

**E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 14.**  
 (An Autonomous Institution – Affiliated to Madurai Kamaraj University)  
 Re-accredited (3<sup>rd</sup> Cycle) with Grade A+ & CGPA 3.51 by NAAC  
 TANSICHE – CBCS with OBE

**DEPARTMENT OF INFORMATION TECHNOLOGY – UG**

**COURSE STRUCTURE**

(w.e.f. 2023 – 2024 Batch onwards)

Semester	Part	Course Code	Course Title	Teaching hrs. (per week)	Duration of Exam (hrs.)	Marks Allotted			CREDITS
						CIA	SE	Total	
I	I	23OU1TA1	<b>Part I:</b> Tamil	6	3	25	75	100	3
	II	23OU2EN1	<b>Part II:</b> General English- I	6	3	25	75	100	3
	III	23OUIT11	<b>CC1:</b> Programming in C	5	3	25	75	100	5
		23OUIT1P	<b>CC2:</b> C Programming Lab	5	3	40	60	100	5
		23OUITGEIT1	<b>GEC1:</b> Digital Logic Fundamentals	4	3	25	75	100	3
	IV	23OUITSECN1	<b>SEC1 (NME):</b> Office Automation	2	3	25	75	100	2
23OUITFC1		<b>FC:</b> Fundamentals of Computers	2	3	25	75	100	2	
II	I	23OU1TA2	<b>Part I:</b> Tamil	6	3	25	75	100	3
	II	23OU2EN2	<b>Part II:</b> General English-II	6	3	25	75	100	3
	III	23OUIT21	<b>CC3:</b> Java Programming and Data Structures	5	3	25	75	100	5
		23OUIT2P	<b>CC4:</b> Java Programming and Data Structures Lab	5	3	40	60	100	5
		23OUITDSE2	<b>DSEC2:</b> Big Data Analytics	4	3	25	75	100	3
	IV	23OUITSECN2	<b>SEC2 (NME):</b> Advanced Excel	2	3	25	75	100	2
23OUITSEC3P		<b>SEC3:</b> Multimedia Lab	2	3	40	60	100	2	
III	I	23OU1TA3	<b>Part I:</b> Tamil	6	3	25	75	100	3
	II	23OU2EN3	<b>Part II:</b> General English- III	6	3	25	75	100	3
	III	23OUIT31	<b>CC5:</b> Relational Database Management System	5	3	25	75	100	5
		23OUIT3P	<b>CC6:</b> Relational Database Management System Lab	5	3	40	60	100	5
		23OUITGEIT3	<b>GEC3:</b> Cost and Management Accounting	4	3	25	75	100	3
	IV	23OUITSEC31	<b>SEC4:</b> Enterprise Resource Planning	1	3	25	75	100	1
23OUITSEC32P		<b>SEC5:</b> PHP Scripting Lab	2	3	40	60	100	2	

		23OU4EV4	Environmental Studies	1	-	-	-	-	-
IV	I	23OU1TA4	Part I: Tamil	6	3	25	75	100	3
	II	23OU2EN4	Part II: General English-IV	6	3	25	75	100	3
	III	23OUIT41	CC7: .NET Programming	5	3	25	75	100	5
		23OUIT4P	CC8: .NET Programming Lab	3	3	40	60	100	5
	IV	23OUITDSE4A	DSEC4: IoT and its Applications	5	3	25	75	100	3
		23OUITSEC4P	SEC6: Web Designing Lab	2	3	40	60	100	2
		23OUITSEC42	SEC7: Human Computer Interaction	2	3	25	75	100	2
		23OU4EV4	Environmental Studies	1	3	25	75	100	2
V	III	23OUIT51	CC9: Python Programming	5	3	25	75	100	4
		23OUIT5P	CC10: Python Programming Lab	5	3	40	60	100	4
		23OUIT52	CC11: Operating Systems	5	3	25	75	100	4
		23OUITPR5	CC12: Project with Viva voce	5	3	20	80	100	4
			DSEC5	4	3	25	75	100	3
			DSEC6	4	3	25	75	100	3
	IV	23OU4VE5	Value Education	2	3	25	75	100	2
		23OUITIN5	Internship / Industrial Training	-	-	-	-	-	2
VI	III	23OUIT61	CC13: Data Mining	6	3	25	75	100	4
		23OUIT6P	CC14: Data Mining Lab	6	3	40	60	100	4
		23OUIT62	CC15: Data Communication and Networking	6	3	25	75	100	4
			DSEC7	5	3	25	75	100	3
			DSEC8	5	3	25	75	100	3
	IV	23OUITSEC6	SEC8: Advanced Excel Lab	2	3	40	60	100	2
	V	23OU5PE6/ 23OU5NS6	Extension Activity N.S.S / Physical Education	-	-	-	-	-	1
	<b>Total Credits</b>								

**Semester IV:****DSEC 4: (Choose any one)**

1. IOT and its Applications – 23OUITDSE4A
2. Cryptography – 23OUITDSE4B

**Semester V:****DSEC 5: (Choose any one)**

1. Software Engineering – 23OUITDSE5A
2. Fuzzy Logic – 23OUITDSE5B

**DSEC 6: (Choose any one)**

1. Artificial Intelligence – 23OUITDSE5C
2. Grid Computing – 23OUITDSE5D

**Semester VI:****DSEC 7: (Choose any one)**

1. Network Security – 23OUITDSE6A
2. Computational Intelligence – 23OUITDSE6B

**DSEC 8: (Choose any one)**

1. Trends in Computing – 23OUITDSE6C
2. Artificial Neural Network – 23OUITDSE6D

**CC:** Core Course

**GEC:** Generic Elective Course

**DSEC:** Discipline Skill Enhancement Course

**SEC:** Skill Enhancement Course

**FC:** Foundation Course

DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
V	Core	23OUIT51	Python Programming	4	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. To understand the concepts of Python programming.
2. To learn selection and Conditional Branching statements.
3. To organize code using functions, string and modules.
4. To Perform operations on lists, sets, tuples, and dictionaries.
5. To handle different types of files in Python.

### Course Content:

#### Unit- I:

**Basics of Python Programming:** History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. **Python Arrays:** Defining and Processing Arrays – Array methods.

#### Unit- II:

**Control Statements:** Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. **Jump Statements:** break, continue and pass statements.

#### Unit- III:

**Functions:** Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. **Function Arguments:** Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. **Python Strings:** String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. **Modules:** import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.

#### Unit- IV:

**Lists:** Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic List Operations-List Methods. **Tuples:** Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. **Dictionaries:** Creating, Accessing, Updating

and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.

### Unit- V:

**Python File Handling:** Types of files in Python - Opening and Closing files-Reading and Writing files: write () and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.

### Text Books:

1. ReemaThareja. (2017). *Python Programming using problem solving approach*. First Edition. Oxford University Press.
2. Nageswara Rao.R.Dr. (2017). *Core Python Programming*. First Edition. Dream tech. Publishers.

UNIT I : Chapter 3: 3.1-3.12,3.16.

UNIT II : Chapter 4 .

UNIT III : Chapter 5: 5.1- 5.6, 5.10.5.11 6.1- 6.8.

UNIT IV : Chapter 8: 8.2 - 8.4 -8.4.12, 8.6 - 8.6.9.

UNIT V : Chapter 7: 7.1 – 7.8.

### Reference Book(s):

1. Allen B. Downey.(2013) *Think Python: How to Think Like a Computer Scientist*. Publisher: Shroff/O'Reilly.
2. Eric Matthes.(2023). *Python Crash Course*. Third edition No Starch Press.
3. John Zelle.(2003). *Introduction to Python Programming*. Publisher. Franklin, Beedle & Associates Inc.
- 4.Mark Lutz .(2013). *Learning Python*. O'Reilly Media. Inc.
- 5.Vamsi Kurama.(2018). *Python Programming: A Modern Approach*. Pearson Education. Kindle Edition.

### Websites and e-Learning resources:

- 1.<https://www.programiz.com/python-programming>
- 2.<https://www.guru99.com/python-tutorials.html>
- 3.<https://www.scribd.com/document/550828322/Reema-Thareja-Python-Programming-using-Problem-Solving-Approach-OUP-India-2017>
4. <https://www.javatpoint.com/python-tutorial> <https://www.learnpython.org/>
5. <https://www.programiz.com/python-programming>

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

COs	CLO Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CO1	Understand and apply basic Python syntax, variables, and data types to solve programming problems.	K1 to K3
CO2	Develop Python programs using control structures such as conditionals, loops, and functions.	K1 to K3
CO3	Apply the principles of Object-Oriented Programming in Python to build modular and reusable code.	K1 to K4
CO4	Utilize Python's built-in data structures (lists, tuples, dictionaries, sets) to organize and manipulate data efficiently.	K1 to K3
CO5	Implement file handling operations to read from and write to text	K1 to K4

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	1	1	2	3	2
CLO2	3	1	1	1	3	2
CLO3	3	1	1	1	3	2
CLO4	3	1	2	3	3	2
CLO5	3	2	1	2	2	3

1-Basic Level

2- Intermediate Level

3- Advanced Level

**LESSON PLAN: TOTAL HOURS (75 Hrs.)**

UNIT	Course Content	No. of Hours	Course Objectives	Mode of Teaching
I	Basics of Python Programming: History of Python- Features of Python-Literal-Constants-Variables - Identifiers-Keywords-Built-in Data Types-Output Statements - Input Statements-Comments - Indentation- Operators-Expressions-Type conversions. Python Arrays: Defining and Processing Arrays - Array methods.	15	CO1	Chalk and Talk, PPT, quiz, on the spot test

II	Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.	15	CO2	Chalk and Talk, PPT, quiz, on the spot test
III	Functions: Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. Python Strings: String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.	15	CO3	Chalk and Talk, PPT, quiz, on the spot test
IV	<b>Lists:</b> Creating a list -Access values in List- Updating values in Lists-Nested lists -Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. <b>Dictionaries:</b> Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.	15	CO4	Chalk and Talk, PPT, quiz, on the spot test
V	<b>Python File Handling:</b> Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.	15	CO5	Seminar, PPT presentation

Mrs.R.Lakshmi  
Course Designer

DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
V	Core	23OUIT5P	Python Programming Lab	4	5	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. To understand the fundamentals of programming using Python, such as variables, data types, control structures, and functions.
2. To learn how to use Python libraries and modules to solve problems.
3. To Practice writing Python code to solve real-world problems and build basic applications.
4. To Gain experience with common programming paradigms, such as object-oriented programming and functional programming.
5. To Understand best practices for debugging and testing code.

### Programs List:

1. Write a Python program that calculates the area of a circle using variables and constants.
2. Write a Python program demonstrating the use of different types of operators.
3. Write a Python program that generates a student mark statement using conditional statements.
4. Write a Python program that prints numbers using loops.
5. Write a Python program that demonstrates the use of jump statements.
6. Write a Python program that calculates the square root of a number using a function.
7. Write a Python program to calculate the factorial of a number using recursion.
8. Write a Python program that demonstrates how to insert a new element into an existing array.
9. Write a Python program for string manipulation.
10. Write a Python program that performs arithmetic operations using modules.

11. Write a Python program using lists.
12. Write a Python program that demonstrates operations on tuples.
13. Write a Python program that demonstrates operations on dictionaries.
14. Write a Python program for file handling.

**Text Book:**

ReemaThareja. (2017). *Python Programming using problem solving approach*. First Edition. Oxford University Press.

**Books for Reference(s):**

1. Eric Matthes.(2023). *Python Crash Course*. Third edition No Starch Press.
2. John Zelle.(2003). *Introduction to Python Programming*. Publisher. Franklin, Beedle & Associates Inc.
3. Mark Lutz .(2013). *Learning Python*. O'Reilly Media. Inc.
4. Kenneth A. Lambert. (2012). *Fundamentals of Python – first programs*. First Edition. CENGAGE publication.
- 5.Vamsi Kurama.(2018). *Python Programming: A Modern Approach*. Pearson Education. Kindle Edition.

**Web Resources / E-Books:**

1. <http://nptel.ac.in/courses/106106145/5>
2. <http://freevideolectures.com/Course/2512/Python-Programming>
3. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/60001-introduction-to-computer-science-and-programming-in-python-fall2016/lecture-videos/>
4. <http://onlinevideolecture.com/?subject=python+programming>
5. <https://www.rgmcet.edu.in/assets/img/departments/CSE/materials/R19/2-1/Python%20Lab.pdf>

**Pedagogy:** Record Book writing, Program development and Demonstration, Practical sessions.

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

COs	CLO Statement	Knowledge According to Bloom's Taxonomy (Upto K level)
CO1	Understand the significance of control statements, loops and functions in creating Simple programs.	K1 to K3
CO2	Interpret the core data structures available in python to store, process and sort the data.	K1 to K3

<b>CO3</b>	Develop the real time applications using python programming language.	K1 to K4
<b>CO4</b>	Analyze the real time problem using suitable python concepts.	K1 to K3
<b>CO5</b>	Assess the complex problems using appropriate concepts in python.	K1 to K4

### Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CLO1</b>	3	1	1	2	3	2
<b>CLO2</b>	3	1	1	1	3	2
<b>CLO3</b>	3	1	1	1	3	2
<b>CLO4</b>	3	1	2	3	3	2
<b>CLO5</b>	3	2	1	2	2	3

1-Basic Level

2- Intermediate Level

3- Advanced Level

### LESSON PLAN: TOTAL HOURS (75 Hrs.)

<b>UNIT</b>	<b>Course Content</b>	<b>No. of Hours</b>	<b>Course Objectives</b>	<b>Mode of Teaching</b>
I	1. Program using variables, constants, I/O statements in Python. 2. Program using Operators in Python. 3. Program using Conditional Statements.	15	CO1	Demo & Practical Session
II	4. Program using Loops. 5. Program using Jump Statements. 6. Program using Functions	15	CO2	Demo & Practical Session
III	7. Program using Recursion. 8. Program using Arrays. 9. Program using Strings.	15	CO3	Demo & Practical Session
IV	10. Program using Modules. 11. Program using Lists. 12. Program using Tuples.	15	CO4	Demo & Practical Session
V	13. Program using Dictionaries. 14. Program for File Handling.	15	CO5	Demo & Practical Session

Mrs.R.Lakshmi  
Course Designer

DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
V	Core	23OUIT52	Operating Systems	4	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

### Course Objectives:

1. To develop fundamental knowledge of Operating Systems.
2. To provide an introduction to the internal operation of modern operating systems.
3. To focus on the core concepts such as processes, threads and mutual exclusion.
4. To become familiar with CPU scheduling, deadlock, memory management, and file systems.
5. To learn concepts and programming techniques of Linux.

### Course Content:

#### Unit I:

Introduction: Definition of Operating System - OS Structures: OS Services - System Calls - Virtual Machines - Process Management: Process Concept - Process Scheduling - Operation on Processes - Co-operating Processes - Inter-process Communication.

#### Unit II:

CPU Scheduling: Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Process Synchronization: The Critical Section Problem - Semaphores - Classical Problems of Synchronization - Critical Regions.

#### Unit III:

Deadlocks: System Model - Deadlock characterization – Methods for Handling Deadlocks Deadlock Prevention - Deadlock avoidance- Deadlock Detection - Recovery from Deadlock.

#### Unit IV:

Storage management: Memory management - Swapping – Contiguous Memory allocation. Paging – Segmentation –Segmentation with Paging –Virtual memory: Demand paging - Page replacement – Thrashing. Mass-Storage Structure: Disk Structure- Disk scheduling.

#### Unit V:

File-System Interface: File Concept-File Attributes-File Operations – Access Methods: Sequential Access – Direct Access –Directory Structure: Single-Level Directory- Two –Level

Directory-Tree-Structured Directories- Introducing Shell Programming – Linux General Purpose Commands-Process Oriented Commands – Communication Oriented Commands.

**Text Books:**

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne. (2012). *Operating System Concepts*. 9th Edition. Wiley Student Edition.
2. B.Mohamed Ibrahim. (2005). *Linux Practical Approach*. Firewall Media.
  - UNIT I : Chapters: 1 (1.1 - 1.4), 2 (2.1, 2.3), 3 (3.1 – 3.4)
  - UNIT II : Chapters: 5 (5.2, 5.6, 5.7), 6 (6.1 - 6.3)
  - UNIT III : Chapter : 7 (7.1 – 7.7)
  - UNIT IV: Chapters: 8 (8.2, 8.3, 8.4, 8.5) 9 (9.2, 9.4, 9.6), 10 (10.2, 10.4)
  - UNIT V : Chapter : 11: 11.1 (11.1.1, 11.1.2), 11.2 (11.2.1, 11.2.2),  
11.3 (11.3.2 -11.3.5)

**Reference Book(s):**

1. Milan Milenkovic. (2003). *Operating System Concepts and Design*. McGraw Hill.
2. Andrew S. Tanenbaum. (2001). *Modern Operating Systems*. 2nd Edition. Prentice Hall of India.
3. Deital and Deital. (1990). *Introduction to Operating System*. Pearson Education.
4. William Stallings. (1997). *Operating Systems*. Prentice Hall of India.
5. Jhon Goerzen. (2002). *Linux Programming Bible*. 4<sup>th</sup> Edition. Wiley- Dream Tech India (P) Ltd.

**Websites and e-Learning resources:**

1. [http://www.tutorialspoint.com/operating\\_system/](http://www.tutorialspoint.com/operating_system/)
2. <http://www.reallylinux.com/docs/files.shtml>
3. [http://www.tutorialspoint.com/operating\\_system/os\\_linux.htm](http://www.tutorialspoint.com/operating_system/os_linux.htm)
4. <http://iips.icci.edu.iq/images/exam/Abraham-Silberschatz-Operating-System-Concepts---9th2012.12.pdf>
5. [https://www.informatics.indiana.edu/rocha/academics/i101/pdfs/os\\_intro.pdf](https://www.informatics.indiana.edu/rocha/academics/i101/pdfs/os_intro.pdf)

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

COs	CLO Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CO1	Outline the fundamental concepts of an OS and their respective functionality	K1 to K3

<b>CO2</b>	Illustrate the importance of open source operating system commands	K1 to K3
<b>CO3</b>	Identify and stimulate management activities of operating system	K1 to K4
<b>CO4</b>	Analyze the various services provided by the operating system.	K1 to K3
<b>CO5</b>	Interpret different problems related to Process, Scheduling, Deadlock, memory and Files	K1 to K4

### Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CO1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>CO2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>CO3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>CO4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>CO5</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>

1-Basic Level

2- Intermediate Level

3- Advanced Level

### LESSON PLAN: TOTAL HOURS (75 Hrs.)

<b>Unit</b>	<b>Course Content</b>	<b>Hrs.</b>	<b>Course Objectives</b>	<b>Mode of Teaching</b>
<b>I</b>	<b>Introduction:</b> Definition of Operating System - OS Structures: OS Services - System Calls - Virtual Machines - <b>Process Management:</b> Process Concept - Process Scheduling - Operation on Processes - Co-operating Processes - Inter-process Communication.	15	CO1	Chalk and Talk, PPT
<b>II</b>	<b>CPU Scheduling:</b> Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Process <b>Synchronization:</b> The Critical Section Problem - Semaphores - Classical Problems of Synchronization - Critical Regions	15	CO2	Chalk and Talk, PPT, quiz, on the spot test
<b>III</b>	<b>Deadlocks:</b> System Model - Deadlock characterization – Methods for Handling Deadlocks Deadlock Prevention - Deadlock	15	CO3	Chalk and Talk, PPT, quiz, on the spot test

	avoidance- Deadlock Detection - Recovery from Deadlock.			
IV	<b>Storage management:</b> Memory management - Swapping – Contiguous Memory allocation. Paging – Segmentation –Segmentation with Paging – <b>Virtual memory:</b> Demand paging - Page replacement – Thrashing. <b>Mass-Storage Structure:</b> Disk Structure- Disk scheduling.	15	CO4	Chalk and Talk, PPT, quiz, on the spot test
V	<b>File-System Interface:</b> File Concept-File Attributes-File Operations – Access Methods: Sequential Access – Direct Access – <b>Directory Structure:</b> Single-Level Directory- Two –Level Directory-Tree-Structured Directories-Introducing Shell Programming – Linux General Purpose Commands-Process Oriented Commands – Communication Oriented Commands	15	CO5	Seminar, PPT presentation

Mrs.S.Sumathi  
Course Designer

DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
V	Core	23OUITPR5	Project with Viva voce	4	5	20	80	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

### Course Objectives:

1. The aim of the Project work is to acquire practical knowledge on the implementation of the programming concepts studied.
2. Each student should carry out individually one Project Work and it may be a work using the software packages that they have learned or the implementation of concepts from the papers studied or implementation of any innovative idea.

### Exam will be conducted as follows

- Viva-voce will be conducted at the end of V semester.
- Both the Internal (Respective Guides) and External Examiners (20+80) should conduct the Viva-Voce Examination.
- For awarding a pass, a candidate should have obtained 40% of the Total 100 marks.

DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
V	(Elective) DSEC5	23OUITDSE5A	Software Engineering	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

**Course Objectives:**

1. To familiarize the students with the knowledge of basic Software engineering methods and practices.
2. To understand about the processes, forms, tasks, techniques and tools involved in Software Engineering.
3. To Estimate the project cost using suitable cost estimation models and rate the software risks.
4. To use the necessary for software testing in each of the phases of software development.
5. To evaluate management strategies for effective software development.

**Course Content:****Unit I:**

Introduction to Software Engineering: Definition - The changing nature of software - Software Myths - Terminologies - Role of Management in Software Development - Software Life Cycle Models: The Waterfall Model - Increment Process Model - Evolutionary Process Model - The Unified Process

**Unit II:**

Software Requirements Analysis and Specifications: Requirements Engineering - Type of Requirements - Feasibility Studies - Requirements Elicitation - Requirements Analysis - Requirements Documentation - Requirements Validation.

**Unit III:**

Software Project Planning: Size Estimation - Cost Estimation - The Constructive Cost Model (COCOMO) - COCOMO II - The Putnam Resource Allocation Model - Software Risk Management - Software Design: Definition - Modularity - Strategy of Design - Function Oriented Design.

**Unit IV:**

Software Testing: A Strategic Approach to Software Testing - Terminologies - Functional Testing - Structural Testing - Levels of Testing - Validation Testing - Testing Tools.

**Unit V:**

Software Reliability: Basic Concepts - Software Quality - McCall Software Quality Model - Boehm Software Quality Model - Capability Maturity Model - Software Maintenance: Definition - Process - Models - Configuration Management -Documentation.

**Text Book:**

K.K Agarwal, Yogesh Singh. (2009). *Software Engineering*. Third Edition. New Age International Publishers.

**Chapters:**

**UNIT I** – Chapter 1: 1.3, 1.4, 1.6, Chapter 2: 2.2 – 2.5

**UNIT II** – Chapter 3: 3.1, 3.3, 3.5 – 3.7

**UNIT III** – Chapter 4: 4.1 – 4.7, Chapter 5: 5.2 – 5.4

**UNIT IV** – Chapter 8: 8.1, 8.2, 8.4 – 8.6, 8.8

**UNIT V** – Chapter 7: 7.1, 7.2 (7.2.1, 7.2.2), 7.4, Chapter 9: 9.1, 9.3, 9.8

**Reference Book(s):**

1. Roger S. Pressman. *Software Engineering – A Practitioners Approach*. 5 th Edition. Tata McGraw Hill Publication.
2. PanajJalote. (2005). *An Integrated Approach to Software Engineering*. 3 rd Edition. Narosa Publication.
3. Thomas T. Baker. *Writing Software Documentation – A task oriented approach*. Second Edition. Pearson Education. 2004.
4. Rajib Mall. *Fundamentals of Software Engineering*. Second Edition. Prentice Hall.
5. Richard Failey. *Software Engineering Concepts*. Tata McGraw-Hill. 2004.

**Websites and e-Learning resources:**

1. [http://www.tutorialspoint.com/software\\_engineering](http://www.tutorialspoint.com/software_engineering)
2. <http://www.nada.kth.se/lectures/>
3. <http://www2.latech.edu/>
4. <https://www.wiziq.com/tutorials/software-engineering>
5. <http://www.jkinfoline.com/software-engineering.html>

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

COs	CLO Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CO1	Define the basic terminologies involved in the entire software developmental life cycle	K1 to K3
CO2	Identify suitable models, techniques and tools for the development of a software product	K1 to K3
CO3	Apply software engineering perspective through requirements analysis, software design and construction, verification, and validation to develop solutions to modern problems	K1 to K4
CO4	Compare and contrast different process, cost, quality models and testing techniques	K1 to K3
CO5	Estimate the project cost using suitable cost estimation models, rate the software risks and evaluate management strategies for effective software development	K1 to K4

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	2
CO2	3	2	2	3	3	2
CO3	3	2	3	2	3	3
CO4	3	3	2	3	3	3
CO5	3	3	3	2	3	3

1-Basic Level

2- Intermediate Level

3- Advanced Level

**LESSON PLAN: TOTAL HOURS (60 Hrs.)**

Unit	Course Content	Hrs.	Course Objectives	Mode of Teaching
I	Introduction to Software Engineering: Definition - The changing nature of software - Software Myths - Terminologies - Role of Management in Software Development - Software Life Cycle Models: The	12	CO1	Chalk and Talk, PPT

	Waterfall Model - Increment Process Model - Evolutionary Process Model - The Unified Process			
<b>II</b>	Software Requirements Analysis and Specifications: Requirements Engineering - Type of Requirements - Feasibility Studies - Requirements Elicitation - Requirements Analysis - Requirements Documentation - Requirements Validation.	12	CO2	Chalk and Talk, PPT, quiz, on the spot test
<b>III</b>	Software Project Planning: Size Estimation - Cost Estimation - The Constructive Cost Model (COCOMO) - COCOMO II - The Putnam Resource Allocation Model - Software Risk Management - Software Design: Definition - Modularity - Strategy of Design - Function Oriented Design.	12	CO3	Chalk and Talk, PPT, quiz, on the spot test
<b>IV</b>	Software Testing: A Strategic Approach to Software Testing - Terminologies - Functional Testing - Structural Testing - Levels of Testing - Validation Testing - Testing Tools.	12	CO4	Chalk and Talk, PPT, quiz, on the spot test
<b>V</b>	Software Reliability: Basic Concepts - Software Quality - McCall Software Quality Model - Boehm Software Quality Model - Capability Maturity Model - Software Maintenance: Definition - Process - Models - Configuration Management -Documentation.	12	CO5	Seminar, PPT presentation

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DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
V	(Elective) DSEC5	23OUITDSE5B	Fuzzy Logic	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

### Course Objectives:

1. To understand the basic concept of Fuzzy logic.
2. To learn the various operations on relation properties.
3. To study about the membership functions.
4. To learn about the Defuzzification and Fuzzy Rule-Based System.
5. To learn the concepts of Applications of Fuzzy Logic.

### Course Content:

#### Unit –I:

Introduction to Fuzzy Logic- Fuzzy Sets- Fuzzy Set Operations, Properties of Fuzzy Sets, Classical and Fuzzy Relations: Introduction-Cartesian Product of Relation-Classical Relations-Cardinality of Crisp Relation.

#### Unit –II:

Operations on Crisp Relation-Properties of Crisp Relations-Composition Fuzzy Relations, Cardinality of Fuzzy Relations-Operations on Fuzzy Relations-Properties of Fuzzy Relations-Fuzzy Cartesian Product and Composition-Tolerance and Equivalence Relations, Crisp Relation.

#### Unit –III:

Membership Functions: Introduction, Features of Membership Function, Classification of Fuzzy Sets, Fuzzification, Membership Value Assignments, Intuition, Inference, Rank Ordering.

#### Unit –IV:

Defuzzification: Introduction, Lambda Cuts for Fuzzy Sets, Lambda Cuts for Fuzzy Relations, Defuzzification Methods, Fuzzy Rule-Based System: Introduction, Formation of Rules, Decomposition of Rules, Aggregation of Fuzzy Rules, Properties of Set of Rules.

#### Unit –V:

Applications of Fuzzy Logic: Fuzzy Logic in Automotive Applications, Fuzzy Antilock Brake System-Antilock-Braking System and Vehicle Speed-Estimation Using Fuzzy Logic.

**Text Book:**

Sivanandam, S. N. Sumathi.S & Deepa S. N. (2007). *Introduction to Fuzzy Logic using MATLAB*. Springer-Verlag Berlin Heidelberg.

Unit I - Chapters : 2, 3.1 - 3.3.1

Unit II - Chapter : 3: 3.2-3.5

Unit III - Chapter : 4

Unit IV - Chapter : 5

Unit V - Chapter 8: 8.6

**Reference Book(s):**

1. Guanrong Chen & Trung Tat Pham. *Introduction to Fuzzy Sets, Fuzzy Logic and Fuzzy Control Systems*.
2. Timothy J Ross , *Fuzzy Logic with Engineering Applications*.
3. Ross, T. J. (2005). *Fuzzy logic with engineering applications*. John Wiley & Sons.
4. Jang, J.S. R. Sun, C.T. & Mizutani, E. *Neuro-Fuzzy and Soft Computing*. Prentice Hall.
5. Rajasekaran, S.&Vijayalakshmi G.A. (2003). *Neural Networks and Fuzzy logic and Genetic Algorithms, Synthesis and Applications*, PHI. New Delhi.

**Websites and e-Learning resources:**

1. <https://www.javatpoint.com/fuzzy-logic>
2. <https://www.guru99.com/what-is-fuzzy-logic.html>
3. <http://www.nptel.ac.in/syllabus/syllabus.php?subjectId=111106048>
4. <https://ia802902.us.archive.org/26/items/FuzzyLogicReferences/Introduction%20to%20Fuzzy%20logic%20using%20MATLAB%20%20S.%20N.%20Sivanandam%2C%20S.%20Sumathi%20and%20S.%20N.%20Deepa.pdf>
5. <https://download.e-bookshelf.de/download/0000/0109/72/L-G-0000010972-002343973.pdf>

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

COs	CLO Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CO1	Understand the basics of Fuzzy sets, operation and properties.	K1 to K3
CO2	Apply Cartesian product and composition on Fuzzy relations and use the tolerance and Equivalence relations.	K1 to K3

<b>CO3</b>	Analyze various fuzzification methods and features of membership Functions	K1 to K4
<b>CO4</b>	Evaluate defuzzification methods for real time applications	K1 to K3
<b>CO5</b>	Design an application using Fuzzy logic and its Relations.	K1 to K4

### Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CO1</b>	3	2	2	3	3	2
<b>CO2</b>	3	2	2	3	3	2
<b>CO3</b>	3	2	3	2	3	3
<b>CO4</b>	3	3	2	3	3	3
<b>CO5</b>	3	3	3	2	3	3

1-Basic Level

2- Intermediate Level

3- Advanced Level

### LESSON PLAN: TOTAL HOURS (60 Hrs.)

<b>Unit</b>	<b>Course Content</b>	<b>Hrs.</b>	<b>Course Objectives</b>	<b>Mode of Teaching</b>
<b>I</b>	Introduction to Fuzzy Logic- Fuzzy Sets- Fuzzy Set Operations, Properties of Fuzzy Sets, Classical and Fuzzy Relations: Introduction-Cartesian Product of Relation-Classical Relations-Cardinality of Crisp Relation.	12	CO1	Chalk and Talk, PPT
<b>II</b>	Operations on Crisp Relation-Properties of Crisp Relations-Composition Fuzzy Relations, Cardinality of Fuzzy Relations-Operations on Fuzzy Relations-Properties of Fuzzy Relations-Fuzzy Cartesian Product and Composition-Tolerance and Equivalence Relations ,Crisp Relation.	12	CO2	Chalk and Talk, PPT, quiz, on the spot test
<b>III</b>	Membership Functions: Introduction, Features of Membership Function, Classification of Fuzzy Sets, Fuzzification, Membership Value Assignments, Intuition, Inference, Rank Ordering.	12	CO3	Chalk and Talk, PPT, quiz, on the spot test

IV	Defuzzification: Introduction, Lambda Cuts for Fuzzy Sets, Lambda Cuts for Fuzzy Relations, Defuzzification Methods, Fuzzy Rule-Based System: Introduction, Formation of Rules, Decomposition of Rules, Aggregation of Fuzzy Rules, Properties of Set of Rules.	12	CO4	Chalk and Talk, PPT, quiz, on the spot test
V	Applications of Fuzzy Logic: Fuzzy Logic in Automotive Applications, Fuzzy Antilock Brake System-Antilock-Braking System and Vehicle Speed-Estimation Using Fuzzy Logic.	12	CO5	Seminar, PPT presentation

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DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
V	(Elective) DSEC6	23OUITDSE5C	Artificial Intelligence	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

### Course Objectives:

1. To learn various concepts of AI Techniques.
2. To learn various Search Algorithm in AI.
3. To learn probabilistic reasoning and models in AI.
4. To learn about Markov Decision Process.
5. To learn various type of Reinforcement learning.

### Course Content:

#### Unit I:

**Introduction:** Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.

#### Unit II:

**Search Algorithms:** Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A\* algorithm, Game Search.

#### Unit III:

**Probabilistic Reasoning:** Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

#### Unit IV:

**Markov Decision process:** MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.

#### Unit V:

**Reinforcement Learning:** Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.

### Text Books:

1. Stuart Russell and Peter Norvig. *Artificial Intelligence: A Modern Approach*. 3rd Edition. Prentice Hall.
2. Elaine Rich and Kevin Knight. *Artificial Intelligence*. Tata McGraw Hill.

**Reference Book(s):**

1. Trivedi, M.C. *A Classical Approach to Artificial Intelligence*. Khanna Publishing House. Delhi.
2. Saroj Kaushik. (2011). *Artificial Intelligence*. Cengage Learning India.
3. David Poole and Alan Mackworth.(2010). *Artificial Intelligence: Foundations for Computational Agents*. Cambridge University Press.

**Websites and e-Learning resources:**

1. <https://nptel.ac.in/courses/106106140/>
2. <https://nptel.ac.in/courses/106106126/>
3. <https://pdfcoffee.com/a-first-course-in-artificial-intelligence-deepak-khemani-pdf-free.html>

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

COs	CLO Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CO1	Understand the various concepts of AI Techniques.	K1 to K3
CO2	Understand various Search Algorithm in AI.	K1 to K3
CO3	Understand probabilistic reasoning and models in AI.	K1 to K4
CO4	Understand Markov Decision Process.	K1 to K3
CO5	Understand various type of Reinforcement Learning Techniques.	K1 to K4

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	3	2	2
CO2	3	3	3	3	2	2
CO3	3	3	3	2	2	3
CO4	3	3	3	3	3	2
CO5	3	3	2	3	2	2

1-Basic Level

2- Intermediate Level

3- Advanced Level

**LESSON PLAN: TOTAL HOURS (60 Hrs.)**

Unit	Course Content	Hrs.	Course Objectives	Mode of Teaching
<b>I</b>	Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.	12	CO1	Chalk and Talk, PPT
<b>II</b>	Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.	12	CO2	Chalk and Talk, PPT, quiz, on the spot test
<b>III</b>	Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.	12	CO3	Chalk and Talk, PPT, quiz, on the spot test
<b>IV</b>	Markov Decision process: MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.	12	CO4	Chalk and Talk, PPT, quiz, on the spot test
<b>V</b>	Reinforcement Learning : Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning	12	CO5	Seminar, PPT presentation

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DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
V	(Elective) DSEC6	23OUITDSE5D	Grid Computing	3	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. To learn the basic construction and application of grid computing.
2. To learn grid computing organization and their Role.
3. To learn grid Computing Anatomy.
4. To learn grid Computing road map.
5. To learn various type of grid Architecture.

### Course Content:

**Unit I:** Introduction: Early Grid Activity, Current Grid Activity, Overview of Grid Business areas, Grid Applications, Grid Infrastructures.

#### Unit II:

Grid Computing organization and their Roles: Organizations Developing Grid Standards, and Best Practice Guidelines, Global Grid Forum (GCF), #Organization Developing Grid Computing Toolkits and Framework#, Organization and building and using grid based solutions to solve computing, commercial organization building and Grid Based solutions.

#### Unit III:

Grid Computing Anatomy: The Grid Problem, The conceptual of virtual organizations, Grid Architecture and relationship to other distributed technology.

#### Unit IV:

The Grid Computing Road Map: Autonomic computing, Business on demand and infrastructure virtualization, Service-Oriented Architecture and Grid, #Semantic Grids#.

#### Unit V:

Merging the Grid services- Architecture with the Web Services Architecture: Service-Oriented Architecture, Web Service Architecture, #XML messages and Enveloping#, Service message description Mechanisms, Relationship between Web Services and Grid Services, Web services Interoperability and the role of the WS-I Organization.

**Text Book:**

Joshy Joseph. & Craig Fellenstein. (2004). *Grid computing*. Pearson. IBM Press. PT.

- UNIT I : Chapter - 1  
 UNIT II : Chapter - 2  
 UNIT III : Chapter - 3  
 UNIT IV : Chapter - 4  
 UNIT V : Chapter - 5

**Reference Book(s):**

1. Ahmer Abbas and Graig. (2003). *Grid computing- A Practical Guide to technology and applications*. Charles River Media.
2. Frederic Magoules, Jie Pan, Kiat-An Tan, Abhinit Kumar. (2019). *Introduction to Grid Computing*. Published CRC Press. First Edition.
3. Jorge G. Barbosa, Ph.D. *Grid Computing: Techniques and Future Prospects*. Publish with Nova Science.
4. Bart Jacob .Michael Brown. Kentaro Fukui &Nihar Trivedi. (2005). *Introduction to Grid Computing*. IBM corporation.
5. Mitesh Agarwal. *Grid Computing Technology, Trends & Attributes*. IT Architect – HPC Solutions Sun Microsystems

**Web Resources:**

1. [https://en.wikipedia.org/wiki/Grid\\_computing](https://en.wikipedia.org/wiki/Grid_computing)
2. [https://link.springer.com/chapter/10.1007/978-1-84882-409-6\\_4](https://link.springer.com/chapter/10.1007/978-1-84882-409-6_4)
3. <https://www.redbooks.ibm.com/redbooks/pdfs/sg246778.pdf>
4. <https://www.redbooks.ibm.com/redbooks/pdfs/sg246778.pdf>
5. <https://indico.cern.ch/event/93835/contributions/1280938/attachments/1103979/1575041/gridcomputing.pdf>

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

	<b>CLO Statement</b>	<b>Knowledge According to Bloom's Taxonomy (Upto K level)</b>
<b>CO1</b>	To understand the basic elements and concepts of Grid computing.	K1 to K3
<b>CO2</b>	To understand the Grid computing toolkits and Framework.	K1 to K3
<b>CO3</b>	To understand the concepts of Anatomy of Grid Computing.	K1 to K4
<b>CO4</b>	To understand the concept of service oriented architecture.	K1 to K3
<b>CO5</b>	To Gain knowledge on grid and web service architecture.	K1 to K4

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

	PO1	PO2	PO3	PO4	PO5	PO6
<b>CLO1</b>	3	1	1	2	3	2
<b>CLO2</b>	3	1	1	1	3	2
<b>CLO3</b>	3	1	1	1	3	2
<b>CLO4</b>	3	1	2	3	3	2
<b>CLO5</b>	3	2	1	2	2	3

**1-Basic Level****2- Intermediate Level****3- Advanced Level****LESSON PLAN: TOTAL HOURS (60 Hrs.)**

UNIT	Course Content	No. of Hours	Course Objectives	Mode of Teaching
I	Introduction: Early Grid Activity, Current Grid Activity, Overview of Grid Business areas, Grid Applications, Grid Infrastructures.	12	CO1	Chalk and Talk, PPT, quiz, on the spot test
II	Grid Computing organization and their Roles: Organizations Developing Grid Standards, and Best Practice Guidelines, Global Grid Forum (GCF), Organization Developing Grid Computing Toolkits and Framework, Organization and building and using grid based solutions to solve computing, commercial organization building and Grid Based solutions.	12	CO2	Chalk and Talk, PPT, quiz, on the spot test
III	Grid Computing Anatomy: The Grid Problem, The conceptual of virtual organizations, # Grid Architecture # and relationship to other distributed technology.	12	CO3	Chalk and Talk, PPT, quiz, on the spot test
IV	The Grid Computing Road Map: Autonomic computing, Business on demand and infrastructure virtualization, Service-Oriented Architecture and Grid, #Semantic Grids#.	12	CO4	Chalk and Talk, PPT, quiz, on the spot test

V	Merging the Grid services Architecture with the Web Services Architecture: Service-Oriented Architecture, Web Service Architecture, XML messages and Enveloping, Service message description Mechanisms, Relationship between Web Services and Grid Services, Web services Interoperability and the role of the WS-I Organization.	12	CO5	Seminar, PPT presentation , Activity and Model Preparation
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DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
VI	Core	23OUIT61	Data Mining	4	6	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. To Understand the fundamental data mining methodologies with the ability to formulate and solve problems.
2. To Describe and implement classification algorithms.
3. To Determine Bayesian classification and Rule-based classification.
4. To Understand clustering methods and association rule mining.
5. To Analysis the Outlier Detection Methods.

### Course Content:

#### Unit- I:

**Introduction:** Data Mining – Kinds of Data and Patterns to be Mined – Technologies used –Kinds of Applications are Targeted - Major Issues –Data objects and Attribute types – Basic statistical Descriptions of Data-**Data Pre-processing:** Data Cleaning – Data Integration - Data Reduction - Data Transformation.

#### Unit- II:

**Association Rules Mining:** Introduction – Frequent Itemset Mining Methods: Apriori Algorithm-Generating Association Rules from Frequent Itemsets-Improving the efficiency of Apriori-A Pattern –Growth Approach for mining Frequent Itemsets-Pattern Evaluation Methods.

#### Unit- III:

**Classification:** Introduction –Basic concepts – Logistic regression - Decision tree induction– Bayesian classification, Rule-based Classification-Model Evaluation and selection.

#### Unit- IV:

**Cluster Analysis:** Introduction-Requirements for Cluster Analysis - **Partitioning Methods:** The K-Means method - **Hierarchical Method:** Agglomerative method - **Density based methods:** DBSCAN-**Evaluation of Clustering:** Determining the Number of Clusters – Measuring Clustering Quality.

**Unit- V:**

**Outlier Detection:** Outliers and Outlier Analysis – Outlier Detection Methods - **Data**

**Visualization:** Pixel-oriented visualization – Geometric Projection visualization technique-  
Icon-based-Hierarchical visualization-Visualizing complex data and relations.

**Text Book:**

1. Jiawei Han, Micheline Kamber, Jian Pei. (2012). *Data Mining concepts and techniques*. 3rd Edition. Elsevier publication.

UNIT I : Chapter 1(1.4-1.7)

Chapter 2( 2.1,2.2)

Chapter 3(3.2-3.5)

UNIT II : Chapter 6 (6.1,6.2(6.2.1-6.2.4),6.3)

UNIT III : Chapter 8(8.1 – 8.5)

UNIT IV : Chapter 10(10.1 – 10.4(10.4.1),10.6(10.6.2,10.6.3)

UNIT V : Chapter 12(12.1,12.2)

**Reference Book(s):**

1. Ian H. Witten and Eibe Frank. (2005). *Data Mining: Practical Machine Learning Tools and Techniques*. Second Edition. Morgan Kaufmann.
2. Arun, Pujari.K. (2015). *Data Mining Techniques*. 10 impression University Press.
3. Daniel T. Larose , Chantal D. Larose. (2015). *Data mining and Predictive analytics*. Second Ed. Wiley Publication.
4. Gupta.G.K. (2011). *Introduction to Data mining with case studies*. 2nd Edition. PHI Private limited. New Delhi.

**Websites and e-Learning resources:**

1. <https://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf>
2. [https://www.ceom.ou.edu/media/docs/upload/Pang-Ning\\_Tan\\_Michael\\_Steinbach\\_Vipin\\_Kumar\\_-\\_Introduction\\_to\\_Data\\_Mining-Pe\\_NRDK4fi.pdf](https://www.ceom.ou.edu/media/docs/upload/Pang-Ning_Tan_Michael_Steinbach_Vipin_Kumar_-_Introduction_to_Data_Mining-Pe_NRDK4fi.pdf)
3. <https://mitmecsept.wordpress.com/wp-content/uploads/2017/04/data-mining-concepts-and-techniques-2nd-edition-impressao.pdf>
4. <https://theswissbay.ch/pdf/Gentoomen%20Library/Data%20Mining/Dunham%20-%20Data%20Mining.pdf>

5. <https://www.scribd.com/document/341140746/Pang-Ning-Tan-Michael-Steinbach-Vipin-Kumar-Introduction-to-Data-Mining-Pearson-2005-1-pdf>

### COURSE OUTCOMES:

At the end of the course, the student will be able to:

	CLO Statement	Knowledge According to Bloom's Taxonomy (Upto K level)
CO1	Outline the fundamentals and the principles of Data Mining	K1 to K3
CO2	Apply suitable different pre-processing for data mining	K1 to K3
CO3	Classify data-mining techniques based on the different applications	K1 to K4
CO4	Analyse the various data mining algorithms with respect to functionality	K1 to K3
CO5	Recommend appropriate data models for data mining techniques to solve real world problems	K1 to K4

### Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	1	1	2	3	2
CLO2	3	1	1	1	3	2
CLO3	3	1	1	1	3	2
CLO4	3	1	2	3	3	2
CLO5	3	2	1	2	2	3

1-Basic Level

2- Intermediate Level

3- Advanced Level

### LESSON PLAN: TOTAL HOURS (90 Hrs.)

UNIT	Course Content	No. of Hours	Course Objectives	Mode of Teaching
I	<b>Introduction:</b> Data Mining – Kinds of Data and Patterns to be Mined – Technologies used –Kinds of Applications are Targeted - Major Issues –Data objects and Attribute types – Basic statistical Descriptions of Data- <b>Data Preprocessing</b> : Data Cleaning – Data Integration - Data Reduction - Data Transformation.	18	CO1	Chalk and Talk, PPT, quiz, on the spot test

II	<b>Association Rules Mining:</b> Introduction – Frequent Itemset Mining Methods: Apriori Algorithm-Generating Association Rules from Frequent Itemsets-Improving the efficiency of Apriori-A Pattern – Growth Approach for mining Frequent Itemsets-Pattern Evaluation Methods.	18	CO2	Chalk and Talk, PPT, quiz, on the spot test
III	<b>Classification:</b> Introduction –Basic concepts – Logistic regression - Decision tree induction–Bayesian classification, Rule–based classification-Model Evaluation and selection.	18	CO3	Chalk and Talk, PPT, quiz, on the spot test
IV	<b>Cluster Analysis:</b> Introduction-Requirements for Cluster Analysis - <b>Partitioning Methods:</b> The K-Means method - <b>Hierarchical Method:</b> Agglomerative method - <b>Density based methods:</b> DBSCAN- <b>Evaluation of Clustering:</b> Determining the Number of Clusters – Measuring Clustering Quality.	18	CO4	Chalk and Talk, PPT, quiz, on the spot test
V	<b>Outlier Detection:</b> Outliers and Outlier Analysis – Outlier Detection Methods - <b>Data Visualization:</b> Pixel-oriented visualization – Geometric Projection visualization technique - Icon-based-Hierarchical visualization-Visualizing complex data and relations.	18	CO5	Seminar, PPT presentation , Activity and Model Preparation

Mrs.G.Amudha  
Course Designer

DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
VI	Core Practical	23OUIT6P	Data Mining Lab	4	6	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

### Course Objectives:

- 1.To Understand Key Data Mining Concepts.
- 2.To implement and visualize mining techniques.
- 3.To techniques for cleaning, transforming, and preparing raw data for mining tasks..
- 4.To Implement Data Mining Algorithms.
- 5.To Evaluate Model Performance.

### Programs List:

1. Understanding the data
2. Visualization Techniques
3. Data Preprocessing
4. Handling Missing Values
5. Data Reduction-Principal Component Analysis
6. Data Normalization-Min-Max, Z-score, Decimal Scaling
7. Association Rule Mining-Apriori Algorithm
8. Classification
9. Logistic Regression
10. Decision Tree
11. Naive Bayesian
12. Clustering
13. K-Means Clustering
14. DBSCAN
15. Agglomerative
16. Case Study

### Text Book:

1. Jiawei Han, MichelineKamber. Jian Pei.(2012). *Data Mining concepts and techniques*. 3rd Edition. Elsevier publication.

**Books for Reference:**

1. Ian H. Witten and Eibe Frank. (2005). *Data Mining: Practical Machine Learning Tools and Techniques*. Second Edition. Morgan Kaufmann.
2. Arun, Pujari.K.(2015). *Data Mining Techniques*. 10 impression University Press.
3. Daniel T. Larose , Chantal D. Larose. (2015). *Data mining and Predictive analytics*. Second Ed. Wiley Publication.
4. Gupta.G.K. (2011). *Introduction to Data mining with case studies*. 2<sup>nd</sup> Edition. PHI Private Limited. New Delhi.

**Web Resources / E-Books:**

1. <http://www.apgcm.edu.in/images/data-mining-lab-manual.pdf>
2. [https://www.mlritm.ac.in/assets/cse/cse\\_lab\\_manuals/R20\\_cse\\_manuals/DATA%20MINING%20LAB%20Manual.pdf](https://www.mlritm.ac.in/assets/cse/cse_lab_manuals/R20_cse_manuals/DATA%20MINING%20LAB%20Manual.pdf)
3. <http://www.tutorialspoint.com/dbms/index.htm>
3. <https://methodist.edu.in/web/uploads/labmanual/DM%20Lab%20Manual.pdf>

**Nature of the course**

Developing of Oracle RDBMS, SQL\* Plus, SQL – query structure, Exception Handling Compilation and Run time, user defined, Stored procedures.

**Activities to be given**

Implement Programming

**Activities on Employability Oriented**

Data Mining Program Development, Problem Solving.

**Pedagogy**

Record Book writing, Program development and Demonstration, Practical sessions.

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

COs	CLO Statement	Knowledge According to Bloom's Taxonomy (Upto K level)
CO1	Understand the real time datasets for analysis	K1 to K3
CO2	Apply suitable pre processing for data mining task	K1 to K3
CO3	Demonstrate data-mining techniques based on the different applications .	K1 to K4
CO4	Analyze the performance evaluation of various data mining algorithms .	K1 to K3
CO5	Prescribe appropriate data models for data mining techniques to solve real world problems .	K1 to K4

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

	PO1	PO2	PO3	PO4	PO5	PO6
<b>CLO1</b>	3	1	1	2	3	2
<b>CLO2</b>	3	1	1	1	3	2
<b>CLO3</b>	3	1	1	1	3	2
<b>CLO4</b>	3	1	2	3	3	2
<b>CLO5</b>	3	2	1	2	2	3

**1-Basic Level****2- Intermediate Level****3- Advanced Level****LESSON PLAN: TOTAL HOURS (90 Hrs.)**

UNIT	Course Content	No. of Hours	Course Objectives	Mode of Teaching
I	1.Understanding the data 2.Visualization Techniques 3.Data Pre-processing	18	CO1	Demo & Practical Session
II	4.Handling Missing Values 5.Data Reduction-Principal Component Analysis 6.Data Normalization-Min-Max, Z-score, Decimal Scaling	18	CO2	Demo & Practical Session
III	7.Association Rule Mining-Apriori Algorithm 8.Classification 9.Logistic Regression	18	CO3	Demo & Practical Session
IV	10.Decision Tree 11.Naive Bayesian 12.lustering	18	CO4	Demo & Practical Session
V	13.DBSCAN 14.Agglomerative 15.Case Study	18	CO5	Demo & Practical Session

Mrs.G.Amudha  
Course Designer

DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
VI	Core	23OUIT62	Data Communication and Networking	4	6	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. Introduce the basic concepts of data communication, network architecture, protocols, and standards.
2. Examine the characteristics of analog and digital transmission, transmission media, bandwidth, and data encoding techniques.
3. To analyze and manage how network protocols handle data flow control, congestion avoidance, and traffic shaping in various networking environment
4. Provide experience to analyze and simulate network behavior.
5. Equip students with foundational knowledge in advanced networking studies.

### Course Content:

#### Unit- I:

Introduction: Data Communication-Networks: Distributed Processing-Network Criteria  
Physical Structures –Network Models-Categories of Network-Internetwork - The Internet  
Protocols and Standards – Network Models: Layers in the OSI Model - TCP/IP Protocol Suite

#### Unit- II:

Data and Signals: Analog and Digital Data - Analog and Digital Signals – Digital  
Transmission: Transmission Modes – Multiplexing: FDM – WDM - Synchronous TDM -  
Statistical TDM - Transmission Media: Guided media - Unguided Media

#### Unit- III:

Switching: Circuit Switched Networks - Datagram Networks-Virtual Circuit Network - Error  
Detection and Correction: Introduction - Block Coding - Linear Block Codes - Cyclic Codes:  
Cyclic Redundancy Check - Checksum. Data Link Control: Framing - Flow Control and  
Error Control - Noiseless Channel: Stop-and-wait Protocol

**Unit- IV:**

Wired LANs: Standard Ethernet-GIGABIT Ethernet-Wireless LAN: Bluetooth Connecting LANs: Connecting Devices: Passive Hubs-Repeaters-Active Hubs-Bridges-Two Layer Switches-Routers-Three layer Switches-Gateway-Network Layer: Internet Protocol: IPv4 – Ipv6-Transition from IPv4 to IPv6.

**Unit- V:**

Network Layer: Delivery, Forwarding and Routing- Unicast Routing Protocols: Distance Vector Routing-Link state routing- Future & Current Trends in Computer Networks: 5G Network: Salient Features-Technology-Applications-Advanced Features-Advantages & Disadvantages-Internet of Things: key Features -Advantages & Disadvantages-IOT Hardware-IOT Technology and Protocols-IOT. Common Uses-Applications-WiFi-WiMaxLifi-LifivWifi

**Text Books:**

1.Behrouz and Forouzan. (2006). Data Communication and Networking. 4th Edition.

TMH

UNIT I : Chapter 1(1.4 ), Chapter 2( 2.2 ,2.4)

UNIT II : Chapter 3 (3.1.1 , 3.1.2) , Chapter 4 (4.3)

Chapter 6 (6.1), Chapter 7 (7.1 , 7.2)

UNIT III : Chapter 8(8.1 – 8.3) , Chapter 10(10.1 -10.4(10.4.1),10.5

Chapter 11(11.1 , 11.2, 11.4 .2)

UNIT IV : Chapter 13(13.2 , 13.5 ) , Chapter 15 (15.1), Chapter 20(20.2 – 20.3)

UNIT V : Chapter 22(22.3.3,22.3.4)

2.Ajit Pal. (2014). Data Communication and Computer Networks. PHI.

**Reference Book(s):**

1.Jean Walrand. (1998). *Communication Networks*. Second Edition. TataMcGraw Hill.

2. Gallager.(2008). R.G. *Principles of Digital Communication*. Cambridge. Cambridge University Press.

3.Vani Dr. MP.(2024).*Data Communication and Computer Network - Advanced : Easy To Learn and Simple to Develop*. Notion Press. India.

4.Prakash C. Gupta (2014).*Data Communications and Computer Networks*. Second Edition. PHI Learning Private Limited. Delhi.

**Websites and e-Learning resources**

1. [http://www.tutorialspoint.com/data\\_communication\\_computer\\_network/](http://www.tutorialspoint.com/data_communication_computer_network/)
2. [http://www.slideshare.net/zafar\\_ayub/data-communication-and-network-11903853](http://www.slideshare.net/zafar_ayub/data-communication-and-network-11903853)
3. <http://www.freetchbooks.com/data-communication-and-networks-f31.html>
4. [https://www.lpude.in/SLMs/Master%20of%20Computer%20Applications/Sem\\_1/DECAP453\\_DATA\\_COMMUNICATION\\_AND\\_NETWORKING.pdf](https://www.lpude.in/SLMs/Master%20of%20Computer%20Applications/Sem_1/DECAP453_DATA_COMMUNICATION_AND_NETWORKING.pdf)
5. [https://mrcet.com/downloads/digital\\_notes/ECE/III%20Year/07012023/DATA%20COMMUNICATIONS%20AND%20COMPUTER%20NETWORKS.pdf](https://mrcet.com/downloads/digital_notes/ECE/III%20Year/07012023/DATA%20COMMUNICATIONS%20AND%20COMPUTER%20NETWORKS.pdf)

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

	<b>CLO Statement</b>	<b>Knowledge According to Bloom's Taxonomy (Upto K level)</b>
<b>CO1</b>	Understand the fundamental concepts of computer networks and its application areas	K1 to K3
<b>CO2</b>	Identify and use various networking techniques and components to establish networking connection and transmission	K1 to K3
<b>CO3</b>	Analyze the services performed by different network layers and recent advancements in networking	K1 to K4
<b>CO4</b>	Compare various networking models, layers, protocols and technologies .	K1 to K3
<b>CO5</b>	Select the appropriate networking mechanisms to build a reliable network	K1 to K4

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CLO1</b>	3	1	1	2	3	2
<b>CLO2</b>	3	1	1	1	3	2
<b>CLO3</b>	3	1	1	1	3	2
<b>CLO4</b>	3	1	2	3	3	2
<b>CLO5</b>	3	2	1	2	2	3

**1-Basic Level**

**2- Intermediate Level**

**3- Advanced Level**

**LESSON PLAN: TOTAL HOURS (90 Hrs.)**

UNIT	Course Content	No. of Hours	Course Objectives	Mode of Teaching
I	Introduction: Data Communication-Networks: Distributed Processing-Network Criteria Physical Structures –Network Models-Categories of Network-Internetwork - The Internet <i>Protocols and Standards – Network Models: Layers in the OSI Model - TCP/IP Protocol Suite</i>	18	CO1	Chalk and Talk, PPT, quiz, on the spot test
II	Data and Signals: Analog and Digital Data - Analog and Digital Signals – Performance - Digital Transmission: Transmission Modes – Multiplexing: FDM – WDM - Synchronous TDM -Statistical TDM - Transmission Media: Guided media - Unguided Media .	18	CO2	Chalk and Talk, PPT, quiz, on the spot test
III	Switching: Circuit Switched Networks - Datagram Networks-Virtual Circuit Network - Error Detection and Correction: Introduction - Block Coding - Linear Block Codes - Cyclic Codes: Cyclic Redundancy Check - Checksum. Data Link Control: Framing - Flow Control and Error Control - Noiseless Channel: Stop-and-wait Protocol	18	CO3	Chalk and Talk, PPT, quiz, on the spot test
IV	<i>Wired LANs: Standard Ethernet-GIGABIT Ethernet-Wireless LAN: Bluetooth Connecting LANs: Connecting Devices: Passive Hubs-Repeaters-Active Hubs-Bridges-Two Layer Switches-Routers-Three layer Switches-Gateway-Network Layer: Internet Protocol: IPv4 –Ipv6-Transition from IPv4 to IPv6</i>	18	CO4	Chalk and Talk, PPT, quiz, on the spot test
V	Network Layer: Delivery, Forwarding and Routing- Unicast Routing Protocols: Distance	18	CO5	Seminar, PPT presentatio

	Vector Routing-Link state routing- Future & Current Trends in Computer Networks: 5G Network: Salient Features-Technology-Applications-Advanced Features-Advantages & Disadvantages-Internet of Things: key Features - Advantages & Disadvantages-IOT Hardware- IOT Technology and Protocols-IOT. Common Uses-Applications-WiFi-WiMaxLifi- LifivsWifi			n , Activity and Model Preparation
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Mrs.R.RajaSangeetha  
**Course Designer**

DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
VI	(Elective) DSEC7	23OUITDSE6A	Network Security	3	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

### Course Objectives:

1. To familiarize on the model of network security, Encryption techniques.
2. To understand the design concept of cryptography and authentication.
3. To develop experiments on algorithm used for security.
4. To understand the various Authentication applications.
5. To understand about virus and threats, firewalls, and implementation of Cryptography.

### Course Content:

#### Unit –I:

Model of network security – Security attacks, services and attacks – OSI security architecture – Classical encryption techniques – SDES – Block cipher Principles DES – Strength of DES – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – RC4 - Differential and linear cryptanalysis – Placement of encryption function – traffic confidentiality.

#### Unit –II:

Number Theory – Prime number – Modular arithmetic – Euclid’s algorithm - Fermat’s and Euler’s theorem – Primality – Chinese remainder theorem – Discrete logarithm – Public key cryptography and RSA – Key distribution – Key management – Diffie Hellman key exchange – Elliptic curve cryptography

#### Unit –III:

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS.

#### Unit –IV:

Authentication applications – Kerberos – X.509 Authentication services - E- mail security – IP security - Web security

#### Unit –V:

Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.

**Text Book:**

William Stallings. (2010). *Cryptography & Network Security*. Pearson Education. Fourth Edition.

**Reference Book(s):**

- 1.Charlie Kaufman, RadiaPerlman, MikeSpeciner. (2002). *Network Security*. Private communication in Public world. PHI. Second Edition.
2. Bruce Schneier, Neils Ferguson. (2003). *Practical Cryptography*. Wiley Dreamtech India Pvt Ltd. First Edition.
3. Douglas R Simson. (1995). *Cryptography–Theory and practice*. CRC Press. First Edition.
4. Stallings, W. (2017). *Cryptography and network security: Principles and practice (7th ed.)*. Pearson.
5. Schneier, B. (2015). *Applied cryptography: Protocols, algorithms, and source code in C (20th anniversary ed.)*. Wiley.

**Websites and e-Learning resources:**

1. <https://www.javatpoint.com/computer-network-security>
- 2.[https://www.tutorialspoint.com/information\\_security\\_cyber\\_law/network\\_security.htm](https://www.tutorialspoint.com/information_security_cyber_law/network_security.htm)
- 3.<https://www.geeksforgeeks.org/network-security/>

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

COs	CLO Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CO1	Understand public-key cryptography, RSA and other public-key cryptosystems such as Diffie-Hellman Key Exchange, ElGamal Cryptosystem.	K1 to K3
CO2	Understand the security issues.	K1 to K3
CO3	Apply key management and distribution schemes design. User Authentication.	K1 to K4
CO4	Analyze and design hash and MAC algorithms, and digital signatures. Analyze and design classical encryption techniques and block ciphers.	K1 to K3
CO5	Assess Intruders and Intruder Detection mechanisms, Types of Malicious software.	K1 to K4

### Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	2
CO2	3	2	2	3	3	2
CO3	3	2	3	2	3	3
CO4	3	3	2	3	3	3
CO5	3	3	3	2	3	3

1-Basic Level

2- Intermediate Level

3- Advanced Level

### LESSON PLAN: TOTAL HOURS (75 Hrs.)

UNIT	Course Content	No. of Hours	Course Objectives	Mode of Teaching
I	Model of network security – Security attacks, services and attacks – OSI security architecture – Classical encryption techniques – SDES – Block cipher Principles DES – Strength of DES – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – RC4 - Differential and linear cryptanalysis – Placement of encryption function – traffic confidentiality.	15	CO1	Chalk and Talk, PPT
II	Number Theory – Prime number – Modular arithmetic – Euclid’s algorithm - Fermet’s and Euler’s theorem – Primality – Chinese remainder theorem – Discrete logarithm – Public key cryptography and RSA – Key distribution – Key management – Diffie Hellman key exchange – Elliptic curve cryptography	15	CO2	Chalk and Talk, PPT, quiz, on the spot test
III	Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS.	15	CO3	Chalk and Talk, PPT, quiz, on the spot test

<b>IV</b>	Authentication applications – Kerberos – X.509 Authentication services - E- mail security – IP security - Web security	15	CO4	Chalk and Talk, PPT, quiz, on the spot test
<b>V</b>	Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security	15	CO5	Seminar, PPT presentation

**Mrs.G.Amudha**  
**Course Designer**

DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
VI	(Elective) DSEC7	23OUITDSE6B	Computational Intelligence	3	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. To identify and understand the basics of AI and its search.
2. To study about the Fuzzy logic systems.
3. To understand and apply the concepts of Neural Network and its functions.
4. To understand the concepts of Artificial Neural Network.
5. To study about the Genetic Algorithm.

### Course Content:

#### Unit- I:

**Introduction to AI:** Problem formulation – AI Applications – Problems – State Space and Search – Production Systems – Breadth First and Depth First – Travelling Salesman Problem – Heuristic search techniques: Generate and Test – Types of Hill Climbing. .

#### Unit- II:

**Fuzzy Logic Systems:** Notion of fuzziness – Operations on fuzzy sets – T-norms and other aggregation operators – Basics of Approximate Reasoning – Compositional Rule of Inference – Fuzzy Rule Based Systems – Schemes of Fuzzification – Inferencing – Defuzzification – Fuzzy Clustering – fuzzy rule-based classifier .

#### Unit- III:

**Neural Networks:** What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Backpropagation (BP) Networks, Back propagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications .

#### Unit- IV:

**Artificial Neural Networks:** Fundamental Concepts – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network .

**Unit- V:**

**Genetic Algorithm:** Introduction – Biological Background – Genetic Algorithm Vs Traditional Algorithm – Basic Terminologies in Genetic Algorithm – Simple GA – General Genetic Algorithm – Operators in Genetic Algorithm .

**Text Books:**

1. Sivanandam S.N. and Deepa.S.N. *Principles of Soft Computing*. 2nd Edition. Wiley India Pvt. Ltd.
2. Stuart Russell and Peter Norvig. *Artificial Intelligence - A Modern Approach*, 2nd Edition, Pearson Education in Asia.
3. Rajasekaran.S. and Vijayalakshmi.G.A. *Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications*, PHI.

**Reference Book(s):**

1. Martin.F. Mcneill and Ellen Thro.(2000) *-Fuzzy Logic: A Practical approach*, AP Professional.
2. Chin Teng Lin and George Lee.C.S.- *Neuro-Fuzzy Systems*, PHI.
3. Andries and Engelbrecht.P.*Computational Intelligence*.Second Edition.University of Pretoria.South Africa.
4. John Fulcher and lakshmi Jain.C.(2008).-*Computational Intelligence*.

**Websites and e-Learning resources:**

1. <https://www.javatpoint.com/artificial-intelligence-tutorial>
2. <https://www.w3schools.com/ai/>
3. <http://papers.harvie.cz/unsorted/computational-intelligence-an-introduction.pdf>

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

COs	CLO Statement	Knowledge According to Bloom's Taxonomy (Upto K level)
CO1	Describe the fundamentals of artificial intelligence concepts and searching techniques.	K1 to K3
CO2	Develop the fuzzy logic sets and membership function and defuzzification techniques	K1 to K3
CO3	Understand the concepts of Neural Network and analyze and apply the learning techniques	K1 to K4
CO4	Understand the artificial neural networks and its applications.	K1 to K3

<b>CO5</b>	Understand the concept of Genetic Algorithm and Analyze the optimization problems using GAs	K1 to K4
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### Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CLO1</b>	3	1	1	2	3	2
<b>CLO2</b>	3	1	1	1	3	2
<b>CLO3</b>	3	1	1	1	3	2
<b>CLO4</b>	3	1	2	3	3	2
<b>CLO5</b>	3	2	1	2	2	3

**1-Basic Level                      2- Intermediate Level                      3- Advanced Level**

### LESSON PLAN: TOTAL HOURS (75 Hrs.)

<b>UNIT</b>	<b>Course Content</b>	<b>No. of Hours</b>	<b>Course Objectives</b>	<b>Mode of Teaching</b>
I	<b>Introduction to AI:</b> Problem formulation – AI Applications – Problems – State Space and Search – Production Systems – Breadth First and Depth First – Travelling Salesman Problem – Heuristic search techniques: Generate and Test – Types of Hill Climbing.	15	CO1	Chalk and Talk, PPT, quiz, on the spot test
II	<b>Fuzzy Logic Systems:</b> Notion of fuzziness – Operations on fuzzy sets – T-norms and other aggregation operators – Basics of Approximate Reasoning – Compositional Rule of Inference – Fuzzy Rule Based Systems – Schemes of Fuzzification – Inferencing – Defuzzification – Fuzzy Clustering – fuzzy rule-based classifier .	15	CO2	Chalk and Talk, PPT, quiz, on the spot test
III	<b>Neural Networks:</b> What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Backpropagation (BP) Networks, Back propagation	15	CO3	Chalk and Talk, PPT, quiz, on the spot test

	Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications			
IV	<b>Artificial Neural Networks:</b> Fundamental Concepts – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network .	15	CO4	Chalk and Talk, PPT, quiz, on the spot test
V	<b>Genetic Algorithm:</b> Introduction – Biological Background – Genetic Algorithm Vs Traditional Algorithm – Basic Terminologies in Genetic Algorithm – Simple GA – General Genetic Algorithm – Operators in Genetic Algorithm .	15	CO5	Seminar, PPT presentation , Activity and Model Preparation

Mrs.G.Amudha  
Course Designer

DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
VI	(Elective) DSEC8	23OUITDSE6C	Trends in Computing	3	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. Learning current trends in various computer science and information technology fields.
2. Learning various fields of Cloud computing, Green computing, the Edge and Fog computing technology.
3. To learn about Architecture and Application design of Cloud, Edge & fog computing
4. To know computing and to improve security services of computing technologies.
5. To learn the various Case Studies in Cloud, Edge & fog Computing.

### Course Content:

#### Unit- I:

**Era of Cloud Computing:** Introduction – Components of Cloud Computing – Cloud Types: Private, Public and Hybrid clouds – Limitations of the Cloud - **Virtualization:** Structure and Mechanisms.

#### Unit- II:

**Cloud computing Services:** Software as a Service(SaaS) – Platform as a Service(PaaS)- Infrastructure as a Service(IaaS)-Database as a Service(DBaaS)- Recent Trends in cloud computing and Standards-**Data Security in Cloud** – Risks and Challenges with Cloud Data-Security as a Service.

#### Unit- III:

**Edge Computing:** Edge Computing and Its Essentials: Introduction- Edge Computing Architecture- Advantages and Limitations of Edge Computing Systems- Edge Computing Interfaces and Devices – Edge Analytics: Edge Data Analytics – Potential of Edge Analytics – Architecture of Edge Analytics – Case study

#### Unit- IV:

**Edge Data storage Security:** Edge-Based Attack Detection and Prevention-Edge Computing Use Cases and Case Studies: Edge Computing High- Potential Use Cases.

**Introduction to green computing–Calculating carbon footprint-Choosing Green PC path:**

A green make over – Buying green computer- Choosing Earth Friendly peripherals

**Unit- V:**

Fog Computing: Introduction to Fog computing – Architecture - Characteristics - Fog Computing Services – Fog Resource Estimation and Its Challenges-Fog computing on 5G networks – Fog computing Use cases and Case studies.

**Text Books:**

1. Kailas Jayaswal .JagannathKallakurchi .Donald.J.Houde. & Devan Shah.DR. (2020). *Cloud Computing Black Book*. (UNIT I & II : CHAPTERS 1,2,3,9,11)
2. Anitha Kumari.K, Sudha Sadasivam.G, Dharani.D & Niranjnamurthy.M.(2020). *EDGE COMPUTING Fundamentals, Advances and Applications*, First Edition. CRC Press. (UNIT III & IV : CHAPTERS 1, 2 , 3, 4, 5, 6)
3. Woody Leonhard & Katherine Murray. (2009). *Green Home Computing for Dummies*. Willey Publishing Inc. (UNIT IV : CHAPTERS 2 ,5, 6, 7)
4. Evangelos Markakis, George Mastorakis, Constandinos X.Mavromoutakis & Evangelospallis. (2017). *Cloud and Fog computing in 5G mobile Networks*. First Edition. (UNIT V: CHAPTER 2)

**Reference Book(s):**

1. Raj Kumar Buyya. Christian Vecchiola. & ThamaraiSelvi.S.(2013). *Mastering Cloud Computing*. McGraw Hill Education.
2. MichaelMiller. (2009). *Cloud Computing*. Pearson Education.
3. Shijun Liu . BedirTekinerdogan Mikio . &Aoyama Liang-Jie Zhang.(2018). *Edge Computing*. 1st ed. 2018 Edition, Kindle Edition.
4. FlavioBonomi, Rodolfo Milito, Jiang Zhu, SateeshAddepalli, (2012). *Fog Computing and Its Role in the Internet of Things*. Helsinki, Finland.
5. Amir M. Rahmani Pasi, Liljeberg Jürgo-Sören Preden. (2018). *Fog Computing in the Internet of Things*. Springer. (UNIT V: PART/CHAPTER (1.4, 2.5))

**Websites and e-Learning resources:**

1. <https://static.googleusercontent.com/media/www.google.com/en//green/pdfs/google-green-computing.pdf> (Case Study)
2. [http://whatiscloud.com/basic\\_concepts\\_and\\_terminology/cloud](http://whatiscloud.com/basic_concepts_and_terminology/cloud)
3. <http://www.computerweekly.com/guides/Using-green-computing-for-improving-energy-efficiency>

4. <https://www.princeton.edu/~ota/disk3/1981/8109/810916>.
5. [https://tell.colvee.org/pluginfile.php/3220/mod\\_resource/content/1/Unit1.pdf](https://tell.colvee.org/pluginfile.php/3220/mod_resource/content/1/Unit1.pdf)

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

	<b>CLO Statement</b>	<b>Knowledge According to Bloom's Taxonomy (Upto K level)</b>
<b>CO1</b>	Outline the concepts, applications, benefits and limitations of various computing paradigms.	K1 to K3
<b>CO2</b>	Classify the computing technologies based on its architecture and infrastructure and identify its strategies.	K1 to K3
<b>CO3</b>	Examine various cloud services, Security threat exposure within a cloud computing infrastructure.	K1 to K4
<b>CO4</b>	Asses the problems and solutions involved in various stages of different computing environments.	K1 to K3
<b>CO5</b>	Discuss the importance of cloud, edge and Fog technology and implement innovative ideas and practices for regulating green IT.	K1 to K4

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CLO1</b>	3	1	1	2	3	2
<b>CLO2</b>	3	1	1	1	3	2
<b>CLO3</b>	3	1	1	1	3	2
<b>CLO4</b>	3	1	2	3	3	2
<b>CLO5</b>	3	2	1	2	2	3

**1-Basic Level****2- Intermediate Level****3- Advanced Level****LESSON PLAN: TOTAL HOURS (75 Hrs.)**

<b>UNIT</b>	<b>Course Content</b>	<b>No. of Hours</b>	<b>Course Objectives</b>	<b>Mode of Teaching</b>
I	<b>Era of Cloud Computing:</b> Introduction – Components of Cloud Computing – Cloud Types: Private, Public and Hybrid clouds –	15	CO1	Chalk and Talk, PPT, quiz, on the spot test

	Limitations of the Cloud - <b>Virtualization:</b> Structure and Mechanisms.			
II	<b>Cloud computing Services:</b> Software as a Service(SaaS) – Platform as a Service(PaaS)- Infrastructure as a Service(IaaS)-Database as a Service(DBaaS)- Recent Trends in cloud computing and Standards- <b>Data Security in Cloud</b> – Risks and Challenges with Cloud Data-Security as a Service.	15	CO2	Chalk and Talk, PPT, quiz, on the spot test
III	<b>Edge Computing:</b> Edge Computing and Its Essentials: Introduction- Edge Computing Architecture- Advantages and Limitations of Edge Computing Systems- Edge Computing Interfaces and Devices – Edge Analytics: Edge Data Analytics – Potential of Edge Analytics – Architecture of Edge Analytics – Case study .	15	CO3	Chalk and Talk, PPT, quiz, on the spot test
IV	<b>Edge Data storage Security:</b> Edge-Based Attack Detection and Prevention-Edge Computing Use Cases and Case Studies: Edge Computing High-Potential Use Cases. <b>Introduction to green computing</b> –Calculating carbon foot print- <b>Choosing Green PC path:</b> A green make over – Buying green computer-Choosing Earth Friendly peripherals	15	CO4	Chalk and Talk, PPT, quiz, on the spot test
V	Fog Computing: Introduction to Fog computing – Architecture - Characteristics - Fog Computing Services – Fog Resource Estimation and Its Challenges-Fog computing on 5G networks – Fog computing Use cases and Case studies.	15	CO5	Seminar, PPT presentation , Activity and Model Preparation

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Course Designer

DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
VI	(Elective) DSEC8	23OUITDSE6D	Artificial Neural Network	3	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓		

### Course Objectives:

1. To identify and understand the basics of AI and its search algorithms.
2. To develop knowledge of fuzzy logic systems.
3. To understand the concepts of neural networks and their functions.
4. To comprehend the principles of artificial neural networks.
5. To analyze genetic algorithms.

### Course Content:

#### Unit- I:

**Introduction to AI:** Problem formulation – AI Applications – Problems – State Space and Search – Production Systems – Breadth First and Depth First – Travelling Salesman Problem – Heuristic search techniques: Generate and Test – Types of Hill Climbing.

#### Unit- II:

##### Fuzzy Logic Systems:

Notion of fuzziness – Operations on fuzzy sets – T-norms and other aggregation operators – Basics of Approximate Reasoning – Compositional Rule of Inference – Fuzzy Rule Based Systems – Schemes of Fuzzification – Inferencing – Defuzzification – Fuzzy Clustering – fuzzy rule-based classifier.

#### Unit- III:

**Neural Networks:** What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Backpropagation (BP) Networks, Back propagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications

**Unit- IV:**

**Artificial Neural Networks:** Fundamental Concepts – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network.

**Unit- V:**

**Genetic Algorithm:** Introduction – Biological Background – Genetic Algorithm Vs Traditional Algorithm – Basic Terminologies in Genetic Algorithm – Simple GA – General Genetic Algorithm – Operators in Genetic Algorithm.

**Text Books:**

1. S.N. Sivanandam and S.N. Deepa. *Principles of Soft Computing*. 2nd Edition. Wiley India Pvt. Ltd.
2. Stuart Russell and Peter Norvig. *Artificial Intelligence - A Modern Approach*. 2nd Edition. Pearson Education in Asia.
3. S. Rajasekaran, G. A. Vijayalakshmi. *Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications*. PHI.

**Reference Book(s):**

1. F.Martin, Mcneill, and Ellen Thro. (2000). *Fuzzy Logic: A Practical approach*. AP Professional.
2. Chin Teng Lin, C. S. George Lee. *Neuro-Fuzzy Systems*. PHI.
3. Charu C. Aggarwal. *Neural Networks and Deep Learning: A Textbook*.
4. Harrison Kinsley and Daniel Kukiela. *Neural Networks*. Scratch.

**Websites and e-Learning resources:**

1. <https://www.javatpoint.com/artificial-intelligence>
2. <https://www.w3schools.com/ai/>
3. <https://hagan.okstate.edu/NNDesign.pdf>

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

	<b>CLO Statement</b>	<b>Knowledge According to Bloom's Taxonomy (Upto K level)</b>
<b>CO1</b>	Describe the fundamentals of artificial intelligence concepts and searching techniques.	K1 to K3
<b>CO2</b>	Develop the fuzzy logic sets and membership function and defuzzification techniques.	K1 to K3

<b>CO3</b>	Understand the concepts of Neural Network and analyze and apply the learning techniques	K1 to K4
<b>CO4</b>	Understand the artificial neural networks and its applications.	K1 to K3
<b>CO5</b>	Understand the concept of Genetic Algorithm and Analyze the optimization problems using GAs.	K1 to K4

### Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CLO1</b>	3	1	1	2	3	2
<b>CLO2</b>	3	1	1	1	3	2
<b>CLO3</b>	3	1	1	1	3	2
<b>CLO4</b>	3	1	2	3	3	2
<b>CLO5</b>	3	2	1	2	2	3

**1-Basic Level**

**2- Intermediate Level**

**3- Advanced Level**

### LESSON PLAN: TOTAL HOURS (75 Hrs.)

<b>UNIT</b>	<b>Course Content</b>	<b>No. of Hours</b>	<b>Course Objectives</b>	<b>Mode of Teaching</b>
I	<b>Introduction to AI:</b> Problem formulation – AI Applications – Problems – State Space and Search – Production Systems – Breadth First and Depth First – Travelling Salesman Problem – Heuristic search techniques: Generate and Test – Types of Hill Climbing.	15	CO1	Chalk and Talk, PPT, quiz, on the spot test
II	<b>Fuzzy Logic Systems:</b> Notion of fuzziness – Operations on fuzzy sets – T-norms and other aggregation operators – Basics of Approximate Reasoning – Compositional Rule of Inference – Fuzzy Rule Based Systems – Schemes of Fuzzification – Inferencing – Defuzzification – Fuzzy Clustering – fuzzy rule-based classifier.	15	CO2	Chalk and Talk, PPT, quiz, on the spot test

III	<b>Neural Networks:</b> What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Backpropagation (BP) Networks, Back propagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications	15	CO3	Chalk and Talk, PPT, quiz, on the spot test
IV	<b>Artificial Neural Networks:</b> Fundamental Concepts – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network.	15	CO4	Chalk and Talk, PPT, quiz, on the spot test
V	<b>Genetic Algorithm:</b> Introduction – Biological Background – Genetic Algorithm Vs Traditional Algorithm – Basic Terminologies in Genetic Algorithm – Simple GA – General Genetic Algorithm – Operators in Genetic Algorithm.	15	CO5	Seminar, PPT presentation, Activity and Model Preparation

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Course Designer

DEPARTMENT OF INFORMATION TECHNOLOGY					Class: III B.Sc.			
Sem.	Category	Course Code	Course Title	Credits	Contact Hours / Week	CIA	SE	Total
VI	(Skill Enhancement Course) SEC8	23OUITSEC6	Advanced Excel Lab	2	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✓	✓	

### Course Objectives:

1. Apply advanced Excel functions such as LOOKUPS, INDEX-MATCH, TEXT, DATE, and conditional formulas to solve complex data problems.
2. Utilize data validation, conditional formatting, and form controls to enhance spreadsheet interactivity and data integrity.
3. Develop and interpret pivot tables, pivot charts, and use Power Query for dynamic data summarization and reporting.
4. Create and automate workflows using Excel macros and basic VBA scripting for repetitive tasks.
5. Design interactive dashboards and data visualizations using charts, slicers, and form elements for business insights.

### Programs List:

1. Getting started with excel: Opening a blank or new workbook, general organization
2. Create and Editing Worksheets by using Excel
3. Creating Excel Sheets with Formula and Functions
4. Create and Save Macros
5. Sorting and Querying Data
6. Calculation of Ratios using Excel
7. Write an Excel Program to form Tabulation
8. Write an Excel Program to form Bar diagram
9. Write an Excel Program to form Multiple Bar diagram
10. Write an Excel Program to form Pie diagram
11. Using basic functions in Excel – Average, Count, Minimum, Maximum
12. Application of Date Function in Ms Excel
13. Write an Excel Program to Text Function and Look Up function.
14. Use of Sum, Sumif, Count and Count if functions

## 15. Extracting Data using combined V lookup and H lookup

### Text Book:

1. Walkenbach, J. (2019). *Excel 2019 Bible*. John Wiley & Sons. Hoboken, NJ.

### Books for Reference:

1. Alexander, M., & Kusleika, D. (2019). *Excel Power Programming with VBA*. John Wiley & Sons. Hoboken, NJ.
2. Collie, R., & Singh, A. (2016). *Power Pivot and Power BI: The Excel User's Guide to DAX, Power Query, Power BI & Power Pivot in Excel 2010–2016*. Holy Macro! Books. Louisville, KY.
3. Puls, K., & Escobar, M. (2015). *M Is for (Data) Monkey: A Guide to the M Language in Excel Power Query*. Holy Macro! Books. Louisville, KY.
4. Blackwood, N. (2014). *Advanced Excel Reporting for Management Accountants*. John Wiley & Sons. Hoboken, NJ.
5. Alexander, M., & Walkenbach, J. (2014). *Excel Dashboards and Reports for Dummies* (3rd ed.). John Wiley & Sons. Hoboken, NJ.

### Web Resources / E-Books:

1. <https://www.simplilearn.com>
2. <https://www.javatpoint.com>
3. <https://www.w3schools.com>

### Nature of the course

The **Advanced Excel Lab** is a **practical, skill-based course** designed to equip students and professionals with advanced-level proficiency in Microsoft Excel. The course emphasizes **hands-on learning**, where participants engage in real-world data scenarios to develop competencies in **data analysis, visualization, automation, and decision support** using Excel's powerful tools and features.

### Activities to be given

Implement Programming

### Activities on Employability Oriented

Excel Program Development and Problem Solving.

### Pedagogy

Record Book writing, Program development and Demonstration, Practical sessions.

**COURSE OUTCOMES:**

At the end of the course, the student will be able to:

COs	CLO Statement	Knowledge According to Bloom's Taxonomy (Upto K level)
CO1	Work with big data tools and its analysis techniques.	K1 to K3
CO2	Analyze data by utilizing clustering and classification algorithms.	K1 to K3
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	K1 to K4
CO4	Perform analytics on data streams.	K1 to K3
CO5	Learn Advance Excel tools.	K1 to K4

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)**

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	1	1	2	3	2
CLO2	3	1	1	1	3	2
CLO3	3	1	1	1	3	2
CLO4	3	1	2	3	3	2
CLO5	3	2	1	2	2	3

1-Basic Level

2- Intermediate Level

3- Advanced Level

**LESSON PLAN: TOTAL HOURS (30 Hrs.)**

UNIT	Course Content	No. of Hours	Course Objectives	Mode of Teaching
I	1. Getting started with excel: Opening a blank or new workbook, general organization 2. Create and Editing Worksheets by using Excel 3. Creating Excel Sheets with Formula and Functions	6	CO1	Demo & Practical Session

II	4. Create and Save Macros 5. Sorting and Querying Data 6. Calculation of Ratios using Excel	6	CO2	Demo & Practical Session
III	7. Write an Excel Program to form Tabulation 8. Write an Excel Program to form Bar diagram 9. Write a Excel Program to form Multiple Bar diagram	6	CO3	Demo & Practical Session
IV	10. Write an Excel Program to form Pie diagram 11. Using basic functions in Excel – Average, Count, Minimum, Maximum 12. Application of Date Function in Ms Excel	6	CO4	Demo & Practical Session
V	13. Write an Excel Program to Text Function and Look Up function. 14. Use of Sum, Sumif, Count and Count if functions 15. Extracting Data using combined Vlookup and H lookup	6	CO5	Demo & Practical Session

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**Course Designer**

**EVALUATION (PRACTICAL)**

<b>Internal</b> (Formative)	: 40 marks
<b>External</b> (Summative)	: 60 marks
<b>Total</b>	: 100 marks

**Question Paper Pattern for Internal Practical Examination: 40 Marks**

<b>S.No</b>	<b>Components</b>	<b>Marks</b>
1.	Major Question	20
2.	Minor Question	10
3.	Record Work	5
4.	Program Explanation / VIVA	5
	<b>Total</b>	<b>40</b>

**Question Paper Pattern for External Practical Examination (Major) : 60 Marks**

<b>S.No</b>	<b>Components</b>	<b>Marks</b>
1.	Major Question	30
2.	Minor Question	20
3.	Record Work	5
4.	Program Explanation / VIVA	5
	<b>Total</b>	<b>60</b>

In respect of external examinations passing minimum is **35%** for Under Graduate Courses and in total, aggregate of **40%**.

Latest amendments and revisions as per **UGC** and **TANSCHÉ** norm is taken into consideration to suit the changing trends in the curriculum.