E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)

Re-accredited **(3rd Cycle)** with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF COMPUTER SCIENCE

CBCS With OBE

BACHELOR OF SCIENCE

PROGRAMME CODE - S

COURSE STRUCTURE

(w.e.f. 2022 – 2023 Batch onwards)

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.
(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
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DEPARTMENT OF COMPUTER SCIENCE - UG
CBCS with OBE
COURSE STRUCTURE
(w.e.f. 2022 – 2023 Batch onwards)

Semester	Part	Course Code	Title of the Course	Teaching hrs (per week)	Duration of Exam (hrs.)	CIA	SE	Total	Credits
I	I	22OU1TA1	Tamil	6	3	25	75	100	3
	II	22OU2EN1	English	6	3	25	75	100	3
	III	22OUCS11	**Core** : Programming in C	4	3	25	75	100	4
	III	22OUCS1P	**Core** : Programming in C Lab	5	3	40	60	100	3
	III	22OUCSGEMA1	**GEC**: Mathematics – 1 Discrete Mathematics	5	3	25	75	100	5
	IV	22OUCSSE1P	**SEC:** Office Automation Lab	2	3	40	60	100	2
	IV	22OUCSID1	**IDC** : Computing Fundamentals	2	3	25	75	100	2
II	I	22OU1TA2	Tamil	6	3	25	75	100	3
	II	22OU2EN2	English	6	3	25	75	100	3
	III	22OUCS21	**Core** : Object Oriented Programming with C++	4	3	25	75	100	4
	III	22OUCS2P	**Core** : Object Oriented Programming with C++ Lab	5	3	40	60	100	3
	III	22OUCSGEMA2	**GEC** : Mathematics – 2 Probability and Statistics	5	3	25	75	100	5
	IV	22OUCSSE2P	**SEC:** Image Editing and Animation Tools Lab	2	3	40	60	100	2
	IV	22OUCSID2	**IDC** : Internet Technology and Web Design	2	3	25	75	100	2
III	I	22OU1TA3	Tamil	6	3	25	75	100	3
	II	22OU2EN3	English	6	3	25	75	100	3
	III	22OUCS31	**Core** : Digital Principles andComputer Organization	4	3	25	75	100	3
	III	22OUCS32	**Core** : RDBMS	4	3	25	75	100	4
	III	22OUCS3P	**Core** : SQL and PL/SQL Lab	3	3	40	60	100	3
	III	22OUCSGEMA3	**GEC** : Mathematics – 3 Numerical Methods	5	3	25	75	100	5
	IV	22OUCSSE3P	**SEC:** VB.Net and ASP.Net Programming Lab	2	3	40	60	100	2
IV	I	22OU1TA4	Tamil	6	3	25	75	100	3
	II	22OU2EN4	English	6	3	25	75	100	3
	III	22OUCS41	**Core** : Data Structures	4	3	25	75	100	3
	III	22OUCS42	**Core** : Programming in JAVA	4	3	25	75	100	4
	III	22OUCS4P	**Core** : Programming in JAVALab	3	3	40	60	100	3
	III	22OUCSGEMA4	**GEC** : Mathematics – 4 Resource Management Techniques	5	3	25	75	100	5

	IV	**22OUCSSE4P**	**SEC:** Data Structures Lab	2	3	40	60	100	2
	III	**22OUCS51**	**Core** : Operating Systems	5	3	25	75	100	4
	III	**22OUCS52**	**Core** : Software Engineering	5	3	25	75	100	4
	III	**22OUCS53**	**Core** : Programming in Python	5	3	25	75	100	4
V	III	**22OUCS5P**	**Core** : Programming in Python Lab	6	3	40	60	100	3
	III		**DSEC I**	5	3	25	75	100	5
	IV	**22OUCSSE5P**	**SEC :** Linux Lab	2	3	40	60	100	2
	IV	**22OUAECEV5**	**AECC:** Environmental Studies	2	3	25	75	100	2
	III	**22OUCS61**	**Core** : Data Communications and Networking	5	3	25	75	100	4
	III	**22OUCS62**	**Core** :Web Programming	5	3	25	75	100	4
	III	**22OUCS6P**	**Core** : Web Programming Lab	6	3	40	60	100	3
VI	III		**DSEC II**	5	3	25	75	100	5
	III		**DSEC III (Project)**	5	3	20	80	100	5
	IV	**22OUCSSE6P**	**SEC:** Machine Learning Lab	2	3	40	60	100	2
	IV	**22OUAECVE6**	**AECC:** Value Education	2	3	25	75	100	2
	PART V	**22OU5NS4/22OU5PE4**	Extension Activities NSS / Physical Education	-	3	25	75	100	1
			Total	180					140

GEC- Generic Elective Course

SEC- Skill Enhancement Course

DSEC- Discipline Specific Elective Course

AECC- Ability Enhancement Compulsory Course

IDC- Inter Disciplinary Course

DSEC: Discipline Specific Elective Course:

Semester - V (DSEC - I Choose any one)

    1. Computer Graphics   -   **22OUCSDSE5A**

    2. Introduction to Data Science   -   **22OUCSDSE5B**

Semester - VI (DSEC – II Choose any one)

    1. Machine Learning   -   **22OUCSDSE6A**

    2. Artificial Intelligence   -   **22OUCSDSE6B**

Semester - VI (DSEC– III)

    1. Project   -   **22OUCSDSEPR6**

NOTE:

    The students are permitted to obtain additional credits (Optional)

    ➤ MOOCs / SWAYAM / NPTEL Course (Online)

Department of Computer Science				Class: III B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
V	Core	22OUCS51	Operating Systems	4	5	25	75	100

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

Course Objectives:

1. To discuss the various ways of structuring an operating system.
2. To describe the services an operating system provides to users, processes, and other systems.
3. To develop a description of deadlocks, which prevent sets of concurrent processes from completing their tasks.
4. To explain the concepts of demand paging, page-replacement algorithms, and allocation of page frames.
5. To implement the local file systems and directory structures.

Course Content:

Unit – I Introduction: What Operating Systems Do-Computer System Organization-Computer System Architecture-Operating System Structure-Operating System Operations-Process Management- Memory Management - Open Source Operating Systems. **System Structures:** Operating System Services- User and Operating System Interface-System Calls-Types of System Calls-System Programs-Operating – System Debugging.

Unit – II Process Management: Process Concept-Process scheduling -Operation on process-Interprocess communication- Examples of IPC Systems-Communication in Client Server Systems. **Multithreaded Programming:** Overview-Multithreading Models-Thread Libraries-Implicit Threading-Threading Issues.

Unit – III Process Scheduling: Basic concepts- Scheduling criteria-Scheduling algorithms. Thread Scheduling - Multiple Processor Scheduling. **Synchronization:** Background - The Critical Section Problem-Peterson's Solution-Synchronization Hardware - Semaphores- **Deadlocks:**

Deadlock Characterization-Methods for Handling Deadlock Deadlock Prevention- Deadlock Avoidance- Deadlock Detection-Recovery from Deadlock.

Unit – IV Memory Management Strategies: Background-Swapping-Contiguous Memory Allocation-Segmentation-Paging-Structure of the Page Table. **Virtual memory Management:** Background-Demand Paging-Copy on Write-Page Replacement Allocation of Frames-Thrashing.

Unit – V File System: File concepts-Access methods- **Implementing File System:** File System Structure-Allocation Methods-Free Space Management. Mass-**Storage Structure:** Overview of Mass Storage Structure-Disk structure- Disk Scheduling-Disk Management.

Book for Study:

Silberschatz Galvin(2011), *Operating System Concepts*, John Wiley & Sons, New Delhi, 9th Edition.

Chapters:

 Unit- I **:** 1.1 to 1.7, 1.12, 2.1 to 2.5, 2.8.

 Unit- II **:** 3.1 to 3.6, 4.1,4.3-4.6.

 Unit- III : 5.1 to 5.5, 6.1 to 6.4,6.6,7.2-7.7.

 Unit- IV : 8.1 to 8.6,9.1-9.6

 Unit- V : 10.1, 10.2, 11.1, 11.4 ,11.5 ,12.1-12.2,12.4 – 12.5

Books for Reference:

1. Achyut Godbole S (2005), *Operating Systems*, Tata McGraw Hill Education, India, 2nd Edition.

2. Milan MilenKovic(2001), *Operating System-Concepts and Design,* Tata McGraw Hill Education, India, 2nd Edition.

3. William Stallings (2010), *Operating Systems: Internals and Design Principles*, Pearson Education, India, 6th Edition.

Web Resources

1. https://www.geeksforgeeks.org/web-operating-system

2. https://www.javatpoint.com/operating-system

3. https://books.google.co.in/books/about/Operating_System_Concepts.html?id=SE0EtAEA CAAJ&redir_esc=y

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make the students to track, develop, and utilize the skills of their workforce to drive innovation and success.

Activities to be given: The **activity** was **given to students** to enhance their knowledge on the devices.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understand the memory management and its allocation policies.	K1 to K3
CLO2	Apply the process management concepts in Operating System	K1 to K3
CLO3	Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.	K1 to K4
CLO4	Interpret the issues and challenges of memory management.	K1 to K3
CLO5	Implement the file system design including access methods, file sharing, file locking, and directory structures.	K1 to K4

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

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

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

LESSON PLAN: TOTAL HOURS (75HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Introduction: What Operating Systems Do-Computer System Organization-Computer System Architecture-Operating System Structure-Operating System Operations-Process Management-Memory Management - Open Source Operating Systems. System Structures: Operating System Services- User and Operating System Interface-System Calls-Types of System Calls-System Programs-Operating – System Debugging.	15	Chalk and Talk, PPT, quiz, on the spot test
II	Process Management: Process Concept-Process scheduling - Operation on process- Interprocess communication- Examples of IPC Systems-Communication in Client Server Systems. Multithreaded Programming: Overview-Multithreading Models-Thread Libraries-Implicit Threading-Threading Issues.	15	Chalk and Talk, quiz, on the spot test
III	Process Scheduling: Basic concepts- Scheduling criteria-Scheduling algorithms. Thread Scheduling - Multiple Processor Scheduling. Synchronization: Background - The Critical Section Problem-Peterson's Solution-Synchronization Hardware - Semaphores-Deadlocks: Deadlock Characterization-Methods for Handling Deadlock Deadlock Prevention- Deadlock Avoidance- Deadlock Detection-Recovery from Deadlock.	15	Chalk and Talk, PPT, group discussion and You tube Links
IV	**Memory Management Strategies**: Background-swapping-Contiguous Memory allocation-Segmentation-Paging-Structure of the Page Table. Virtual memory Management: Background-Demand Paging-Copy on Write-Page Replacement Allocation of Frames-Thrashing.	15	Chalk and Talk, PPT, quiz
V	**File System:** File concepts-Access methods- Implementing File System: File System Structure-Allocation Methods-Free Space Management. **Mass-Storage Structure:** Overview of Mass Storage Structure-Disk structure- Disk Scheduling-Disk Management.	15	Chalk and Talk, PPT, group discussion, quiz, open book test

Course Designer
P.Ruby Stella Mary

Department of Computer Science				Class: III B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
V	Core	22OUCS52	Software Engineering	4	5	25	75	100

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

Course Objectives:

1. Make the students to comprehend the nature of software and software development process and its components.
2. Identify the importance of understanding user needs in software development.
3. Understand the fundamental of design concepts and principles.
4. To enable the students to perform testing of a software.
5. Learn how to manage software changes and versions effectively.

Course Content:

Unit – I   The Nature of Software: The Nature of Software. **Software Engineering:** Defining the Discipline – The Software Process. **Software Process Structure:** A Generic Process Model – Defining a Framework Activity – Identifying a Task Set – Process Patterns – Process Assessment and Improvement. **Process Models:** Prescriptive Process Models – Specialized Process Models – The Unified Process – Personal and Team Process Models. **Agile Development:** What is Agility? – What is an Agile Process?

Unit – II Understanding Requirements: Establishing the Groundwork – Eliciting Requirements – Building the Analysis Model. **Requirements Modeling: Scenarios-Based Methods:** Requirement Analysis – Scenario-Based Modeling – UML Models That Supplement the Use Case – **Requirements Modeling: Class-Based Methods:** Identifying Analysis Classes – Specifying attributes – Defining operations – Class-Responsibility-Collaborator Modeling.

Unit – III Design Concepts: Design Concepts – The Design Model. **Architectural Design:** Software Architecture – Architectural Design. **Component-Level Design:** What Is a Component? – Designing Class-Based Components. **User Interface Design:** User Interface Analysis and Design – Interface Design Steps.

Unit – IV Software Quality Assurance: Elements of Software Quality Assurance – SQA Tasks, Goals, and Metrics – Software Reliability. **Software Testing Strategies:** A Strategies Approach to Software Testing – Test Strategies for Conventional Software – Validation Testing – System Testing – The Art of Debugging. **Testing Conventional Applications:** Software Testing Fundamentals – White-Box Testing – Basis Path Testing – Control Structure Testing – Black-Box Testing.

Unit – V Software Configuration Management: Software Configuration Management – The SCM Repository – The SCM Process. **Project Scheduling:** Project Scheduling – Scheduling. **Risk Management:** Risk Identification – Risk Projection – Risk Refinement. **Maintenance and Reengineering:** Software Maintenance – Business Process Reengineering – Software Reengineering – Restructuring.

Book for Study:

Roger S. Pressman and Bruce R. Maxim (2015), *Software Engineering A Practitioner's Approach,* 8th Edition, McGraw-Hill.

Chapters:

Unit I   **:** 1.1, 2.1, 2.2, 3.1 to 3.5, 4.1 to 4.4, 5.1, 5.3

Unit II **:** 8.2, 8.3, 8.5, 9.1 to 9.3, 10.1 to 10.4

Unit III **:** 12.3, 12.4, 13.1, 13.6, 14.1, 14.2, 15.2, 15.4

Unit IV **:** 21.2, 21.4, 21.7, 22.1, 22.3, 22.7 to 22.9, 23.1, 23.3 to 23.6

Unit V **:** 29.1 to 29.3, 34.2, 34.5, 35.3 to 35.5, 36.1, 36.4, 36.5, 36.7

Books for Reference:

1. Dhanalakshmi R (2008), *Software Engineering*, Charulatha Publications, Chennai, 2nd Edition.
2. Frank Tsui (2010), *Essentials of Software Engineering*, Jones and Bartlett India Private Limited, New Delhi, 2nd Edition.
3. Richard Fairley E(2011), Software Engineering Concepts, Tata McGraw Hill, New Delhi.

Web Resources / E.Books:

1. https://www.geeksforgeeks.org/software-engineering/
2. https://www.javatpoint.com/software-engineering

3. https://www.sciencedirect.com/topics/computer-science/software-engineering

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make the students to understanding of the working knowledge of the Techniques for estimation, design, testing and quality management of large software development projects.

Activities to be given: students shall be practiced with the goal is to identify and understand the needs and requirements for the software being developed.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understand the fundamental concepts of Software Engineering Lifecycle models.	K1 to K3
CLO2	Analyze the various software engineering models	K1 to K3
CLO3	Apply methods for design and development of software projects.	K1 to K4
CLO4	Work with various techniques, metrics and strategies for Testing software projects.	K1 to K3
CLO5	Identify the various risks in project development	K1 to K4

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

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

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

LESSON PLAN: TOTAL HOURS (75HRS)

UNIT	DESCRIPTION	HRS	MODE
I	**The Nature of Software:** The Nature of Software. **Software Engineering:** Defining the Discipline – The Software Process. **Software Process Structure:** A Generic Process Model – Defining a Framework Activity – Identifying a Task Set – Process Patterns – Process Assessment and Improvement. **Process Models:** Prescriptive Process Models – Specialized Process Models – The Unified Process – Personal and Team Process Models. **Agile Development:** What is Agility? – What is an Agile Process?.	15	Chalk and Talk, PPT, quiz, on the spot test
II	**Understanding Requirements:** Establishing the Groundwork – Eliciting Requirements – Building the Analysis Model. **Requirements Modeling: Scenarios-Based Methods:** Requirement Analysis – Scenario-Based Modeling – UML Models That Supplement the Use Case – **Requirements Modeling: Class-Based Methods:** Identifying Analysis Classes – Specifying attributes – Defining operations – Class-Responsibility-Collaborator Modeling.	15	Chalk and Talk, quiz, on the spot test
III	**Design Concepts:** Design Concepts – The Design Model. **Architectural Design:** Software Architecture – Architectural Design. **Component-Level Design:** What Is a Component? – Designing Class-Based Components. **User Interface Design:** User Interface Analysis and Design – Interface Design Steps.	15	Chalk and Talk, PPT, group discussion and You tube Links
IV	**Software Quality Assurance:** Elements of Software Quality Assurance – SQA Tasks, Goals, and Metrics – Software Reliability. **Software Testing Strategies:** A Strategies Approach to Software Testing – Test Strategies for Conventional Software – Validation Testing – System Testing – The Art of Debugging. **Testing Conventional Applications:** Software Testing Fundamentals – White-Box Testing – Basis Path Testing – Control Structure Testing – Black-Box Testing.	15	Chalk and Talk, PPT, quiz

V	**Software Configuration Management:** Software Configuration Management – The SCM Repository – The SCM Process. **Project Scheduling:** Project Scheduling – Scheduling. **Risk Management:** Risk Identification – Risk Projection – Risk Refinement. **Maintenance and Reengineering:** Software Maintenance – Business Process Reengineering – Software Reengineering – Restructuring.	15	Chalk and Talk, PPT, group discussion, quiz, open book test

Course Designer
Mrs.V. Jayavani

Department of Computer Science				Class: III B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
V	Core	22OUCS53	Programming in Python	4	5	25	75	100

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

Course Objectives:

1. To interpret the fundamental concepts of Python.
2. To Implementing the data types, Control statement and operators in Python programs.
3. To define the array and string concepts in Python program.
4. To Determine the methods to create and manipulate Python programs by utilizing the data structures like lists and tuples
5. To Acquire the Knowledge of exception handling in Python.

Course Content:

Unit – I Introduction to Python: Python– Features of Python– Execution of Python Program Viewing the Byte Code – Comparisons between Java and Python. **Writing Our First Python Program:** Installing Python for Windows – Verifying the Path to Python – Writing Our First Python Program – Executing a Python Program. **Datatypes in Python:** Comments in Python– Docstrings – How Python sees Variables – Datatypes in Python – Built-in datatypes – bool Datatype– Sequences in Python – Sets– Literals in Python– Determining the Datatype of a variable – What about Characters User- defined Datatypes – Constants in Python – Identifiers and Reserved words – Naming Conventions in Python.

Unit – II Operators in Python: Operator– Arithmetic Operators– Using Python Interpreter as Calculator– Assignment Operators – Unary Minus Operator – Relational Operators– Logical Operators– Boolean Operators– Bitwise Operators – Membership Operators– Identity Operators – Mathematical Functions. **Input and Output:** Output statements– Input Statements – Command Line Arguments. **Control Statements:** Control Statements – The if Statement – The if…else Statement – The if…elif…else Statement– The while statement – The for Loop– Infinite Loops– Nested Loops – The else Suite– The break Statement – The continue Statement– The pass Statement – The assert Statement– The return Statement.

Unit – III: **Arrays in Python**: Arrays – Advantages of Arrays – Creating an Array – Importing the Array Module – Indexing and Slicing on Arrays – Types of Arrays– Aliasing the Arrays. **Strings and Characters:** Creating Strings – Length of a String – Indexing in Strings – Slicing the Strings – Repeating the Strings – Concatenation of Strings – Checking Membership – Comparing Strings – Removing Spaces from a String – Finding Sub Strings – Counting Substrings in a String – Strings are Immutable – Replacing a String with another String – Splitting and Joining Strings – Checking Starting and Ending of a String – Sorting Strings.

Unit – IV: Functions: Difference between a Function and a Method – Defining a Function Calling a   Function – Returning Results from a Function – Returning Multiple Values from a Function – Pass by Object Reference – The Global Keyword–Passing a Group of Elements to a Function – Recursive Function– Anonymous Functions or Lambdas –– Function Decorators –Generators –Creating our Own Modules in Python. **Lists and Tuples**: List – Creating Lists using range () Function – Updating the Elements of a List – Concatenation of Two Lists – Repetition of Lists –Membership in Lists – Aliasing and Cloning Lists – Tuples – Creating Tuples – Accessing the Tuple Elements – Basic Operations on Tuples – Function to Process Tuples– Nested Tuples – Inserting Elements in a Tuple – Modifying Elements of a Tuple – Deleting Elements from a Tuple.

Unit – V Dictionaries: Operations on Dictionaries – Dictionary Methods – Using for Loop with Dictionaries – Sorting the Elements of a Dictionary using Lambdas– Converting Lists into Dictionary – Converting Strings into Dictionary – Passing Dictionaries to Functions – Ordered Dictionaries. **Exceptions**: Errors in a Python Program – Exceptions – Exception Handling – Types of Exceptions – The Except Block – The assert Block– User-Defined Exceptions – Logging the Exceptions. **Files in Python**: Files– Types of Files in Python – Opening a File –Closing a File – Working with Text Files containing Strings – The seek() and tell() Methods – Working with Directories.

 Book for Study:

Dr.R.Nageswara Rao(2018), *Core Python Programming*, Dreamtech Press, 2nd Edition.

Chapters:

      Unit I **:** 1 , 2 , 3

      Unit II **:** 4, 5, 6

      Unit III: 7, 8

      Unit IV **:** 9, 10

      Unit V **:** 11, 16, 17

Books for Reference:

1. Allen Downey,Jeffrey Elkner,Chris Meyers(2015), *How to think like a computer scientists: learning with Python*, 2nd Edition.

2. Mark Lutz(2018), *Learning Python Powerful Object Oriented Programming*, O'reilly Media,5th Edition.

3. Sheetal Taneja & Naveen Kumar(2017), *Python Programming a Modular approach- A Modular approach with Graphics, Database, Mobile and Web applications*, Pearson Limited,1st Edition.

Web Resources / E.Books:

1. https://www.fullstackpython.com/best-python-resources.html
2. https://www.learnpython.org/
3. https://realpython.com/products/

Pedagogy: Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make the students to know the Programming language.

Activities to be given: students shall be practiced with different programming concepts.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Build basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions	K1 to K3
CLO2	To develop Python programs with conditionals and loops.	K1 to K3
CLO3	Construct the Array and String Concept	K1 to K4
CLO4	To define Python functions and to use Python data structure- lists, tuples, dictionaries	K1 to K3
CLO5	To do input/output with files in Python	K1 to K4

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

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

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

LESSON PLAN: TOTAL HOURS (75HRS)

UNIT	DESCRIPTION	HRS	MODE
I	**Introduction to Python**: Python– Features of Python– Execution of Python Program Viewing the Byte Code – Comparisons between Java and Python. **Writing Our First Python Program:** Installing Python for Windows – Verifying the Path to Python – Writing Our First Python Program – Executing a Python Program. **Datatypes in Python:** Comments in Python– Docstrings – How Python sees Variables – Datatypes in Python – Built-in datatypes – bool Datatype– Sequences in Python – Sets– Literals in Python– Determining the Datatype of a variable – What about Characters User- defined Datatypes – Constants in Python – Identifiers and Reserved words – Naming Conventions in Python.	15	Chalk and Talk, PPT, quiz, on the spot test
II	**Operators in Python:** Operator– Arithmetic Operators– Using Python Interpreter as Calculator– Assignment Operators – Unary Minus Operator – Relational Operators– Logical Operators– Boolean Operators– Bitwise Operators – Membership Operators– Identity Operators – Mathematical Functions. **Input and Output:** Output statements– Input Statements – Command Line Arguments. **Control Statements:** Control Statements – The if Statement – The if…else Statement – The if…elif…else Statement– The while statement – The for Loop– Infinite Loops– Nested Loops – The else Suite– The break Statement – The continue Statement– The pass Statement – The assert Statement– The return Statement.	15	Chalk and Talk, quiz, on the spot test

III	**Arrays in Python:** Arrays – Advantages of Arrays – Creating an Array – Importing the Array Module – Indexing and Slicing on Arrays – Types of Arrays– Aliasing the Arrays. **Strings and Characters:** Creating Strings – Length of a String – Indexing in Strings – Slicing the Strings – Repeating the Strings – Concatenation of Strings – Checking Membership – Comparing Strings – Removing Spaces from a String – Finding Sub Strings – Counting Substrings in a String – Strings are Immutable – Replacing a String with another String – Splitting and Joining Strings – Checking Starting and Ending of a String – Sorting Strings.	15	Chalk and Talk, quiz, on the spot test
IV	**Functions**: Difference between a Function and a Method – Defining a Function – Calling a Function – Returning Results from a Function – Returning Multiple Values from a Function –Pass by Object Reference – The Global Keyword–Passing a Group of Elements to a Function – Recursive Function– Anonymous Functions or Lambdas –– Function Decorators –Generators –Creating our Own Modules in Python. **Lists and Tuples:** List – Creating Lists using range () Function – Updating the Elements of a List – Concatenation of Two Lists – Repetition of Lists –Membership in Lists – Aliasing and Cloning Lists – Tuples – Creating Tuples – Accessing the Tuple Elements – Basic Operations on Tuples – Function to Process Tuples– Nested Tuples – Inserting Elements in a Tuple – Modifying Elements of a Tuple – Deleting Elements from a Tuple**.	15	Chalk and Talk, quiz, on the spot test
V	**Dictionaries**: Operations on Dictionaries – Dictionary Methods – Using for Loop with Dictionaries – Sorting the Elements of a Dictionary using Lambdas– Converting Lists into Dictionary – Converting Strings into Dictionary – Passing Dictionaries to Functions – Ordered Dictionaries. **Exceptions**: Errors in a Python Program – Exceptions – Exception Handling – Types of Exceptions – The Except Block – The assert Block– User-Defined Exceptions – Logging the Exceptions. **Files in Python**: Files– Types of Files in Python – Opening a File – Closing a File – Working with Text Files containing Strings – The seek() and tell() Methods – Working with Directories.	15	Chalk and Talk, quiz, on the spot test

Course Designer

Mrs.N.Kavitha

Department of Computer Science				Class: III B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
V	Core	22OUCS5P	Programming in Python Lab	3	6	40	60	100

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

PROGRAM LIST

Simple Program

1. Add Two Numbers
2. Swap Two Variables
3. Reverse The Digit
4. Biggest Three Numbers
5. Armstrong Number
6. Print a number is positive/negative using if-else.
7. To check whether the given string is palindrome or not.

Array

8. Create an integer type array
9. Create an array with a group of characters.
10. Retrieve the elements of an array using array index.
11. Effects of slicing operations on an array.
12. Various methods of arrays class.

Strings and Characters

13. Access each element of a string in forward and reverse orders using while loop.
14. Whether a sub string exists in main string or not.
15. Accept and display a group of numbers.
16. Type of Character entered by the user.
17. Find the number of words in a string

Functions

18. To print date, time using date and time functions.
19. To display a particular month of a year using calendar module.

20. To add some days to your present date and print the date added.

Annexure -7

21. To understand how a function returns two values

22. How to assign a function to a variable

23. How to define a function inside another function

24. How a function can return another function

25. To access global variable inside a function and modify it.

Lists and Tuples

26. To create lists with different types of elements.

27. To create lists using range() function.

28. To sort the list elements using bubble sort technique.

29. To find the first occurrence of an element in a tuple.

30. To modify or replace an existing element of a tuple with a new element.

Dictionaries

31. To create a dictionary with employee details and reverse the values upon giving the keys.

32. To retrieve keys, values and key-value pairs from a dictionary.

33. To create a dictionary from keyboard and display the elements.

34. To show the usage of for loop to retrieve elements of dictionaries.

35. To accept a dictionary and display its elements.

Exceptions

36. To demonstrate runtime error.

37. To understand the effect of an exception.

38. To handle the ZeroDivisionError exception.

39. To handle IOError produced by open() function.

40. To handle multiple exceptions.

Files in Python

41. To append data to an existing file and then displaying the entire file.

42. To know whether a file exists or not.

43. To count number of lines, words and characters in a text file.

44. To copy an image file into another file.

45. To use 'with' to open a file and write some strings into the file.

Books for Reference:

1. Mark Lutz(20170, *Learning Python Programming,* O'relly,4th Edition.
2. Akkem Yaganteeswarudu(2022), *Complete Python Programming Learn with Example,* OrangeBooks Publication.
3. Mark Lutz(2018), *Learning Python Powerful Object Oriented Programming*, O'reilly Media,5th Edition.

Web Resources / E.Books:

1. https://python-iitk.vlabs.ac.in/
2. https://www.learnpython.org/
3. http://python.berkeley.edu/resources/

Pedagogy

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

LESSON PLAN FOR PRACTICAL: TOTAL HOURS (90HRS)

Cycle	Description	Hrs	Mode
1	**Simple Program** 1. Add Two Numbers 2. Swap Two Variables 3. Reverse The Digit 4. Biggest Three Numbers 5. Armstrong Number 6. Print a number is positive/negative using if-else. 7. To check whether the given string is palindrome or not. **Array** 8. Create an integer type array 9. Create an array with a group of characters. 10. Retrieve the elements of an array using array index. 11. Effects of slicing operations on an array. 12 Various methods of arrays class.	18	Writing and executing the program in a system
	Strings and Characters 13. Access each element of a string in forward and reverse orders using		

2	while loop. 14. Whether a sub string exists in main string or not. 15. Accept and display a group of numbers. 16. Type of Character entered by the user. 17. Find the number of words in a string **Functions** 18. To print date, time using date and time functions. 19. To display a particular month of a year using calendar module. 20. To add some days to your present date and print the date added. 21. To understand how a function returns two values 22. How to assign a function to a variable 23. How to define a function inside another function 24. How a function can return another function 25. To access global variable inside a function and modify it.	18	Writing and executing the program in a system
3	**Lists and Tuples** 26. To create lists with different types of elements. 27. To create lists using range() function. 28. To sort the list elements using bubble sort technique. 29. To find the first occurrence of an element in a tuple. 30. To modify or replace an existing element of a tuple with a new element.	18	Writing and executing the program in a system
4	**Dictionaries** 31. To create a dictionary with employee details and reverse the values upon giving the keys. 32. To retrieve keys, values and key value pairs from a dictionary. 33. To create a dictionary from keyboard and display the elements. 34. To show the usage of for loop to retrieve elements of dictionaries. 35. To accept a dictionary and display its elements. **Exceptions** 36. To demonstrate runtime error. 37. To understand the effect of an exception. 38.To handle the ZeroDivisionError exception. 39. To handle IOError produced by open() function. 40. To handle multiple exceptions.	18	Writing and executing the program in a system

	Files in Python		
5	**41.** To append data to an existing file and then displaying the entire file. 42. To know whether a file exists or not. 43. To count number of lines, words and characters in a text file. 44. To copy an image file into another file. 45.To use 'with' to open a file and write some strings into the file.	18	Writing and executing the program in a system

Course Designer

Mrs.N.Kavitha

EVALUATION (PRACTICAL)
Core Lab / Skill Enhancement Course Lab

Internal (Formative)   :40 marks

External (Summative)   : 60 marks

Total   :100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

- ✓ There will be Two Internal Practical Examination.
- ✓ Duration of Internal Examination will be 2 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x8)	16
2.	II – Test and Debug the Program (2x4)	08
3.	III - Printing the Correct Output (2x4)	08
4.	IV- Viva	03
5.	V –Record book	05
	Total	**40**

Question Paper Pattern for External Practical Examination: 60 Marks

- ✓ Duration of External Examination will be 3 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x10)	20
2.	II – Test and Debug the Program (2x10)	20
3.	III- Printing the Correct Output (2x5)	10
4.	IV – Viva	5
5.	V - Record book	5
	Total	**60**

Department of Computer Science				Class: III B.Sc.,				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hours/ Week**	**CIA**	**External Exam**	**Total**
V	Discipline Specific Elective Course	22OUCSDSE5A	Computer Graphics	5	5	25	75	100

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

Course Objectives:

1. To introduce concepts of graphics input and display devices.

2. To implement the algorithms for line drawing, circle drawing and polygon filling.

3. To demonstrate the main aspects of two-dimensional graphics.

4. To apply various projection techniques on 3D objects.

5. To explore the advanced animation techniques.

Course Content:

Unit – I: A Survey of Computer Graphics: Computer-Aided Design – Presentation Graphics – Computer Art- Entertainment- Education and Training – Visualization – Image Processing – Graphical User Interface. **Overview of Graphics Systems:** Video Display Devices- Raster-Scan Systems-Random-Scan Systems-Input Devices-Graphics software.

Unit – II: Output Primitives: Point and Lines. **Line-Drawing Algorithms:-**DDA Algorithm-Bresenham's Line algorithm – Circle-Generating Algorithm – Character Generation. **Attributes of Output Primitives:** Line Attributes – Curve Attributes – Area-Fill Attributes – Character Attributes – Bundled Attributes.

Unit – III: Two-Dimensional Geometric transformations: Basic Transformations - Matrix Representations – Composite Transformations. **Two-Dimensional Viewing:** Two Dimensional Viewing Functions – Clipping Operations – Point Clipping - Line Clipping: Cohen-Sutherland Line Clipping**-** Polygon Clipping: Sutherland-Hodgeman Polygon – Curve Clipping – Text Clipping – Exterior Clipping.

Unit –IV: Graphical User Interfaces and Interactive Input Methods: Input of Graphical Data–**Three-Dimensional Concepts:** Three- Dimensional Display Methods – Three-Dimensional Graphics Packages. **Three-Dimensional Object Representations:** Polygon Surfaces – Curved Lines and Surfaces – Quadric Surfaces – Super quadrics.

Unit – V: Color Models: Properties of Light – RGB Color Model – YIQ Color Models – CMY Color Model – HSB Color Model – Color Selection and Applications. **Computer**

Animation: Design of Animation Sequences – General Computer Animation – Raster animations – Computer Animation languages – Key-Frame System.

Book for Study:

      Donald Hearn & Pauline Baker M(2009), *Computer Graphics C Version,* Pearson Education, India, 2nd Edition.

Chapters:

        Unit I : 1, 2.1, 2.2, 2.3, 2.5, 2.7

        Unit II : 3.1, 3.2, 3.5,3.14, 4.1 to 4.6

        Unit III: 5.1 to 5.4, 6.4 to 6.11

        Unit IV: 8.2, 9.1, 9.2, 10.1 to 10.4

        Unit V: 15.1, 15.4 to15.7, 15.10, 16.1 to 16.5

Books for Reference:

1. Dr. Jeffrey &McConnell J(2006), *Computer Graphics Theory into practice*, Jones & Bartlett publishers, Sudbury, 1st Edition.

2. Parslow R D & Prowse R W(2001), *Computer Graphics: Techniques and Applications*, Richard Elliot Green, USA,7th Edition.

3. Peter Shirley(2002), *Fundamentals of Computer graphics*, A.k.Peters Ltd, Wellesley, United States, 2nd Edition.

Web Resources / E.Books:

1. https://www.tutorialspoint.com/computer_graphics/computer_graphics_useful_resources.htm
2. https://legends2k.github.io/note/cg_resources/
3. https://erkaman.github.io/posts/beginner_computer_graphics.html

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.
Rationale for nature of Course:

Knowledge and Skill: To make the students to know about the Graphics designing.

Activities to be given: Students shall be practiced with different Algorithm concepts.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Understand the basics of computer graphics, different graphics systems and applications of computer graphics	K1 to K3
CLO2	Use of geometric transformations on graphics objects and their application in composite form.	K1 to K3
CLO3	Analyze and apply clipping algorithms and transformation on 2D images.	K1 to K4
CLO4	Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.	K1 to K3
CLO5	Render projected objects to naturalize the scene in 2D view and use of illumination models for this	K1 to K4

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

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

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

LESSON PLAN : TOTAL HOURS(75HRS)

UNIT	DESCRIPTION	HRS	MODE
I	**A Survey of Computer Graphics:** Computer-Aided Design – Presentation Graphics – Computer Art- Entertainment- Education and Training – Visualization – Image Processing – Graphical User Interface. **Overview of Graphics Systems:** Video Display Devices-Raster-Scan Systems-Random-Scan Systems-Input Devices-Graphics software.	15	Chalk and Talk, PPT, quiz, on the spot test
II	**Output Primitives**: Point and Lines. Line-Drawing Algorithms:-DDA Algorithm- Bresenham's Line algorithm – Circle-Generating Algorithm – Character Generation. **Attributes of Output Primitives**: Line Attributes – Curve Attributes – Area-Fill Attributes – Character Attributes – Bundled Attributes.	15	Chalk and Talk, quiz, on the spot test

III	**Two-Dimensional Geometric transformations:** Basic Transformations - Matrix Representations – Composite Transformations. **Two-Dimensional Viewing:** Two Dimensional Viewing Functions – Clipping Operations – Point Clipping - Line Clipping: Cohen-Sutherland Line Clipping- Polygon Clipping: Sutherland-Hodgeman Polygon – Curve Clipping – Text Clipping – Exterior Clipping.	15	Chalk and Talk, quiz, on the spot test
IV	**Graphical User Interfaces and Interactive Input Methods:** Input of Graphical Data–**Three-Dimensional Concepts:** Three- Dimensional Display Methods – Three- Dimensional Graphics Packages. **Three-Dimensional Object Representations**: Polygon Surfaces – Curved Lines and Surfaces – Quadric Surfaces – Super quadrics.	15	Chalk and Talk, quiz, on the spot test
V	**Color Models**: Properties of Light – RGB Color Model – YIQ Color Models – CMY Color Model – HSB Color Model – Color Selection and Applications. **Computer Animation:** Design of Animation Sequences – General Computer Animation – Raster animations – Computer Animation languages – Key-Frame System.	15	Chalk and Talk, quiz, on the spot test

Course Designer
Ms.K.Shalini

Department of Computer Science				Class: III B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
V	Discipline Specific Elective Course	22OUCSDSE5B	Introduction to Data Science	5	5	25	75	100

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

Course Objectives:
1. understanding of the data operations
2. An overview of simple statistical models and the basics of machine learning techniques of regression.
3. An understanding good practices of data science
4. Skills in the use of tools such as python, IDE
5. Understanding of the basics of the Supervised learning

Course Content:

Unit – I Introduction to Data Science: What is Data Science? **Toolboxes for Data Scientists:** Introduction – Why Python? – Fundamental Python Libraries for Data Scientists – Integrated Development Environment (IDE). Get Started with Python for Data Scientists.

Unit – II Descriptive statistics: Introduction – Data Preparation – Exploratory Data Analysis: Summarizing the Data – Data Distributions – Measuring Asymmetry – Estimation – Sample and Estimated Mean, Variance and Standard Score. **Statistical Inference:** Statistical Inference: The Frequentist Approach, Measuring the Variability of Estimates, Hypothesis Testing.

Unit – III Supervised Learning: Introduction – First step – Learning curves – Training, Validation and test – Two Learning models – Generalities, Support Vector Machines, Random Forest.

Unit – IV Regression Analysis: Introduction – Linear Regression – Simple Linear Regression – Multiple Linear Regression and Polynomial Regression – Sparse Model. **Unsupervised**

learning: Introduction – Clustering – Similarity and Distances – What Constitutes a Good Clustering? Defining Metrics to Measure of Clustering Quality.

Unit – V Network Analysis: Introduction – Basic Definitions in Graphs – Social Networks Analysis – Centrality – Drawing Centrality in Graphs – PageRank – Ego-Networks – Community Detection.

Book for Study:

Laura Igual, Santi Segui'(2017), *Introduction to Data Science a Python approach to concepts, Techniques and Applications*, Springer International Publishing.

Chapters:

Unit I   **:** 1, 2.1 to 2.3, 2.5, 2.6

Unit II   **:** 3.1, 3.2, 3.3.1, 3.3.2, 3.3.4, 3.4.1, 4.2, 4.3, 4.4

Unit III **:** 5.1, 5.3, 5.5 to 5.7

Unit IV **:** 6.1, 6.2, 7.1, 7.2.1, 7.2.2

Unit V   **:** 8.1 to 8.6

Books for Reference:

1. Jeffrey S. Saltz, Jeffrey Morgan Stanton (2017), *An Introduction to Data Science*, SAGE Publications, Inc, 1st Edition.

2. Mike Loukides (2011), *What Is Data Science?*, O'Reilly Media, 1st Edition.

3. Dr. Sushil Dohare, Dr. V SelvaKumar, Sachin Raval, Dr. Sumegh Shrikant Tharewal (2023), *Introduction to Data Science*, Xoffencer International Publication.

Web Resources / E.Books:

1. https://www.javatpoint.com/data-science
2. https://www.simplilearn.com/tutorials/data-science-tutorial/introduction-to-data-science
3. https://www.tutorialspoint.com/data_science/index.htm

Pedagogy: Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make the students to know the Data Science.

Activities to be given: students shall be practiced with various analytical tools and techniques.

The header "Annexure- 7" is in a box at top right.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Describe what Data Science is and the skill sets needed to be a data scientist	K1 to K3
CLO2	Explain the significance of exploratory data analysis (EDA) in data science	K1 to K3
CLO3	Ability to learn the supervised learning, SVM	K1 to K4
CLO4	Apply basic machine learning algorithms (Linear Regression)	K1 to K3
CLO5	Explore the Networks, PageRank	K1 to K4

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

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

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

LESSON PLAN : TOTAL HOURS (75HRS)

UNIT	DESCRIPTION	HRS	MODE
I	**Introduction to Data Science:** What is Data Science? **Toolboxes for Data Scientists:** Introduction – Why Python? – Fundamental Python Libraries for Data Scientists – Integrated Development Environment (IDE). Get Started with Python for Data Scientists.	15	Chalk and Talk, PPT, quiz, on the spot test
II	**Descriptive statistics**: Introduction – Data Preparation – Exploratory Data Analysis: Summarizing the Data – Data Distributions – Measuring Asymmetry – Estimation – Sample and Estimated Mean, Variance and Standard Score. **Statistical Inference:** Statistical Inference: The Frequentist Approach, Measuring the Variability of Estimates, Hypothesis Testing.	15	Chalk and Talk, quiz, on the spot test

III	**Supervised Learning:** Introduction – First step – Learning curves – Training, Validation and test – Two Learning models – Generalities, Support Vector Machines, Random Forest.	15	Chalk and Talk, PPT, group discussion and You tube Links
IV	**Regression Analysis:** Introduction – Linear Regression – Simple Linear Regression – Multiple Linear Regression and Polynomial Regression – Sparse Model. **Unsupervised learning**: Introduction – Clustering – Similarity and Distances – What Constitutes a Good Clustering? Defining Metrics to Measure of Clustering Quality.	15	Chalk and Talk, PPT, quiz
V	**Network Analysis**: Introduction – Basic Definitions in Graphs – Social Networks Analysis – Centrality – Drawing Centrality in Graphs – PageRank – Ego-Networks – Community Detection.	15	Chalk and Talk, PPT, group discussion, quiz, open book test

Course Designer
Mrs.V. Jayavani

Department of Computer Science				Class: III B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
V	Skill Enhancement Course	22OUCSSE5P	Linux Lab	2	2	40	60	100

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

Program List

1. Write a program to accepts a file name, starting and ending line numbers as arguments and displays all lines between the given line numbers.

2. Write a program to deletes all lines containing the specified word in one or more files supplied as arguments to it.

3. Write a program that displays a list of all files in the current directory to which the user has read, write and execute permissions.

4. Write a program that receives any number of file names as arguments checks if Every argument supplied is a file or directory and reports accordingly. whenever the argument is a file it reports no of lines present in it

5. Write a program that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument

6. Write a program to list all of the directory files in a directory

7. Write a program to find factorial of a given number.

8. Write a program to count number of lines in a file that does not contain vowels

9. Write a program script to find the no of characters, words and lines in a file

10. Write a program to change date format. Show the time taken in execution of this script.

11. Write a program to print file names in directory showing date of creation & serial no. of file.

12. Write a program to count lines, words & characters in its input. (do not use wc)

13. Write a program to print end of a Glossary file in reverse order using array.

14. Write a program script to compute gcd lcm & of two numbers.

15. Write a program to Check Whether Leap Year or Not

Books for Reference:
1. Richard Petersen(2017), *Linux: The Complete Reference*, McGraw Hill Education, Sixth Edition.

2. Kaiwan N Billimoria (2024), *Linux Kernel Programming*, Packt Publishing, Second Edition.

3. Mike McGrath (2021), *Linux in Easy Steps*, In Easy Steps Limited, 7th Edition.

Web Resources / E.Books:
1. https://researchcomputing.princeton.edu/education/external-online-resources/linux

2. https://library.triton.edu/c.php?g=1177346&p=8606088

3. https://training.linuxfoundation.org/resources/

Pedagogy

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

LESSON PLAN FOR PRACTICAL TOTAL HOURS(30HRS)

Cycle	Description	Hrs	Mode
1	1.Write a program to accepts a file name, starting and ending line numbers as arguments and displays all lines between the given line numbers. 2.Write a program to deletes all lines containing the specified word in one or more files supplied as arguments to it. 3.Write a program that displays a list of all files in the current directory to which the user has read, write and execute permissions.	6	Writing and executing the program in a system
2	4.Write a program that receives any number of file names as arguments checks if Every argument supplied is a file or directory and reports accordingly. whenever the argument is a file it reports no of lines present in it 5. Write a program that accepts a list of file names as its arguments, counts and reports the occurrence of	6	Writing and executing the program in a system

	each word that is present in the first argument file on other argument 6. Write a program to list all of the directory files in a directory		
3	7.Write a program to find factorial of a given number. 8.Write a program to count number of lines in a file that does not contain vowels 9. Write a program script to find the no of characters, words and lines in a file.	6	Writing and executing the program in a system
4	10. Write a program to change date format. Show the time taken in execution of this script. 11. Write a program to print file names in directory showing date of creation & serial no. of file. 12. Write a program to count lines, words & characters in its input. (do not use wc)	6	Writing and executing the program in a system
5	13 Write a program to print end of a Glossary file in reverse order using array. 14. Write a program script to compute gcd lcm & of two numbers. 15. Write a program to Check Whether Leap Year or Not	6	Writing and executing the program in a system

Course Designer

Ms.K.Shalini

Department of Computer Science				Class: III B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
VI	Core	22OUCS61	Data Communications and Networking	4	5	25	75	100

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

Course Objectives:

1. To introduce the Fundamentals of data communication networks
2. To demonstrate the Functions of Transmission Media and Switching concept.
3. To determine the Error Detection and Correction and Data Link Control.
4. To explore the Network Layer and Process-to-Process Delivery.
5. To understand the significance of Network Security and Security in the Internet.

Course Content:

Unit –I: Introduction – Data Communications – Networks – The Internet – Protocols and Standards. **Network Models:** The OSI Model –Layers in the OSI Model– TCP/IP Protocol Suite –Addressing.

Unit – II: Transmission media – Guided Media – Unguided Media: Wireless. Switching: Circuit – Switched Network – Datagram Networks – Virtual Circuit Networks – Structure of a Switch.

Unit – III: Error Detection and Correction: Introduction – Block Coding – Linear Block Codes – Cyclic Codes. **Data Link Control**: Framing – Flow and Error Control. **Network Layer:** **Logical Addressing**: IPv4 Addresses – IPv6 Addresses.

Unit – IV: Network Layer: Delivery, Forwarding and Routing: Delivery – Forwarding – Unicast Routing Protocols-Multicast Routing Protocols. **Process-to-Process Delivery: UDP, TCP and SCTP:** Process-to-Process Delivery - User Datagram Protocol (UDP) –TCP – SCTP. **Domain Name System:** DNS in the Internet.

Unit – V: Network Security: Security Services – Message Confidentiality – Message Integrity – Message Authentication – Digital Signature – Entity Authentication –**Security in the Internet:** **IPSec, SSL/TGS, PGP, VPN and Firewalls**. IPSecurity (IPSec) – Firewalls.

Book for Study:

Behrouz Forouzan A(2006), *Data Communications and Networking*, Tata MC Graw Hill, New Delhi, 4th Edition.

Chapters:

    Unit I   : 1.1-1.4, 2.2-2.5

    Unit II   : 7.1,7.2,8.1-8.4

    Unit III   : 10.1-10.4, 11.1, 11.2, 19.1, 19.2

    Unit IV   : 22.1 - 22.4, 23.1 – 23.4, 25.4

    Unit V   : 31.1-31.6, 32.1, 32.4

Books for Reference:

1. Comer(2000), *Computer Networks & Internet with Internet Applications*, Pearson Education, Pearson Prentice Hall, New Delhi, 4th edition.

2. Tanenbam S(2005), *Computer Network*, PHI Prentice Hall, New Delhi, 6th edition.

3. William Stallings(2004), *Data and Computer Communication Network*, Tata McGraw Hill, New Delhi, 2nd edition.

Web Resources / E.Books:

1. https://www.tutorialspoint.com/data_communication_computer_network/index.htm

2. https://ebooks.inflibnet.ac.in/ae01/chapter/data-communications-and-networking-systems/

3. https://www.javatpoint.com/computer-network-tutorial

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: The students will acquire knowledge on the importance of computer use in business, important concepts of telecommunications as well as understanding computer network communications.

Activities to be given: students shall be practiced with networking lab.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Build basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions	K1 to K3
CLO2	To develop Python programs with conditionals and loops.	K1 to K3
CLO3	Construct the Array and String Concept	K1 to K4
CLO4	To define Python functions and to use Python data structure- lists, tuples, dictionaries	K1 to K3
CLO5	To do input/output with files in Python	K1 to K4

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

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

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

LESSON PLAN : TOTAL HOURS(75HRS)

UNIT	DESCRIPTION	HRS	MODE
I	**Introduction** – Data Communications – Networks – The Internet – Protocols and Standards. **Network Models:** The OSI Model – Layers in the OSI Model– TCP/IP Protocol Suite –Addressing.	15	Chalk and Talk, PPT, quiz, on the spot test
II	**Transmission media** – Guided Media – Unguided Media: Wireless. Switching: Circuit -Switched Network – Datagram Networks – Virtual Circuit Networks – Structure of a Switch.	15	Chalk and Talk, quiz, on the spot test
III	**Error Detection and Correction:** Introduction – Block Coding – Linear Block Codes – Cyclic Codes. **Data Link Control**: Framing – Flow and Error Control. **Network Layer: Logical Addressing**: IPv4 Addresses – IPv6 Addresses.	15	Chalk and Talk, quiz, on the spot test

IV	**Network Layer: Delivery, Forwarding and Routing:** Delivery – Forwarding –Unicast Routing Protocols-Multicast Routing Protocols. **Process-to-Process Delivery: UDP, TCP and SCTP:** Process-to-Process Delivery - User Datagram Protocol (UDP) – TCP – SCTP. **Domain Name System:** DNS in the Internet.	15	Chalk and Talk, quiz, on the spot test
V	**Network Security:** Security Services – Message Confidentiality – Message Integrity – Message Authentication – Digital Signature – Entity Authentication –**Secutity in the Internet: IPSec, SSL/TGS, PGP, VPN and Firewalls**. IPSecurity(IPSec) – Firewalls.	15	Chalk and Talk, quiz, on the spot test

Course Designer

Mrs.N.Kavitha

Department of Computer Science				Class: III B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
VI	Core	22OUCS62	Web Programming	4	5	25	75	100

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

Course Objectives:

1. To understand the fundamentals of the web and thereby develop web applications using various development languages and tools.
2. To enrich knowledge about XHTML control and Cascading Style Sheets.
3. To provide in- depth knowledge about JavaScript.
4. To enhance knowledge in XML documents with presentations using CSS and XSLT.
5. To develop the depth knowledge about PHP and JavaScript

Course Content:

Unit-I: Introduction to HTML5: Part1: Introduction-Editing HTML5-First HTML5 Example-Headings-Linking-Images-Special Characters and Horizontal Rules-Lists-Tables-Forms-Internal Linking-Meta Element- **Introduction to HTML5:Part2**: New HTML5 Form Input Types. **Introduction to Cascading Style Sheets^{TM}(CSS): Part1:** Introduction –Inline Styles-Embedded Style Sheets- Linking External Style Sheets-Backgrounds - **Introduction to Cascading Style Sheets^{TM}(CSS): Part 2:** Text Shadows-Rounded Corners – Color - Box Shadows - Linear Gradients -Radial Gradients - Multiple Background Images.

Unit-II: JavaScript: Introduction to Scripting: Introduction-Your First Script: Displaying a Line of Text with JavaScript in a Web Page. **JavaScript: Function:** Function Definitions- JavaScript Global Functions. **JavaScript: Arrays:** Arrays-Declaring and Allocating Arrays- Passing Arrays to Functions-Multidimensional Arrays. **JavaScript: Objects**: Math Object- String Objects-Date Object-Boolean and Number Objects-Document Object.

Unit-III: HTML5: Introduction to Canvas: Introduction-canvas Coordinate System-Rectangles-using paths to Draw Line-Drawing Arcs and Circles-Shadows-Quadratics

Curves-Bezier Curves. **XML** –Introduction -XMLBasics-Structuring Data-XML Namespaces- Document Type Definition (DTD)-W3C XML Vocabularies-Extensible Stylesheet Language and XSL Transformations-Document Object Model (DOM).

Unit – IV: Introducing PHP: What is PHP –**Server-Side Scripting Overview:** Static HTML – Client-Side Technologies – Server-Side Scripting - **Getting Started with PHP:** Installing PHP - **Learning PHP Syntax and Variables:** PHP Syntax's Syntax Is C-Like – Comments – Variables – Types in PHP – The Simple Types – Doubles – Booleans – NULL – Strings – Output.

Unit-V: Learning PHP Control Structures and Functions: Boolean Expressions – Branching – Looping – Using Functions – Function Documentation – Defining Your Own Functions – Functions and Variable Scope – Function Scope –**Learning PHP String Handling:** Strings in PHP, String Functions.

Book for Study:

1. Paul Deitel, Harvey Deitel, Abbey Deitel, *Internet & World Wide Web*, *How to Program,* Pearson Edition, 5th Edition.

Chapters:

Unit I   :   2.1- 2.3, 2.5- 2.13, 3.2, 4.1- 4.3, 4.5- 4.8, 5.2,-5.7, 5.9

Unit II :   6.1,6.2,9.3,9.8,10.2,10.3,10.7,10.10,11.2-11.6,11.8

Unit III :   14.1 – 14.8, 15.1-15.9

2. Steve Suehring, Tim Converse, and Joyce Park (2014), PHP*6 and MySQL*, Wiley Publishers, 3rd Edition.

Chapters:

Unit IV : 1, 2, 3, 4

Unit V : 5, 7

Books for Reference:

1. Achuyt God bole S & Atul Kahate(2005) , *Web Technologies*, TMH Publications, New Delhi, 2**nd** Edition.

2. Ivan Bayross(2007), *Web Technologies part II*, BPB publications, NewDelhi, 2**nd** Edition.

3. Vikram Vaswani(2007)*, PHP: A BEGINNER'S GUIDE,* Tata McGraw Hill Education, New Delhi, 5th Edition.

Web Resources / E.Books:

1. https://iowalakes.libguides.com/computer_programming/web_design_ebooks

2. https://hub.packtpub.com/free-web-development-ebooks/

3. https://www.e-booksdirectory.com/listing.php?category=60

Pedagogy: Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make the students to know coding to develop and design websites.

Activities to be given: To explore various innovative ideas that offer hands-on experience and valuable learning opportunities in web development.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Build basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions	K1 to K3
CLO2	To develop Python programs with conditionals and loops.	K1 to K3
CLO3	Construct the Array and String Concept	K1 to K4
CLO4	To define Python functions and to use Python data structure- lists, tuples, dictionaries	K1 to K3
CLO5	To do input/output with files in Python	K1 to K4

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

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

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

LESSON PLAN : TOTAL HOURS(75HRS)

UNIT	DESCRIPTION	HRS	MODE
I	**Introduction to HTML5: Part1**: Introduction-Editing HTML5-First HTML5 Example-Headings-Linking-Images-Special Characters and Horizontal Rules-Lists-Tables-Forms-Internal Linking-Meta Element- **Introduction to HTML5:Part2**: New HTML5 Form Input Types. **Introduction to Cascading Style Sheets™(CSS): Part1:** Introduction –Inline Styles-Embedded Style Sheets- Linking External Style Sheets-Backgrounds - **Introduction to Cascading Style Sheets™(CSS):Part 2:** Text Shadows- Rounded Corners – Color - Box Shadows - Linear Gradients -Radial Gradients - Multiple Background Images.	15	Chalk and Talk, PPT, quiz, on the spot test
II	**JavaScript: Introduction to Scripting**: Introduction-Your First Script: Displaying a Line of Text with JavaScript in a Web Page. **JavaScript: Function:** Function Definitions-JavaScript Global Functions. **JavaScript: Arrays:** Arrays-Declaring and Allocating Arrays-Passing Arrays to Functions-Multidimensional Arrays. **JavaScript: Objects**: Math Object- String Objects-Date Object-Boolean and Number Objects-Document Object.	15	Chalk and Talk, quiz, on the spot test
III	**HTML5: Introduction to Canvas:** Introduction-canvas Coordinate System- Rectangles-using paths to Draw Line-Drawing Arcs and Circles-Shadows-Quadratics Curves-Bezier Curves. **XML** – Introduction -XMLBasics-Structuring Data-XML Namespaces-Document Type Definition (DTD)-W3C XML Vocabularies-Extensible Stylesheet Language and XSL Transformations-Document Object Model (DOM).	15	Chalk and Talk, quiz, on the spot test
IV	**Introducing PHP:** What is PHP –**Server-Side Scripting Overview:** Static HTML – Client-Side Technologies – Server-Side Scripting - **Getting Started with PHP:** Installing PHP - **Learning PHP Syntax and Variables:** PHP Syntax's Syntax Is C-Like – Comments – Variables – Types in PHP – The Simple Types – Doubles – Booleans – NULL – Strings – Output.	15	Chalk and Talk, quiz, on the spot test
V	**Learning PHP Control Structures and Functions:** Boolean Expressions – Branching – Looping – Using Functions – Function Documentation – Defining Your Own Functions – Functions and Variable Scope – Function Scope –**Learning PHP String Handling:** Strings in PHP, String Functions.	15	Chalk and Talk, quiz, on the spot test

Course Designer

Mrs.R.Chinthamani

Department of Computer Science				Class: III B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
VI	Core	22OUCS6P	Web Programming Lab	3	6	40	60	100

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

List of Programs:

HTML:

1. HTML Documents using Basic tags.
2. Menu using Ordered and unordered list.
3. Web page using Table tags and their attributes.
4. Personal profile web page using form.
5. College application form using form and frames.
6. Mark sheet using frame and form.
7. On-line application forms for any one application.
8. Web application that functions as a simple hand calculator.
9. Web page using in-line style sheets.
10. Web page using external style sheets.

CSS:

11. CSS embedded style settings.
12. CSS colors and positioning elements.
13. Document using CSS.

JAVA SCRIPT:

11. Arithmetic Operations
12. Color Palette
13. Preparing class average
14. Window Objects
15. Array objects
16. Usage of cookies

XML:

17. Text string into an XML DOM object

18. XML Schema

19. File Creation-Elements

20. Opacity

PHP:

21. Objects

22. Arrays

23. Functions

24. Session and Cookies.

25. Reading and Writing the files using PHP.

Books for Reference:
1. Ivan Bayross(2007), *Web Technologies part II*, BPB publications, NewDelhi, 2**nd** Edition.

2. W. Jason Gilmore(2010), *Beginning PHP and MySQL: From Novice to Professional* Dreamtech Press ,4th Edition.

3. Vikram Vaswani(2007)*, PHP: A BEGINNER'S GUIDE,* Tata McGraw Hill Education, New Delhi, 5th Edition.

Web Resources / E.Books:
1. https://hub.packtpub.com/free-web-development-ebooks/

2. https://www.e-booksdirectory.com/listing.php?category=60

3. https://iowalakes.libguides.com/computer_programming/web_design_ebooks

Pedagogy: Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

LESSON PLAN FOR PRACTICAL: TOTAL HOURS (90HRS)

Cycle	Description	Hrs	Mode
1	**HTML:** 1. HTML Documents using Basic tags. 2. Menu using Ordered and unordered list. 3. Web page using Table tags and their attributes. 4. Personal profile web page using form. 5. College application form using form and frames. 6. Mark sheet using frame and form. 7. On-line application forms for any one application. 8. Web application that functions as a simple hand calculator. 9. Web page using in-line style sheets. 10. Web page using external style sheets.	18	Writing and executing the program in a system

2	**CSS:** 11. CSS embedded style settings. 12. CSS colors and positioning elements. 13. Document using CSS.	18	Writing and executing the program in a system
3	**JAVA SCRIPT:** 14. Arithmetic Operations 15. Color Palette 16. Preparing class average 17. Window Objects 18. Array objects 19. Usage of cookies	18	Writing and executing the program in a system
4	**XML:** 20. Text string into an XML DOM object 21. XML Schema 22. File Creation-Elements 23. Opacity	18	Writing and executing the program in a system
5	**PHP**: 24. Objects 25. Arrays 26. Functions 27. Session and Cookies. 28. Reading and Writing the files using PHP.	18	Writing and executing the program in a system

Course Designer

Mrs.R.Chinthamani

EVALUATION (PRACTICAL)
Core Lab / Skill Enhancement Course Lab

Internal (Formative)   : 40 marks

External (Summative)   : 60 marks Total

                               :100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

- ✓ There will be Two Internal Practical Examination.
- ✓ Duration of Internal Examination will be 2 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x8)	16
2.	II – Test and Debug the Program (2x4)	08
3.	III - Printing the Correct Output (2x4)	08
4.	IV- Viva	03
5.	V –Record book	05
	Total	**40**

Question Paper Pattern for External Practical Examination: 60 Marks

- ✓ Duration of External Examination will be 3 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x10)	20
2.	II – Test and Debug the Program (2x10)	20
3.	III- Printing the Correct Output (2x5)	10
4.	IV – Viva	5
5.	V - Record book	5
	Total	**60**

Department of Computer Science				Class: III B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
VI	Discipline Specific Elective Course	22OUCSDSE6A	Machine Learning	5	5	25	75	100

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

Course Objectives:

1. To understand the basic concepts and techniques of Machine Learning.
2. To solve the classification problem using Bayesian Learning Model.
3. To gain knowledge about Decision Trees.
4. To apply various reinforcement algorithms to solve real time complex problems.
5. To analyze the machine learning models and basic concepts of artificial neural network.

Course Content:

Unit I: Introducing Machine Learning: The Origins of Machine Learning, Uses and Abuses of Machine Learning _ Basics of Machine Learning Algorithm Model Works - Steps to apply Machine Learning - Choosing a Machine Learning Algorithm - Using Machine Learning concepts. **Managing and Understanding Data:** Data Structures, Vectors And Factors: Lists, Data frames, Matrixes and arrays - Managing Data - Exploring and Understanding Data: Exploring the Structure of Data, Exploring Numeric variables - Exploring Categorical Variables- Exploring Relationships between Variables.

Unit II: Lazy Learning – Classification Using Nearest Neighbors: The KNN Algorithm-Diagnosing Breast Cancer with the KNN Algorithm- Probabilistic Learning – Classification Using Naive Bayes: Basic concepts of Bayesian Methods- The Naïve Bayes Algorithm-Example – filtering Mobile Phone Spam with the Naive Bayes Algorithm.

Unit III: Divide and Conquer – Classification Using Decision Trees and Rules: Understanding Decision Trees- Example – Identifying Risky Bank Loans using C5.0 Decision

Trees- Understanding Classification Rules- Example – Identifying Poisonous Mushrooms with Rule Learners.

Unit IV: Forecasting Numeric Data – Regression Methods: Understanding Regression: Example – Predicting Medical Expenses using Linear Regression- Understanding Regression Trees and Model Trees- Example – Estimating the Quality of Wines with Regression Trees and Model Trees.

Unit V: Black Box Methods Neural Networks and Support Vector Machines: Understanding Neural Networks, from Biological to Artificial Neurons, Activation Functions, Network Topology, Training Neural Networks with Back propagation - Modeling the Strength of Concrete with ANNs- Understanding Support Vector Machines- Performing OCR with SVMs- Finding Patterns – **Market Basket Analysis Using Association Rules:** Understanding Association Rules.

Book for Study:
Brett Lantz(2013), *"Machine Learning with R"*, Addision – Wesly Packt Publishing.
Chapters:
      Unit I **:** 1, 2
      Unit II **:** 3, 4
      Unit III **:** 5
      Unit IV **:** 6
      Unit V **:** 7, 8

Books for Reference:

1. Jason Bell(2014), *Machine Learning – Hands on for Developers and Technical Professionals*, First Edition, Wiley.

2. Peter Flach(2012), *Machine Learning: The Art and Science of Algorithms that Make Sense of Data*, First Edition, Cambridge University Press.

3. S Sridhar(2021), *"Machine Learning"*, Oxford University Press, 1st Edition.

Web Resources / E.Books:

1. https://github.com/declanbarnes1989/FinalYearProject/blob/master/Machine%20Learning%20with%20R%20-%20Brett%20lantz%20(1).pdf

2. https://bradleyboehmke.github.io/HOML/

3. https://cognitiveclass.ai/courses/machine-learning-r

Pedagogy: Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make the students to know the basic concepts of Machine Learning.

Activities to be given: students shall be practiced with Algorithm examples.
Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	To understand, impart and analyze the concepts and of Machine Learning Techniques and types of data	K1 to K3
CLO2	To comprehend, apply and evaluate the classification techniques for real-world applications	K1 to K3
CLO3	To recognize, implement and analyze the unsupervised techniques for real-world applications	K1 to K4
CLO4	To understand, use and perform evaluation of Regression methods	K1 to K3
CLO5	To understand, identify, implement and review the deep learning techniques for real-time applications	K1 to K4

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

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

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

LESSON PLAN: TOTAL HOURS (75 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	**Introducing Machine Learning:** The Origins of Machine Learning, Uses and Abuses of Machine Learning _ Basics of Machine Learning Algorithm Model Works - Steps to apply Machine Learning - Choosing a Machine Learning Algorithm - Using Machine Learning concepts. **Managing and Understanding Data:** Data Structures, Vectors And	15	Chalk and Talk, PPT, quiz, on the spot test

	Factors: Lists, Data frames, Matrixes and arrays - Managing Data - Exploring and Understanding Data: Exploring the Structure of Data, Exploring Numeric variables - Exploring Categorical Variables- Exploring Relationships between Variables.		
II	**Lazy Learning – Classification Using Nearest Neighbors:**The kNN Algorithm- Diagnosing Breast Cancer with the kNN Algorithm- Probabilistic Learning – Classification Using Naive Bayes: Basic concepts of Bayesian Methods- The Naïve Bayes Algorithm- Example – filtering Mobile Phone Spam with the Naive Bayes Algorithm.	15	Chalk and Talk, quiz, on the spot test
III	**Divide and Conquer – Classification Using Decision Trees and Rules:** Understanding Decision Trees- Example – Identifying Risky Bank Loans using C5.0 Decision Trees- Understanding Classification Rules- Example – Identifying Poisonous Mushrooms with Rule Learners.	15	Chalk and Talk, PPT, group discussion and You tube Links
IV	**Forecasting Numeric Data – Regression Methods: Understanding Regression**: Example – Predicting Medical Expenses using Linear Regression- Understanding Regression Trees and Model Trees- Example – Estimating the Quality of Wines with Regression Trees and Model Trees.	15	Chalk and Talk, PPT, quiz
V	**Black Box Methods Neural Networks and Support Vector Machines:** Understanding Neural Networks, from Biological to Artificial Neurons, Activation Functions, Network Topology, Training Neural Networks with Back propagation - Modeling the Strength of Concrete with ANNs- Understanding Support Vector Machines- Performing OCR with SVMs- Finding Patterns – **Market Basket Analysis Using Association Rules:** Understanding Association Rules.	15	Chalk and Talk, PPT, group discussion, quiz, open book test

Course Designer
Mrs.P.Krishna Geetha

Department of Computer Science				Class: III B.Sc.,				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hours/ Week**	**CIA**	**External Exam**	**Total**
VI	Discipline Specific Elective Course	22OUCSDSE6B	Artificial Intelligence	5	5	25	75	100

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

Course Objectives:

1. To provide the basic ideas on Artificial Intelligence

2. To impart knowledge on the various search techniques and the basic functioning of Artificial Intelligence.

3. To give understanding of the main abstractions and reasoning for intelligent systems.

4. To Explore applications of predicate logic in formalizing mathematical statements and algorithms.

5. To impart the basics of NLP, Game Playing and Neural Networks

Course Content:

Unit I: Artificial Intelligence: The AI Problems – The Underlying Assumption – AI Technique The level of the Model – Criteria for Success. Problems, Problem-Spaces and Search: Defining the Problem as a State Space Search –Production Systems – Problems Characteristics – Production System-Characteristics – Issues in the Design of Search Programs – Additional Problems.

Unit II: Generate-and-Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction – Means-Ends Analysis.

Unit III: Representing Knowledge using Rules: Procedural versus Declarative knowledge – Logic Programming – Forward versus Backward Reasoning – Representations and Mappings – Approaches to Knowledge Representation – Issues in Knowledge representation - The Frame Problem.

Unit IV: Using Predicate Logic: Representing Simple Facts in Logic – Representing instance and is a Relationships – Computable Functions and Predicates –Resolution – Natural Deduction.

Unit V: Game Playing: Overview – The Minimax Search Procedure. Natural Language

Processing: Introduction. Connectionist Models: Introduction – Hopfield Networks – Learning in Neural Networks: Perceptrons.

Book for Study:

Elaine Rich, Kevin Knight and Shivashankar B Nair(2014), *Artificial Intelligence*, Tata McGraw-Hill publications, 3rd Edition.

Chapters:

Unit I   : 1, 2.1, 2.2, 2.3, 2.5, 2.7

Unit II : 3.1, 3.2, 3.5,3.14, 4.1 to 4.6

Unit III: 5.1 to 5.4, 6.4 to 6.11

Unit IV: 8.2, 9.1, 9.2, 10.1 to 10.4

Unit V: 15.1, 15.4 to15.7, 15.10, 16.1 to 16.5

Books for Reference:
1. Elaine Rich(2008), *Artificial Intelligence,* Tata McGraw-Hill publications.
2. V.S.Janakiraman K. Sarukesi, P.Gopalakrishnan(2016), *Foundations of Artificial Intelligence and Expert System* Infinity Press, 1st Edition.
3. Aggarwal C.C(2017), *Artificial Intelligence*, SPRINGER EXCLUSIVE(CBS)

Web Resources / E.Books:
1. https://www.ibm.com/topics/artificial-intelligence
2. https://www.britannica.com/technology/artificial-intelligence
3. https://cloud.google.com/learn/what-is-artificial-intelligence

Pedagogy: Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.
Rationale for nature of Course:

Knowledge and Skill: To make the students to know the Artificial Intelligence.

Activities to be given: students shall be practiced with Artificial Intelligence Algorithm concepts.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	To be aware of the Important of Artificial Intelligence and Knowledge based systems.	K1 to K3
CLO2	To Analyse the various AI programming languages and its functionalities.	K1 to K3

CLO3	To study in depth about the Knowledge Representation and Knowledge Organization and its techniques	K1 to K4
CLO4	To Implement natural language processing techniques and its pattern recognition	K1 to K3
CLO5	To demonstrate the detailed concepts of knowledge acquisition and machine learning principles	K1 to K4

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

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

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

LESSON PLAN: TOTAL HOURS (75 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Artificial Intelligence: The AI Problems – The Underlying Assumption – AI Technique – The level of the Model – Criteria for Success. Problems, Problem-Spaces and Search: Defining the Problem as a State Space Search –Production Systems – Problems Characteristics – Production System-Characteristics – Issues in the Design of Search Programs – Additional Problems.	15	Chalk and Talk, PPT, quiz, on the spot test
II	Generate-and-Test – Hill Climbing – Best-First Search – Problem Reduction –Constraint Satisfaction – Means-Ends Analysis.	15	Chalk and Talk, quiz, on the spot test
III	Representing Knowledge using Rules: Procedural versus Declarative knowledge – Logic Programming – Forward versus Backward Reasoning – Representations and Mappings – Approaches to Knowledge Representation – Issues in Knowledge representation - The Frame Problem.	15	Chalk and Talk, quiz, on the spot test

IV	Using Predicate Logic: Representing Simple Facts in Logic – Representing instance and isa Relationships – Computable Func and Predicates –Resolution – Natural Deduction.	15	Chalk and Talk, quiz, on the spot test
V	Game Playing: Overview – The Minimax Search Procedure. Natural Language Processing: Introduction. Connectionist Models: Introduction – Hopfield Networks – Learning in Neural Networks: Perceptrons.	15	Chalk and Talk, quiz, on the spot test

Course Designer

Mrs.N.Kavitha

Department of Computer Science				Class: III B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
VI	Discipline Specific Elective Course	22OUCSDSEPR6	Project	5	5	20	80	100

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

The Students are allowed to develop their project within our campus with the help of the internal staff members.

In the first review the students submit their title of the project and synopsis, and also submit the determination of the modules.

In the second review 50% of the project is completed and demonstrate the project.

In the final review the students prepare the powerpoint presentation. The oral is must for the completion of the project.

This report will be evaluated 80 marks for external examiner and 20 mark for internal examiner.

	Department of Computer Science			Class: III B.Sc.,				
Sem	Category	Course Code	Course Title	Credits	Hours/ Week	CIA	External Exam	Total
VI	Skill Enhancement Course	22OUCSSE6P	Machine Learning Lab	2	2	40	60	100

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

List of Programs:

1. Download and install R-Programming environment and install basic packages using install. Packages () command in R.

2. Learn the basics of R-Programming (Data types, Variables, Operators etc.)

3. Implement R-Loops with different examples.

4. Learn the basics of functions in R and implement with examples.

5. Implement data frames in R. Write a program to join

6. Columns and rows in a data frame using c bind () and r bind () in R.

7. Implement different String Manipulation functions in R.

8. Implement different data structures in R(Vectors ,Lists ,Data Frames)

9. Write a program to read acsv file and analyze the data in the file in R

10. Create pie charts and bar charts using R.

11. Create a data set and do statistical analysis on the data using R.

12. Write R program to find Correlation and Covariance

13. Write R program for Regression Modeling

14. Write R program to build classification model using KNN algorithm

Books for Reference:

1. Christopher M. Bishop(2006), *Pattern Recognition and Machine LearningI*, Springer New York, 1st Edition, 2006.

2. Peter Flach(2012), *Machine Learning: The Art and Science of Algorithms that Make Sense of Data*, First Edition, Cambridge University Press.

3. S Sridhar(2021), *"Machine Learning"*, Oxford University Press, 1st Edition.

Web Resources / E.Books:

1. https://github.com/declanbarnes1989/FinalYearProject/blob/master/Machine%20Learning%20with%20R%20-%20Brett%20lantz%20(1).pdf

2. https://bradleyboehmke.github.io/HOML/

3. https://cognitiveclass.ai/courses/machine-learning-r

Pedagogy: Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

LESSON PLAN FOR PRACTICAL: TOTAL HOURS(30HRS)

Cycle	Description	Hrs	Mode
1	1. Download and install R-Programming environment and install basic packages using install. Packages () command in R. 2.Learn the basics of R-Programming (Data types, Variables, Operators etc.) 3.Implement R-Loops with different examples.	6	Writing and executing the program in a system
2	4.Learn the basics of functions in R and implement with examples. 5.Implement data frames in R. Write a program to join 6.Columns and rows in a data frame using c bind () and r bind () in R.	6	Writing and executing the program in a system
3	7. Implement different String Manipulation functions in R. 8.Implement different data structures in R(Vectors ,Lists ,Data Frames) 9.Write a program to read a csv file and analyze the data in the file in R	6	Writing and executing the program in a system
4	10.Create pie charts and bar charts using R. 11.Create a data set and do statistical analysis on the data using R. 12.Write R program to find Correlation and Covariance	6	Writing and executing the program in a system
5	13.Write R program for Regression Modeling 14.Write R program to build classification model using KNN algorithm	6	Writing and executing the program in a system

Course Designer
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