O virtualization techniques that serve in offering software, computation and storage services on the cloud; Software Defined Networks (SDN) and Software Defined Storage(SDS); cloud storage technologies and relevant distributed file systems, NoSQL databases and object storage;
- To introduce the variety of programming models and develop working experience in several of them.

Outcomes:

- Understand the evolution, principles, and benefits of Cloud Computing in order to assess existing cloud infrastructures to choose an appropriate architecture that meets business needs.
- Decide a suitable model to capture the business needs by interpreting different service delivery and deployment models.
- Understand virtualization foundations to cater the needs of elasticity, portability and resilience by cloud service providers.
- Infer architectural style, work flow of real-world applications and to implement the cloud applications using map reduce programming models.
- Compare operation and economic models of various trending cloud platforms prevailing in IT industry.

Unit I: Foundations of cloud: Inception and need for cloud computing: Motivations from distributed computing predecessors - Evolution - Characteristics - Business Benefits – Challenges in cloud computing - Exploring the Cloud Computing Stack - Fundamental Cloud Architectures – Advanced Cloud Architectures - Specialized Cloud Architectures

Unit II: Service Delivery and Deployment Models: Service Models (XaaS): Infrastructure as a Service (IaaS) - Platform as a Service (PaaS) - Software as a Service(SaaS) - Deployment Models: Types of cloud - Public cloud - Private cloud - Hybrid cloud – Service level agreements - Types of SLA – Lifecycle of SLA- SLA Management

Unit III: Cloud Resource Virtualization: Virtualization as Foundation of Cloud – Understanding Hypervisors – Understanding Machine Image and Instances - Managing Instances – Virtual Machine Provisioning and Service Migrations Cloud Computing Applications and Paradigms: Existing Cloud Applications and Opportunities for New Applications - Architectural Styles for Cloud Applications - Workflows: Coordination of Multiple Activities - Coordination Based on a State Machine Model: The ZooKeeper - The MapReduce Programming Model - A Case Study: The Grep The Web Application

Unit IV: Resource Management and Scheduling in Cloud: Policies and Mechanisms for Resource Management – Stability of a Two-Level Resource Allocation Architecture- Feedback Control Based on Dynamic Thresholds - Coordination of Specialized Autonomic Performance Managers - A Utility-Based Model for Cloud-Based Web Services - Resource Bundling: Combinatorial Auctions for Cloud Resources – Scheduling Algorithms for Computing Clouds - Resource Management and Dynamic Application Scaling

Unit V: Cloud Platforms and Application Development: Comparing Amazon web services, Google AppEngine, Microsoft Azure from the perspective of architecture (Compute, Storage Communication) services and cost models. Cloud application development using third party APIs, Working with EC2 API – Google App Engine API - Facebook API, Twitter API. Advances in Cloud: Media Clouds - Security Clouds - Computing Clouds - Mobile Clouds – Federated Clouds – Hybrid Clouds

Recommended Texts:

1. Rajkumar Buyya, James Broberg, Andrzej, M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 1st Edition, 2013.
2. Sosinsk, Barrie, Cloud Computing Bible, John Wiley & Sons, 1st Edition, 2011.

Reference Books:

1. Marinescu, Dan C. Cloud Computing: Theory and Practice. MorganKaufmann, 2017.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, Mc Graw Hill Education, 1st Edition, 2017.
3. Buyya, Rajkumar, Christian Vecchiola, and S. Thamarai Selvi. Mastering Cloud Computing: Foundations and Applications Programming, Tata Mcgraw Hill, 1st Edition, 2017.

Web References:

1. <https://www.youtube.com/watch?v=-8O32k26RWA>
2. Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	L	L	S	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	M	S	M	S	M	S	L	L	L	M
CO4	S	L	M	S	S	L	L	M	M	S
CO5	S	S	M	S	L	M	M	L	M	L

3. S-Strong M-Medium L-Low

Title of the Course/ Paper	Software Testing	
Elective-II	I Year & II Semester	Credit: 3

Objectives:

- To understand the principles of Software Testing and tools..
- Enable the students to learn about the principle and tools of Software testing.
- Improve knowledge in software testing tools.

Outcomes:

- Understand the fundamentals of software testing.
- Gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.
- Analyze path testing concept. Analyze state testing concept. Execute programs and test data in Client-Server Architecture.
- Able to debug the project and to test the entire computer based systems at all levels.
- Able to apply quality and reliability metrics to ensure the performance of the software.
- Able to evaluate the web applications using bug tracking tools.

Unit 1: Purpose of Software testing – Some Dichotomies – a model for testing – Playing pool and consulting oracles – Is complete testing possible – The Consequence of bugs – Taxonomy of Bugs.

Unit 2: Testing Fundamentals– Test case Design – Introduction of Black Box Testing and White Box testing – Flow Graphs and Path testing – Path testing Basics - Predicates, Path Predicates and Achievable Paths - Path Sensitizing – Path Instrumentation – Implementation and Application of Path Testing.

Unit 3: Transaction Flow testing – Transaction Flows – techniques – Implementation Comments – Data Flow Testing – Basics – Strategies – Applications, Tools and effectiveness – Syntax Testing – Why, What, How – Grammar for formats – Implementation – Tips.

Unit 4: Logic Based Testing – Motivational Overview – Decision tables – Path Expressions – KV Charts – Specifications – States, State Graphs and transition Testing – State Graphs – Good & bad states – state testing Metrics and Complexity.

Unit 5: Testing Types -Testing GUIs – Testing Client – Server Architecture – Testing for Real-time System – A Strategic Approach to Software testing – issues – unit testing – Integration Testing – Validation testing – System testing – The art of Debugging.

Recommended Texts:

- 1) Boris Beizer, Software testing techniques, DreamTech Press, Second Edition – 2003.
- 2) Myers and Glenford.J., The Art of Software Testing, John-Wiley & Sons,1979.

Reference Books:

- 1) Roger.S.Pressman, Software Engineering – A Practitioner’s Approach, McGraw Hill, 5th edition, 2001.
- 2) Marnie.L. Hutcheson, Software Testing Fundamentals, Wiley-India, 2007.

E-learning resources:

- 1) https://www.tutorialspoint.com/software_testing/index.htm
- 2) <https://www.guru99.com/software-testing-introduction-importance.html>
- 3) <https://nptel.ac.in/courses/106/105/106105150/> Course

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	L	L	S	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	M	S	M	S	M	S	L	L	L	M
CO4	S	L	M	S	S	L	L	M	M	S
CO5	S	S	M	S	L	M	M	L	M	L

S-Strong M-Medium L-Low

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
	SOFT COMPUTING		4	-	-	-	3	25	75	100
Learning Objectives										
LO1	Understand Neural Networks									
LO2	Learn Fuzzy Logic									
LO3	Analyze and Apply to Adaptive Neuro Fuzzy Inference System, Classification and Regression Trees, Data Clustering Algorithms.									
LO4	Analyze and Apply to Algorithms									
LO5	Learn Artificial Intelligence									
UNIT	Contents									No. of Hours
I	Neural Networks : Introduction to ANS- adaline- BPN- Hopfield network- Boltzman machine- Self Organizing maps									09
II	Fuzzy Logic : Fuzzy sets – Fuzzy rules and fuzzy reasoning – Fuzzy inference system – Mamdani fuzzy model – Sugeno fuzzy model – Tsukamoto fuzzy model.									09
III	Adaptive Neuro Fuzzy Inference System- Co active Neuro Fuzzy modelling- Classification and Regression Trees- Data Clustering Algorithms- Rule based structure-Neuro Fuzzy control 1-Neuro Fuzzy control 2- Fuzzy Decision Making									09
IV	Genetic Algorithms : Introduction- Implementation of GA- Reproduction- Cross over- Mutation- Coding- Fitness Scaling- Applications of GA									09

V	ARTIFICIAL INTELLIGENCE: Introduction – Searching techniques – First order Logic – Forward reasoning – Backward reasoning – Semantic – Frames.	09
TOTAL HOURS		45
Course Out comes		Programme Outcomes
CO1	Learn about soft computing techniques and their applications.	To introduce about soft computing techniques and their applications.
CO2	Define the fuzzy systems	Fuzzy Logic, Various fuzzy systems and their functions.
CO3	Analyze various neural network architectures	Neural Networks, architecture, functions and various algorithms involved.
CO4	Analyze the genetic algorithms and their applications.	Genetic algorithms, its applications and advances.
CO5	Analyze the Artificial Intelligence and their applications	Artificial Intelligence, Various types of production systems, characteristics of production systems.
Textbooks		

1	James A. Freeman, David M. Skapura, "neural networks, algorithms, applications and programming techniques, Pearson Education, 1991
2	S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 2011.
3	S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication, 1st Edition, 2009
4	Jang, sun, Mizutani, "Neuro Fuzzy and Soft computing", Prentice Hall India, 2006
5	Stuart J. Russel, Peter Norvig, "Artificial intelligence- a novel approach". 2nd Edititon, Pearson Education, 2003
Reference Books	
1.	John A. Bullinaria Introduction to Neural Networks : Lecture 16, SOM fundamentals, 2004
2.	Jang, sun, Mizutani, "Neuro Fuzzy and Soft computing", Prentice Hall India, 2006
3.	David E. Goldberg, "In Search optimization and machine learning", Pearson Education, 2005
4	Eiben. A.E and Smith J.E, "Introduction to Evolutionary Computing, Genetic Algorithms".
Web Resources	
1	http://lcn.epfl.ch/tutorial/english/perceptron/html/learning.html
2	https://en.wikipedia.org
3	http://www.cs.bham.ac.uk/~jxb/NN/116.pdf
4	https://www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzydecisions.htm
5	http://cse.unl.edu/~sscott/research/html/hga_conf/node3.shtml
6	http://geneticprogramming.com/ga/GAsoftware.html
7	www.cs.vu.nl/~gusz/ecbook/slides/Genetic_Algorithms.ppt
8	https://www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzydecisions.htm

Title of the Course/Paper	Web Technology	
Elective -III	I Year & II Semester	Credit:3

Objectives:

- To understand the basics of Javascript and to acquire the knowledge about XML, Webservices
- and ASP.NET in Web technology
- To understand about the internet technologies and Client side programming javascript
- To Empower the websites with use of XML and web services
- To Identify the Basics of ASP.Net Framework Architecture and its controls
- To Learn the Database connection architecture using ADO.net

Outcome:

At the end of the course, the students should be able to:

- Acquire vast knowledge of Javascript and Internet Technologies
- Understand and explore various Features of ASP.Net Framework
- Understand the details of XML and Webservices
- Apply the knowledge of ASP.NET object, ADO.NET data access to develop a client server model

Unit I: Understanding Internet , Difference between websites and web server, Internet technologies Overview. Understanding websites and web servers: Understanding the difference between internet and intranet. Web 2.0: Basics, RIA Rich Internet Applications , collaborations tools .HTML and CSS: HTML 5.0. XHTML, CSS 3. An introduction to JavaScript, JavaScript DOM Model- Built-in objects, Date and Objects -Regular Expressions -Exception Handling, Validation. Event Handling , DHTML with JavaScript.

Unit II: XML : Introduction to XML, DTD, CSS, Namespace, Schema, XSD, XSL- Introduction to Web Services : The Web Services Type System, Data Type Mappings - SOAP : Communication on the Web -WSDL : Describing Web Services.

Unit III: Understanding ASP.NET Controls: Web forms, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box etc. Running a web Application, creating a multiform web project.

Unit IV: Form Validation Controls- Required Field, Compare, Range. Calendar Control, Ad Rotator Control, State Management-View State, Session State, Application State.

Unit V: Architecture Of ADO.NET, Connected and Disconnected Database, Create Connection Using ADO.NET Object Model, Connection Class, Command Class, DataReader Class, Data adapter Class, Dataset Class. Display Data on Bound Controls and Gridview. Database

Accessing on Web Applications: Insert records in database, delete and update records from database, Display a particular record and all records on web form.

Textbook :

1. Deitel, Deitel and Nieto, Internet and World Wide Web : How to Program, 5 thEdition, 2012, Prentice Hall,. ISBN-13: 978-0-13-215100-9
2. Jeffrey C. Jackson, “Web Technologies A computer Science Perspective”, 2011, Pearson, ISBN 9780133001976.
3. Beginning XML by David Hunter, Andrew Watt (Wrox P ublication)
4. Teach yourself ASP programming in 21 days – Fleet, Warret, Hen Stojanovic , Techmedia.
5. ASP.NET 2.0 Black Book By RudrakshBatra, CharulShukla (Dream Tech Press)
6. ASP. NET Bible By MridulaParihar and et al. (Hungry Minds, New York)

Reference book:

1. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
2. ASP.NET Developer’s Guide By G Buezek (TMH)

Web References:

1. <https://www.w3schools.com/js/>
2. https://www.w3schools.com/xml/xml_services.asp
3. <https://www.tutorialspoint.com/asp.net/index.htm>

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	S	M	L	L	S	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	S	S	M	S	M	S	L	M	L	M
CO4	S	L	M	S	S	L	M	M	M	S
CO5	S	S	M	S	L	M	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/ Paper	Relational Database Management System		
Core – 3	I Year & II Semester	Credit: 4	

OBJECTIVES

- To learn the fundamentals of data models and to represent a database system using ER diagrams.
- To study SQL and relational database design.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures.
- To have an introductory knowledge about the Storage and Query processing Techniques

OUTCOMES: Upon completion of the course, the students will be able to:

- Classify the modern and futuristic database applications based on size and complexity
- Map ER model to Relational model to perform database design effectively
- Write queries using normalization criteria and optimize queries
- Compare and contrast various indexing strategies in different database systems
- Appraise how advanced databases differ from traditional databases.

UNIT I: RELATIONAL DATABASES: Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL

UNIT II: DATABASE DESIGN: Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT III: TRANSACTIONS: Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery - Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.

UNIT IV: IMPLEMENTATION TECHNIQUES RAID: – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using

Heuristics and Cost Estimation.

UNIT V: ADVANCED TOPICS: Distributed Databases: Architecture, Data Storage, Transaction Processing – Object-based Databases: Object Database Concepts, Object-Relational features, ODMG Object Model, ODL, OQL - XML Databases: XML Hierarchical Model, DTD, XML Schema, XQuery – Information Retrieval: IR Concepts, Retrieval Models, Queries in IR systems.

QUESTION PAPER PATTERN

SECTION	UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V	TOTAL
	THEORY	THEORY	THEORY	THEORY	THEORY	
SECTION A (2 MARKS) ANSWER ANY 10 OUT OF 12	3	2	2	3	2	12
SECTION B (5 MARKS) ANSWER ANY 5 OUT OF 8	1	2	2	1	2	08
SECTION C (10 MARKS) ANSWER ANY 3 OUT OF 5	1	1	1	1	1	05
TOTAL	5	5	5	5	5	25

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System Concepts, Sixth Edition, Tata McGraw Hill, 2011.
2. Ramez Elmasri, Shamkant B. Navathe, —Fundamentals of Database Systems, Sixth Edition, Pearson Education, 2011.

REFERENCES:

1. C.J.Date, A.Kannan, S.Swamynathan, —An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.
2. Raghu Ramakrishnan, —Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.
3. G.K.Gupta, "Database Management Systems, Tata McGraw Hill, 2011.

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	S	L	M	L	L
CO2	S	M	L	S	M	S	M	L	M	M
CO3	L	M	S	L	M	M	S	L	S	M
CO4	S	M	L	M	L	L	M	M	M	S
CO5	M	S	M	S	S	S	M	L	M	L

-Strong	M-Medium	L-Low
Title of the Course/Paper	Mobile Application Development	
Elective -III	I Year & II Semester	Credit:3

OBJECTIVES:

1. To facilitate students to understand android SDK
2. To help students to gain a basic understanding of Android application development
3. To inculcate working knowledge of Android Studio development tool

OUTCOMES:

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

1. Identify various concepts of mobile programming that make it unique from programming for other platforms.
2. Critique mobile applications on their design pros and cons.
3. Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces
4. Program mobile applications for the Android operating system that use basic and advanced phone features
5. Deploy applications to the Android marketplace for distribution.

Unit- I

Introduction- The Mobile Ecosystem: Operators - Networks - Devices - Platforms – Operating Systems - Application Frameworks - Applications – Services- Mobile Devices Profiles - Options for development - Categories of Mobile Applications: SMS - Mobile Websites - Mobile Web Widgets - Native Applications - Games - Utility Apps- Location, Based Services(LBS) Apps - Informative Apps - Enterprise Apps

Unit- II

Mobile Information Architecture: Introduction - Sitemaps - Click Streams - Wireframes - Prototyping - Architecture for Different Devices. Mobile Design: Interpreting Design – Elements of Mobile Design - Mobile Design Tools - Designing for Different Device/ Screens

Unit– III

Introduction to Android: The Android Platform-Android SDK-Eclipse Installation-Android Installation- Building you First Android application-Understanding Anatomy of Android Application-Android Manifest file

Unit –IV

Android Application Design Essentials: Anatomy of an Android applications-Android

terminologies-Application Context- Activities-Services-Intents-Receiving and Broadcasting Intents-Android Manifest File and its common settings-Using Intent Filter- Permissions.

Unit – V

Android User Interface Design Essentials: User Interface Screen elements-Designing User Interfaces with Layouts-Drawing and Working with Animation-Testing Android applications: Publishing Android application-Using Android preferences-Managing Application resources in a hierarchy-working with different types of resources.

TEXT BOOKS:

1. Mobile Design and Development by Brian Fling, O'Reilly Media, Inc 2009
2. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd ed. (2011)
3. J2ME: The Complete Reference, James Keogh, Tata McGrawHill 2003

REFERENCE BOOKS:

1. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd
2. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies by Barry Burd, Edition: I

E-Resource:

https://www.tutorialspoint.com/android/android_resources.htm

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	S	M	L	L	S	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	S	S	M	S	M	S	L	M	L	M
CO4	S	L	M	S	S	L	M	M	M	S
CO5	S	S	M	S	L	M	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/ Paper	Internet of Things		
Elective – IV	II Year & III Semester	Credit: 3	

Objectives:

- To understand the concepts of Internet of Things and the application of IoT.
- To Determine the Market Perspective of IoT.
- To Understand the vision of IoT from a global context
- To learn how to integrate IoT with the environment; communicate from and to machines and some aspects of security of IoT.

Outcomes:

- Students would have become familiar with IoT and its flavors; realised the IoT ecosystem and topologies; learnt how to integrate IoT with the environment; communicate from and to machines and some aspects of security of IoT.
- Implement basic IoT applications on embedded platforms.
- Design IoT applications in different domain and be able to analyze their performance.

Unit 1: Introduction: Defining Internet of Things (IoT) – IoT: A Web 3.0 View – Ubiquitous IoT Applications – Important vertical IoT applications - Four Pillars of IoT: M2M, RFID, WSN and SCADA – DNA of IoT: Device, Connect and Manage.

Unit 2: Middleware for IoT: An Overview of middleware – Communication middleware for IoT – LBS and Surveillance middleware. Protocol Standardization for IoT - IoT Protocol Standardization Efforts: M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards.

Unit 3: Architecture Standardization for Web of Things (WoT): Web of Things versus Internet of Things — Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence

Unit 4: Cloud of Things: Cloud Computing - Grid/SOA and Cloud Computing - Cloud Middleware - NIST's SPI Architecture and Cloud Standards - Cloud Providers and Systems. IoT and Cloud Computing - Mobile Cloud Computing – The Cloud of Things Architecture - Four Deployment Models - Vertical Applications - Fifteen Essential Features - Four Technological Pillars - Three Layers of IoT Systems - Foundational Technological Enablers

Unit 5: Applications: Case Studies illustrating IoT design – Smart lighting and intrusion detection in Home – Smart parking in cities – Weather Monitoring System and Forest Fire detection – Smart irrigation – IoT printer.

Text Books:

1. Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, Taylor and Francis Group, 2012
2. Arshdeep Bahga , Vijay Madiseti , “Internet of Things: A Hands-on-Approach”, 2014. (Chapter 9)

References

1. Jean-Philippe Vasseur, Adam Dunkels,,”Interconnecting Smart Objects with IP: The Next Internet”, Morgan Kuffmann, 2010.
2. Dieter Uckelmann; Mark Harrison; Florian Michahelles-(Editors), Architecting the Internet of Things, First Edition, Springer – 2011
3. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, First Edition, Wiley, 2014.
4. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	S	L	S	M	M	L	S	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	M	S	M	S	S	S	L	M	L	M
CO4	S	L	M	S	S	L	M	M	M	S
CO5	S	S	M	S	L	S	M	L	M	L

S-Strong M-Medium L-Low

Title of the Course/Paper	Computer vision		
Elective - IV	II Year - III Semester		Credit: 3

Objectives:

- Understanding the Basics of Computer Vision.
- Acquiring skills to develop computer vision-based applications.
- To introduce students the fundamentals of image formation
- To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition
- To develop an appreciation for various issues in the design of computer vision and object recognition systems
- To provide the student with programming experience from implementing computer vision and object recognition applications

Outcomes:

- Ability to understand the computer vision pipeline.
- Ability to build solutions using computer vision algorithms.
- Identify basic concepts, terminology, theories, models and methods in the field of computer vision
- Describe known principles of human visual system
- Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition
- Suggest a design of a computer vision system for a specific problem

UNIT I Image Formation Models: Monocular imaging system, Orthographic & Perspective Projection, Camera model and Camera calibration, Binocular imaging systems

UNIT II Image Processing and Feature Extraction: Image representations (continuous and discrete), Edge detection

UNIT III Motion Estimation: Regularization theory, Optical computation, Stereovision, Motion estimation, Structure from motion

UNIT IV Shape Representation and Segmentation: Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multiresolution analysis

UNIT V Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal Component analysis, Shape priors for recognition. Classifying image content – Image segmentation: Graph cuts – Segmentation using clustering – OpenCV: Basics – processing video – tracking.

Recommended Texts:

- Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall
- Robot Vision, by B. K. P. Horn, McGraw-Hill.

Reference Books:

- Richard Szeliski “Computer Vision: Algorithms and Applications” (<http://szeliski.org/Book/>)
- Haralick& Shapiro, “Computer and Robot Vision”, Vol II
- Gerard Medioni and Sing Bing Kang “Emerging topics in computer vision”
- Emanuele Trucco and AlessandroVerri “Introductory Techniques for 3-D Computer Vision”, Prentice Hall, 1998.
- Olivier Faugeras, “Three-Dimensional Computer Vision”, The MIT Press, 1993

Web References:

- <https://www.youtube.com/watch?v=3LaVxEX3F0o&list=PLwdnzlV3ogoVsma5GmBSsgJM6gHv1QoAo>

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	S	L	S	M	M	L	S	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	M	S	M	S	S	S	L	M	L	M
CO4	S	L	M	S	S	L	M	M	M	S
CO5	S	S	M	S	L	S	M	L	M	L

S-Strong

M-Medium

L-Low

Title of the Course/ Paper	Data Visualization		
Elective - IV	II Year & III Semester	Credit: 3	

Course Objectives:

- To understand the various types of data, apply and evaluate the principles of data visualization
- Acquire skills to apply visualization techniques to a problem and its associated dataset
- To apply structured approach to create effective visualizations
- To learn how to bring valuable insight from the massive dataset using visualization
- To learn how to build visualization dashboard to support decision making
- 6.To create interactive visualization for better insight using various visualization tools

Expected Course Outcome:

After successfully completing the course the student should be able to

- Identify the different data types, visualization types to bring out the insight.
- Relate the visualization towards the problem based on the dataset to analyze and bring out valuable insight on large dataset.
- Design visualization dashboard to support the decision making on large scale data.
- Demonstrate the analysis of large dataset using various visualization techniques and tools.

Unit I: Introduction to Data Visualization and Visualization techniques: Overview of data visualization - Data Abstraction - Task Abstraction - Analysis: Four Levels for Validation. Visualization Techniques -Scalar and point techniques – colour maps – Contouring – Height Plots - Vector visualization techniques – Vector properties – Vector Glyphs – Vector Color Coding. Visual Analytics: Visual Variables- Networks and Trees –Tables - Map Color and Other Channels- Manipulate View.

Unit II: Visualization Tools: Fundamentals of R- Visualization using R library -Introduction to various data visualization toolstableau

Unit III: Geo spatial visualization: Geo spatial data and visualization techniques : Chloropleth map, Hexagonal Binning, Dot map, Cluster map, cartogram map

Unit IV: Diverse Types Of Visual Analysis: Time- Series data visualization – Text data visualization – Matrix visualization techniques – Heat Map- Multivariate data visualization and case studies. Visualization of Streaming Data: Introduction to Data Streaming, processing and presenting of streaming data, streaming visualization techniques, streaming analysis.

Unit V: Visualization Dashboard Creations: Dashboard creation using visualization tools for the use cases: Finance-marketing-insurance healthcare etc., Recent Trends.

Text Books

1. Tamara Munzer, Visualization Analysis and Design, CRC Press 2014.
2. Aragues, Anthony. Visualizing Streaming Data: Interactive Analysis Beyond Static Limits. O'Reilly Media, Inc., 2018

Reference Books

2. Chun-hauh Chen, W.K.Hardle, A.Unwin, Hand book of Data Visualization, Springer publication, 2016.
3. Christian Toninski, Heidrun Schumann, Interactive Visual Data Analysis, CRC press publication,2020
4. Alexandru C. Telea, Data Visualization: Principles and Practice, AK Peters, 2014.

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	S	L	S	M	M	L	S	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	M	S	M	S	S	S	L	M	L	M
CO4	S	L	M	S	S	L	M	M	M	S
CO5	S	S	M	S	L	S	M	L	M	L

S-Strong

M-Medium

L-Low

Syllabus of Soft Skill Courses

Title of the Course/Paper	Communication Skills for Software Engineers - I		
Soft Skill -	Year - Semester		Credit:2

Objectives:

- Understand the need of current soft skills
- Generalize self development and implementation procedures
- Demonstrate narration skills
- Design simple comprehension with given requirements
- Develop implementations in latest technologies
- Demonstrate the applications with varied soft skills like debate, oration, tell about yourself etc.

Outcomes:

- Enumerate varied soft skills needed for employment
- Identify the lack in oneself and improve it
- Learn the current technical implementations
- Summarize the different requirements for employability
- Calculate self performance ,Generalize narration , oration and debate skills
- Conceptualize the representation of current technologies

6 Basics of Communication

Definition and process of communication

Types of communication - formal and informal, oral and written, verbal and non-verbal

Communications barriers and how to overcome them

Barriers to Communication, Tools of Communication

7 Application of Grammar

Parts of Speech (Noun, verb, adjective, adverb) and modals

Sentences and its types

Tenses

Active and Passive Voice

Punctuation

Direct and Indirect Speech

8 Reading Skill

Unseen passage for comprehension (one word substitution, prefixes, suffixes, antonyms, synonyms etc. based upon the passage to be covered under this topic)

9 Writing Skill

Picture composition

Writing paragraph

Notice writing

10 Listening and Speaking Exercises

11. Self and peer introduction
12. Newspaper reading
13. Just a minute session-Extempore
14. Greeting and starting a conversation
15. Leave taking
16. Thanking
17. Wishing well
18. Talking about likes and dislikes
19. Group Discussion
20. Listening Exercises.

- Student should be encouraged to participate in role play and other student centred activities in class room and actively participate in listening exercises
- Assignments and quiz/class tests, mid-semester and end-semester written tests – Actual practical work, exercises and viva-voce – Presentation and viva-voce

Recommended Texts:

3. Communicating Effectively in English, Book-I by RevathiSrinivas; Abhishek Publications, Chandigarh.
4. Communication Techniques and Skills by R. K. Chadha; DhanpatRai Publications, New Delhi.

Reference Books:

6. High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
7. Excellent General English-R.B.Varshnay, R.K. Bansal, Mittal Book Depot, Malhotra
8. The Functional aspects of Communication Skills – Dr. P. Prasad, S.K. Katria & Sons, New Delhi
9. Q. Skills for success – Level & Margaret Books, Oxford University Press.
10. e-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.

Web References:

6. <http://www.mindtools.com>
7. <http://www.letstalk.com.in>
8. <http://www.englishlearning.com>
9. <http://learnenglish.britishcouncil.org/en/>
10. <http://swayam.gov.in>

Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	M	S	M	S	L	S	S	M
CO2	S	M	L	M	L	S	M	L	M	S
CO3	M	S	S	L	M	S	L	M	S	M
CO4	S	L	S	M	S	L	L	M	M	S
CO5	S	M	L	S	L	M	S	L	M	S

S-Strong M-Medium L-Low

General aptitude for competitive Examinations	Year & Semester: I Year II Semester	
Pre-requisite	Basic knowledge in numerical ability	
Learning Objectives: (for teachers: what they have to do in the class/lab/field) <ul style="list-style-type: none"> • To improve the quantitative skills of the students • To prepare the students for various competitive exams 		
Course Outcomes: (for students: To know what they are going to learn) <p>CO1: To gain knowledge on LCM and HCF and its related problems CO2: To get an idea of age, profit and loss related problem solving. CO3: Able to understand time series simple and compound interests CO4: Understanding the problem related to probability, and series</p> <p>CO5: Able to understand graphs, charts</p>		
Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)		
Units	Contents	Required Hours
I	Numbers - HCF and LCM of numbers - Decimal fractions - Simplification - Square roots and cube roots - Average - problems on Numbers	06
II	Problems on Ages - Surds and Indices - percentage - profits and loss - ratio and proportion - partnership - Chain rule.	06
III	Time and work - pipes and cisterns - Time and Distance - problems on trains - Boats and streams - simple interest - compound interest - Logarithms - Area - Volume and surface area - races and Games of skill.	06
IV	Permutation and combination - probability - True Discount	06

	- Bankers Discount - Height and Distances - Odd man out & Series.	
V	Calendar - Clocks - stocks and shares - Data representation - Tabulation - Bar Graphs - Pie charts - Line graphs	06
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	
Learning Resources: <ul style="list-style-type: none"> ● Recommended Texts <ol style="list-style-type: none"> 1. . “Quantitative Aptitude”, R.S. AGGARWAL., S. Chand & Company Ltd., ● Web resources: Authentic Web resources related to Competitive examinations 		

Title of the Course/Paper	Personality Development and other Soft Skills for Software Engineers	
Soft skill		Credit:2

Objectives:

- The course intends to develop talent, facilitate employability enabling the incumbent to excel and sustain in a highly competitive world of business.
- The programme aims to bring about personality development with regard to the different behavioural dimensions that have far reaching significance in the direction of organisational effectiveness.
- To make students know about self-awareness, life skills, soft skills, need for personal development etc.

Outcomes:

- The student will be able to understand, analyse develop and exhibit accurate sense of self.
- Think critically.
- Demonstrate knowledge of personal beliefs and values and a commitment to continuing personal reflection and reassessment.
- Learn to balance confidence with humility and overcome problems associated with personality

Unit 1: Personality Development : A Must for Leadership and Career Growth

Case 1: One's Personality Sends Out a Signal that Others Read

Case 2: Same Person: Consciously Different Personalities can be Powerful

Case 3: There isn't One Right Personality

Learnings About Personality Development from the Three Cases

Personality Analysis - Freudian Analysis of Personality Development - Swami Vivekananda's Concept of Personality Development - Physical Self- Energy Self - Intellectual Self - Mental Self - Blissful Self - Personality Begets Leadership Qualities - Interpersonal Skills - Resolving Conflict - A Smiling Face - Appreciative Attitude - Assertive Nature - Communication - Skills-Listening Skills -Developing Empathy - The Personality Attribute of Taking Bold Decisions - Personality Types and Leadership Qualities - Mapping the Different Personality Types - Perfectionists-Helpers-Achievers- Romantics-Observers - Questioners - Enthusiasts or Adventurers-Bosses or-Asserters- Mediators or Peacemakers - Personality Tests - Example of a Personality Test: Jung Typology Test - Personality Assessment

Unit 2: Soft Skills: Demanded by Every Employer

Case I: Dr Devi Shetty

Case II: Abraham Lincoln

Case III: Jeff Immelt

Lessons from the Three Case Studies - Change in Today's Workplace: Soft Skills as a Competitive Weapon - Antiquity of Soft Skills - Classification of Soft Skills - Time Management -Attitude -Responsibility - Ethics, Integrity, Values, and Trust -Self-confidence and Courage - Consistency and Predictability - Teamwork and Interpersonal Skills - Communication and Networking - Empathy and Listening Skills - Problem Solving, Troubleshooting and Speed-reading - Leadership

Unit 3: Your Resume or Curriculum Vitae: The First Step Forward

The Strategy of Resume Writing—From an Employer's Perspective

Strategy I: The Resume Should Reveal the Personality Traits that Align with the Organization's Values

Strategy II: The Resume Should Convince the Potential Employer of Right Fitment to the Opening

Strategy III: The Resume Should Show to the Employer the Benefits that the Candidate Will Bring in

A Favourable First Impression—The 'Career Objective' in the Resume - The Main Body of the Resume - Clarity and Crispness of the Resume - Format and Content of the Resume - A Fresher's Resume - Examples - Example of a Well-written Resume by an Experienced Professional -Example of a Well-written Resume of a Fresh Graduate - Example of a Poorly Written Resume - Writing a Modern Resume - How is the Modern CV Different from the Traditional One? - Various Modern Resume Formats -

Unit 4: Group Discussion: A Test of Your Soft Skills

Case Studies - Learning from the Three Case Studies - Ability to Work as a Team - Communication Skills, Including Active Listening - Non-verbal Communication - Leadership and Assertiveness - Reasoning - Ability to Influence - Innovation, Creativity and Lateral Thinking - Flexibility - Group Discussion Types - The Responsibility of the First Speaker - Concluding the Discussion — The Technique of Summing Up

Recommended Texts:

1. Personality Development and SOFT SKILLS, BARUN K. MITRA, Oxford University Press

Reference Books:

1. Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.

2. Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.

Web References:

1. <http://www.mindtools.com>

2. <http://www.letstalk.com.in>

Title of the Course/Paper	Team Project		
Soft Skill -	I Year -II Semester		Credit: 2

Objectives:

- Understand programming language concepts, particularly object-oriented concepts or go through research activities.
- Plan, analyze, design and implement a software project or gather knowledge over the field of research and design or plan about the proposed work.
- Learn to work as a team and to focus on getting a working project done on time with each student being held accountable for their part of the project.
- Learn about and go through the software development cycle with emphasis on different processes - requirements, design, and implementation phases.

Outcomes:

- Demonstrate the ability to locate and use technical information from multiple sources.
- Demonstrate the ability to communicate effectively in speech and writing.
- To demonstrate a depth of knowledge of modern technology.
- To do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques.
- To complete an independent research project, resulting in at least a thesis publication, and research outputs in terms of publications in high impact factor journals, conference proceedings.

Project:

- Any Computer related project has to be developed using latest software as a team.
 - The project must be presented for viva-voce at the end of the semester.
 - Students will write up a project report, which is an essay to provide a complete record of all the work carried out in their projects.
 - The student project reports will be assessed solely according to academic marking guidelines by the supervisor(s) of the student project.
 - If the work of the candidate is found to be insufficient and plagiarism, the supervisor(s) will decide the further process.
- Mapping with Programme Outcomes:

Mapping with Programmers outcomes*										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	M	S	M	S	L	S	S	M
CO2	S	M	L	M	L	S	M	L	M	S
CO3	L	S	S	L	M	L	M	S	S	M
CO4	S	L	S	M	S	L	L	M	M	S
CO5	S	M	L	S	L	M	S	L	M	S

- S-Strong M-Medium L-Low
-

Title of the Course/Paper	Documentation and Interview skills for Software Engineers		
Soft Skill -	II Year –III Semester		Credit: 2

Objectives:

- Ensure that you understand what the job involves, and that you have the necessary skills
- Make sure you do want to work for the company
- Check that the philosophy/values of the company match your personal requirements
- Find out more about the job, training, career structure etc.

Outcomes:

- Understand the purpose of interviews
- Be aware of the processes involved in different types of interviews
- Know how to prepare for interview
- Be clear about the importance of self presentation

Unit 1: Job Interviews: The Gateway to the Job Market

Types of Interviews - Groundwork Before the Interview - Abide by the Dress Code - Importance of Body Language in Interviews - Need for Proper Articulation - **Probable Interview Questions:** Tell Us about Yourself - Would You Call Yourself a Team Player? - **Few Tricky Questions and Possible Answers:** Why Should We Employ You? - Do You Have Offers from Other Companies? - What Salary are You Expecting? - How Much do You think You are Worth? - What Kind of a Culture are You Comfortable with? - What is More Important to You—Salary or Growth Opportunities? - What do You Know about Our Company? - Tell Us about Your Strengths and Weaknesses - Where do You See Yourself in 5 or 10 Years? - What are Your Plans for Higher Studies? - When Leading a

Team, How Will You Motivate Your Team Members and Resolve Any Differences between them? - What Has Been the Biggest Challenge You Have Faced, and How Did You Handle It? - What Do You think are the Essential Qualities of a Good Employee? - You Claim to be Computer-savvy. Can You Mention Any Innovative Way to Enhance the Sales of the Company Using Your Computer Knowledge and Skills? — Concluding an Interview - Telephonic or Video Interview—A Growing Trend - Disadvantages of Telephonic or Video Interview - **A Mock Interview:** Why did the Interview Team Select Vikram? - Why did the Interview Team not Select Chandra and Amit?

Unit 2: Body Language: Reveals Your Inner Self and Personality

Emotions Displayed by Body Language: Aggressive - Submissive - Attentive - Nervous - Upset - Bored - Relaxed - Power - Defensive—Handshake—The Most Common Body

Language— Eyes— A Powerful Reflection of One’s Inner Self —Entry to My Space— Personal Zones May Vary: Intimate Zone - Personal Zone - Social Zone - Public Zone - Typical Body Language when Zones are Intruded — Body Language Exhibited During Different Professional Interactions -Interview - Manager’s Discussions with a Subordinate Employee - Discussions with Supervisor - Presentation to a Large Audience - Group Discussions - Video-conference

Unit 3: Enhance Your Writing Skill to Create an Impression

Fifteen Principles to Increase Clarity of Communication - Use Short, Simple and Clear Words - Use Short Sentences - Do not Cram Different Points into One Sentence - Using Compact Substitutes for Wordy Phrases - Remove Redundant Words and Expressions - Avoid Use of Mixed Metaphors - Avoid Hackneyed and Stilted Phrases - Avoid Verbosity in the Use of Common Prepositions - Do not Twist the Word Order - Present Similar Ideas in a Sentence with Same Structural and Grammatical Form - Make Positive Statements Without Being Hesitant or Non-committal - e Statements Without Being Hesitant or Non-committal - Avoid Pompous Words and Phrases - Use Active Instead of Passive Voice - Ensure Correct Spelling and Grammar in the Text - Substitute Easily-understood Words for Words Imported from Other Fields - Edit-Edit-Edit - The Reader’s Perspective - Clarity of Thought - Clarity of Text - Example of Poorly and Well-written Texts

Unit 4: Fog Index: Provides Guidance for Proper Writing

Fog Index or Clarity Index -Examples of Passages with High and LowFog Index - Infogineering Clarity Rating - Flesch Kincaid Reading Ease Index - Other Readability Indices - Checking Grammar, Spelling and Voice - Clarity of Verbal Communication - Case 1 - Case 2

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2. <http://www.letstalk.com.in>
3. <http://www.englishlearning.com>
4. <http://learnenglish.britishcouncil.org/en/>
5. <http://swayam.gov.in>

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CO3	M	S	S	L	M	S	L	M	S	M
CO4	S	L	S	M	S	L	L	M	M	S
CO5	S	M	L	S	L	M	S	L	M	S

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