B. Sc Artificial Intelligence and Machine Learning

Course Structure and Syllabus

(For the candidates admitted from the academic year 2024-2025 onwards)

Choice Based Credit System (CBCS)

&

Learning Outcomes-Based Curriculum Framework (LOCF)

THANTHAI HANS ROEVER COLLEGE (AUTONOMOUS)
(Approved by NAAC, Affiliated to Bharathidasan University)
ELAMBALUR, PERAMBALUR – 621 220

Vision

To construct a centre of excellence for the students, mold them to meet the present need of IT industry and to attain academic excellence by continuous progress of the faculty through research activities.

Mission

To provide an educational possibility to all expectant youth to shine in life by means of inculcating academic excellence, promoting human values and creating social responsibility

Programme Outcomes (POs)

After successful completion of B.Sc. AI &ML program the students are expected to

1. Apply the concepts and practical knowledge in analysis, design and development of computing systems and applications to multi-disciplinary problems

2. Provide a concrete foundation and enrich their abilities to qualify for Employment, Higher studies and Research in Artificial Intelligence and Machine Learning with ethical values

3. Understand, analyze and develop essential proficiency in the areas related to artificial intelligence and machine learning in terms of underlying statistical and computational principles.

4. Learn the basic concepts of AI & ML and apply in various research areas like image processing, speech recognition and Medical diagnostics etc.,

5. Find solutions to complex AI problems using various AI tools

PO1: Knowledge

PO2: Problem Analysis

PO3: Design/ Development of Solutions

PO4:Conduct investigations of complex problems

PO5: Modern tool usage

PO6:Applying to society

Program Specific Outcomes (PSOs)

PSO1:Think in a critical and logical based manner

PSO2:Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and real time application related sciences.

PSO3:Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.

PSO4:Understand, formulate, develop programming model with logical approaches to a Address issues arising in social science, business and other contexts.

PSO5:Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.

PO6:Provide students/learners sufficient knowledge and skills enabling them to under take further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science.

PO7:Equip with Computer Science technical ability, problem solving skills, creative talentandpowerofcommunicationnecessaryforvariousformsofemployment.

PO8:Develop a range of generic skills helpful in employment, internships & societal activities.

PO9:Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of computing sciences.

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

B.Sc ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

CHOICE BASED CREDIT SYSTEM – LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK(CBCS- LOCF)

(For the candidates admitted from the academic year 2024 - 2025 onwards)

Semester	Part	Course Code	Title of the Course	Ins. Hours/ Week	Credits	Exam Hours	CIA (Max)	ESE (Max)	Total (Max)
1	I	23UT1/H1	Language	6	3	3	25	75	100
1	II	23UE1	English	6	3	3	25	75	100
1	III	24UAI1CC1	Programming in C and Data Structure	6	4	3	25	75	100
1	III	24UAI1CC2P	Programming in C Lab	5	4	3	40	60	100
1	III	23UMA1AC13	Numerical Methods and Statistics	5	4	3	25	75	100
1	IV	24UAI1SE1	NME-1: Office Automation	2	2	3	25	75	100
1			Value Added Course*		2*	2	50	50	100*
			Total	**30**	**20**	**-**	**-**	**-**	**600**
2	I	23UT2/H2	Language	6	3	3	25	75	100
2	II	23UE2	English	6	3	3	25	75	100
2	III	24UAI2CC3	Programming in Python	6	5	3	25	75	100
2	III	24UAI2CC4P	Practical: Programming in Python Lab	4	4	3	40	60	100
2	III	23UMA 2AC2	Operations Research	4	3	3	25	75	100
2	IV	24UAI2SE2	NME-2:Web Designing	2	2	3	25	75	100
2	IV	24UAI2SE3	Fundamentals of Information Technology	2	2	3	25	75	100
2			Value Added Course*		2*	3	50	50	100*
			Total	**30**	**22**	**-**	**-**	**-**	**700**
3	I	23UT3/H3	Language	6	3	3	25	75	100
3	II	23UE3	English	6	3	3	25	75	100
3	III	24UAI3CC5	RDBMS and No SQL	5	4	3	25	75	100
3	III	24UAI3CC6P	RDBMS and No SQL Lab	3	3	3	40	60	100
3	III	24UAI3AC1	Microprocessor and Assembly Language Programming	3	3	3	25	75	100
3	III	24UAI3AC2P	Assembly Language Programming Lab	3	3	3	25	75	100
3	IV	24UAI3SE4	Machine Learning in Everyday Life	2	2	3	25	75	100
3	IV	25UHW	Health and Wellness	1	1	-	-	-	100
3	IV	24UGS	Gender Studies	1	1	3	25	75	100
3			Value Added Course*		2*	3	50	50	100*
			Total	**30**	**23**	**-**	**-**	**-**	**900**

Semester	Part	Course Code	Title of the Course	Ins. Hours/ Week	Credits	Exam Hours	CIA (Max)	ESE (Max)	Total (Max)
4	I	23UT4/H4	Language	6	3	3	25	75	100
4	II	23UE4	English	6	3	3	25	75	100
4	III	24UAI4CC7	Artificial Intelligence	6	5	3	25	75	100
4	III	24UAI4CC8P	Artificial Intelligence Lab	4	4	3	40	60	100
4	III	23UPH4AC4	Digital Electronics	4	3	3	25	75	100
4	IV	24USS	Soft Skills	2	2	3	25	75	100
4	IV	24UES	Environment Studies	2	2	3	25	75	100
4			Value Added Course*		2*	2	50	50	100*
			Total	**30**	**22**	**-**	**-**	**-**	**700**
5	III	24UAI5CC9	Embedded Systems and IoT	6	5	3	25	75	100
5	III	24UAI5CC10	Robotics	6	5	3	25	75	100
5	III	24UAI5CC11P	Robotics Lab	4	4	3	40	60	100
5	III	24UAI5CC12	Open Source Software	6	5	3	25	75	100
5	III	24UAI5DE11 24UAI5DE12	Mobile Application Development AI for Industry and Business	3	3	3	25	75	100
5	III	24UAI5DE21 24UAI5DE22	Virtual Reality and Augmented Reality Fuzzy Logics and Neural Networks	3	3	3	25	75	100
5	IV	24UVE	Value Education	2	2	3	25	75	100
5			Summer Internship **		2*				100*
5			Value Added Course*		2*	3	50	50	100*
			Total	**30**	**27**	**-**	**-**	**-**	**700**
6	III	24UAI6CC13	Human Computer Interaction	6	5	3	25	75	100
6	III	24UAI6CC14	Machine Learning Techniques	6	5	3	25	75	100
6	III	24UAI6CC15P	Machine Learning Techniques Lab	4	4	3	40	60	100
6	III	24UAI6CC16PW	Project Work	6	5	3	25	75	100
6	III	24UAI6DE31 24UAI6DE32	Natural Language Processing Deep Learning	4	3	3	25	75	100
6	III	24UAI6DE41 24UAI6DE42	Cloud Computing Cryptography	4	3	3	25	75	100
6	V		Extension Activity	-	1	-	-	-	-
6			Value Added Course*	-	2*	3	50	50	100*
			Total	**30**	**26**	**-**	**-**	**-**	**600**
			Total	**180**	**140**	**-**	**-**	**-**	**4200**

Credit Distribution for UG Artificial Intelligence

S. No	Part	Course Details	Credit
1	**III**	Core Course	67
2		Allied Course / Disciplinary Elective	32
3	I& II	Language & English	24
4	IV & V	NME	4
5		EVS	2
6		Value Education	2
7		Extension Activity	1
8		Skill Enhancement Course	4
9		Health and Wealth	1
10		Gender Studies	1
11		Professional Competency Soft Skill	2
			140

List of Core Courses

1. Programming in C and Data Structure
2. Programming in C Lab
3. Programming in Python
4. Programming in Python Lab
5. RDBMS and NoSQL
6. RDBMS and NoSQL Lab
7. Artificial Intelligence
8. Artificial Intelligence Lab
9. Embedded Systems and IoT
10. Robotics
11. Robotics Lab
12. Open Source Software
13. Project Work
14. Machine Learning Techniques
15. Machine Learning Techniques Lab

List of Allied Courses

1. Numerical Methods and Statistics
2. Operations Research
3. Microprocessor and Assembly Language Programming
4. Assembly Language Programming Lab
5. Digital Electronics

List of Skill Enhancement Courses

1. Office Automation (NME-1)
2. Web Designing (NME-2)
3. Fundamentals of Information Technology
4. Machine Learning in Everyday Life
5. Soft Skills

Note:

	Internal Marks	External Marks
1. Theory	25	75
2. Practical	40	60

3. Separate passing minimum is prescribed for Internal and External marks

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]
The passing minimum for Semester Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]
The passing minimum for Semester Examinations shall be 40% out of 60 marks [i.e. 24 marks]

- Project : 100 Marks (The Project will be evaluated by an Internal and an External Examiner)
  Dissertation- 80 Marks
  Viva Voce - 20 Marks

List of Value Added Courses

Course Code	Course Title
24UVAAI1	Introduction to Data Science
24UVAAI2	Ruby on Rails
24UVAAI3	Ethical Hacking
24UVAAI4	Network Programming

Question Paper Pattern

UG Programme		
Maximum Marks : 75		**Duration: 3 Hours**
Section - A	**i) a-** (5 Questions for Multiple Choice) One question from each unit	5 x 1 = 5 Marks
	b- (5 Questions for Fill in the Blanks) One question from each unit	5 x 1 = 5 Marks
	ii) (5 short answer questions) One question from each unit	5 x 2 = 10 Marks
Section - B	**5 Questions** (Internal Choice: Either or) One set of questions from each unit	5 x 5 = 25 Marks
Section - C	**3 Questions**(Answer any 3 out of 5 Questions) One question from each unit	3 x10 = 30 Marks

SEMESTER-I

Course Code: 24UAI1CC1 **Exam Hours: 3**
Instruction Hours: 6 **Internal Marks: 25**
Credits: 4 **External Marks: 75**

CORE COURSE-I -PROGRAMMING IN C AND DATA STRUCTURES

COURSE OBJECTIVES:

- To know about the basics of C Programming, Control and Looping Structures and programming with it.
- To understand Arrays, Pointers, structures and String Processing in C language
- To know about the basic concepts in Data Structures.

UNIT - I:
Basic of C: History of C and its importance – Structure of a C program – Data Types – Constants and Variables – Operators and Expressions – Order of Precedence, Evaluating of Arithmetic Expressions – Type Conversion- Decision Statements: if, if-else, and nested if statements.

UNIT - II:
Loops Structures: For Loop, While, Do-while loop – Arrays: - One Dimensional Array, Two dimensional Arrays, Character Arrays and Strings – Functions: Function with arrays- Function with decision and looping statements - Recursion.

UNIT - III:
Pointers: Introduction – Pointer Expressions – Chain of Pointers – Pointers and Arrays – Array of Pointers – Pointers as function arguments – Functions returning Pointers – Pointers to Functions –Function pointer – Structures - declaration, initialization, Array of Structures – Pointer to structures, Structures and functions – Typed of Enumerated data types, Unions.

UNIT - IV:
Strings Processing, Standard string library functions – Files: introduction and files functions – Writing and reading in Text mode – Simple application: Display the contents of a file. Write data to a file. Append data to an existing file – File IO – Reading and writing structures.

UNIT - V:
Stack: LIFO concept, Stack operations, Array implementation of stack – Queue: FIFO concept, Queue operations, Array implementation of queue – Singly Linked List: concepts, operations – Doubly Linked List: concepts, operations – Trees: General trees, Binary trees.

REFERENCES:

1. E. Balagurusamy, “Programming in ANSI C”, Tata McGraw Hill, New Delhi, Seventh Edition, 2016.
2. E. Horowitz, S. Sahni and Susan Anderson Freed, “Fundamental Data Structures in C”, 2ed, Orient Black Swan Publisher, 2009.
3. Byron S. Gottfried, “Programming with C”, Schaum’s Outline Series, Tata- McGraw Hill Edition, New Delhi, 1991.
4. YashavantKanetkar, “Let us C”, BPB Publications, Tenth Edition, New Delhi, 2010.
5. https://www.tutorialspoint.com/cprogramming/index.htm
6. https://www.w3schools.in/data-structures/intro

COURSE OUTCOMES:

Upon successful completion of this course the students would be able to:

- Summarize the basic knowledge to develop C programs
- Manipulate Looping, arrays and functions
- Apply and write programs for solving real world problems
- Create open, read, manipulate, write and close files.
- Understand the basic concepts in data structures.

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

Semester	Code		Title of the Course			Hours		Credits		
I	**24UAI1CC1**		**PROGRAMMING IN C AND DATA STRUCTURES**			**6**		**5**		
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	□		□	□		□				□
CO2	□		□	□		□	□		□	□
CO3		□	□		□	□			□	□
CO4		□			□	□	□	□	□	□
CO5	□	□		□	□		□	□	□	
Number of matches (□) = 35, Relationship: High										

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

SEMESTER-I

Course Code: 24UAI1CC2P **Exam Hours: 3**
Instruction Hours: 5 **Internal Marks: 25**
Credits: 4 **ExternalMarks:75**

CORE COURSE PRACTICAL –II-PROGRAMMING IN C LAB

COURSE OBJECTIVES:

- To learn the programming knowledge using C language.
- To create derived and user defined data types.
- To demonstrate the functioning of pointers in C.

1. Write a Program
    a. To convert temperature from degree Centigrade to Fahrenheit.
    b. To find whether the given number is Even or Odd.
    c. To find the greatest of three numbers.
2. Write a Program to use the switch statement to display the week days.
3. Write a Program to display first Ten Natural Numbers and their sum.
4. Write a Program to find Multiplication of Two Matrices.
5. Write a Program
    a. To find the maximum number in Array using pointer.
    b. To reverse a number using pointer.
    c. To add two numbers using pointer.
6. Write a Program to solve Quadratic Equation using functions.
7. Write a Program to find factorial of a number using Recursion.
8. Write a Program to show Call by Value and Call by Reference.
9. Write a Program to create a file containing Student Details.
10. Write a program to implement a stack using singly linked list, Implement Queue using Linked List.

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

- To relate the ways to solve simple programs
- To understand and trace the execution of programs using arrays
- To develop programs with functions and pointers
- To solve data handling problems using files
- To implement stack and queue operations.

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

Semester	Code	Title of the Course	Hours	Credits
I	24UAI1CC2P	PROGRAMMING IN C LAB	6	5

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□		□	□		□				□
CO2	□		□	□		□	□		□	□
CO3	□		□	□	□	□	□		□	□
CO4		□	□		□		□	□		□
CO5	□	□		□	□		□	□	□	
Number of matches (□) = 36, Relationship: High										

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

SEMESTER-I

VALUE ADDED – INTRODUCTION TO DATA SCIENCE

Course Code: 24UVAAI1
Instruction Hours: 30

Exam Hours: 2
Internal Marks: 50
External Marks: 50

COURSE OUTCOMES:

Upon completion of the course students will be able to

CO1: Understanding fundamental concepts and significance of data science.

CO2: Application of data collection and cleaning techniques.

CO3: Utilization of exploratory data analysis methods.

CO4: Application of statistical inference methods.

CO5: Implementation of basic machine learning models.

UNIT I

Introduction to Data Science : Overview of data science and its history_Differences between data science, statistics, and machine learning.

UNIT II

Data Collection and Preparation : Methods of data collection (surveys, web scraping, APIs)_Data cleaning and preparation techniques.

UNIT III

Exploratory Data Analysis (EDA): Statistical methods for summarizing data_Data visualization techniques and tools Matplotlib, Seaborn.

UNIT IV

Introduction to Statistical Inference: Principles of statistical inference and hypothesis testing_ Practical applications of statistical methods.

UNIT V

Introduction to Machine Learning: Basics of machine learning concepts and algorithms_Overview of supervised vs. unsupervised learning and model evaluation.

REFERENCE BOOKS:

1. Data Science for Business - Foster Provost & Tom Fawcett, 1st Edition (2013), O'Reilly Media.
2. The Data Warehouse Toolkit - Ralph Kimball & Margy Ross, 3rd Edition (2013), Wiley.
3. Statistics for Data Science - James D. Miller, 1st Edition (2015), CreateSpace Independent Publishing.

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

Semester	Code	Title of the Course					Hours		Credits
I	24UVAAI1	INTRODUCTION TO DATA SCIENCE					2		2
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□	□	□	□	□	□		□	□	□
CO2		□	□	□	□	□	□		□	□
CO3	□	□	□	□		□	□	□		
CO4	□		□		□	□	□	□	□	□
CO5	□	□	□	□	□		□	□	□	
Number of matches (□) = 40, Relationship: High										

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

SEMESTER – II

Course Code: 24UAI2CC3 **Exam Hours: 3**

Instruction Hours: 6 **Internal Marks: 25**

Credits: 5 **External Marks: 75**

CORE COURSE – III PROGRAMMING IN PYTHON

Course Objectives :

- To make students understand the concepts of Python programming.
- To apply the OOPs concept in PYTHON programming.
- To impart knowledge on demand and supply concepts
- To make the students learn best practices in PYTHON programming
- To know the costs and profit maximization.

Course Outcomes (CO):

On completion of this course, students will

CO1: Learn the basics of python, Do simple programs on python, Learn how to use an array.

CO2: Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.

CO3: Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.

CO4: Work with List, tuples and dictionary, Write program using list, tuples and dictionary.

CO5: Usage of File handlings in python, Concept of reading and writing files, Do programs using files.

UNIT - I

Introduction to Python: Features of Python - How to Run Python -Identifiers - Reserved Keywords - Variables - Comments in Python -Indentation in Python - Multi-Line Statements - Multiple Statement Group (Suite) - Quotes in Python - Input, Output and Import Functions -Operators. Data Types and Operations: Numbers – Strings – List – Tuple– Set – Dictionary – Data type conversion.

UNIT - II

Flow Control: Decision Making – Loops – Nested Loops – Types of Loops. Functions: Function Definition – Function Calling - Function Arguments - Recursive Functions - Function with more than one return value.

UNIT - III

Modules and Packages: Built-in Modules - Creating Modules – import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules. File Handling- Directories in Python.

UNIT - IV

Object-Oriented Programming: Class Definition - Creating Objects -Built-in Attribute Methods - Built-in Class Attributes- Destructors in Python – Encapsulation - Data Hiding – Inheritance – Method Overriding- Polymorphism.

UNIT - V

Exception Handling: Built-in Exceptions-Handling Exceptions-Exception with Arguments - Raising Exception - User-defined Exception - Assertions in Python. Regular Expressions: The match() function - The search() function - Search and Replace – Regular Expression Modifiers: Option Flags-Regular Expression Patterns-Character Classes-Special Character Classes - Repetition Cases -findall() method - compile() method.

Text Book:

1. Reema Thareja, "Python Programming using problem solving approach", First Edition, 2017, Oxford University Press.
2. Dr.R.NageswaraRao, "Core Python Programming", First Edition, 2017, Dream tech Publishers.

Reference Books:

3. Martin C. Brown, ―PYTHON: The Complete Reference‖, McGraw-Hill, 2001.
4. Jeeva Jose and P. Sojan Lal, "Introduction to Computing and Problem Solving with PYTHON", Khanna Book Publishing Co, 2016.

Web Resources:

https://www.programiz.com/python-programming

https://www.guru99.com/python-tutorials.html

https://www.w3schools.com/python/python_intro.asp

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

<table>
<tr><td>Semester</td><td>Code</td><td colspan="4">Title of the Course</td><td colspan="2">Hours</td><td colspan="3">Credits</td></tr>
<tr><td>II</td><td>24UAI2CC3</td><td colspan="4">PROGRAMMING IN PYTHON</td><td colspan="2">6</td><td colspan="3">5</td></tr>
<tr><td rowspan="2">Course Outcomes (Cos)</td><td colspan="5">Programme Outcomes (POs)</td><td colspan="5">Programme Specific Outcomes (PSOs)</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td></tr>
<tr><td>CO1</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td></td><td>□</td><td>□</td><td>□</td></tr>
<tr><td>CO2</td><td></td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td></td><td>□</td><td>□</td></tr>
<tr><td>CO3</td><td>□</td><td>□</td><td>□</td><td>□</td><td></td><td>□</td><td>□</td><td>□</td><td></td><td></td></tr>
<tr><td>CO4</td><td>□</td><td></td><td>□</td><td></td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td></tr>
<tr><td>CO5</td><td>□</td><td>□</td><td></td><td>□</td><td>□</td><td></td><td>□</td><td>□</td><td>□</td><td></td></tr>
<tr><td colspan="11">Number of matches (□) = 39, Relationship: High</td></tr>
</table>

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

SEMESTER – II

Course Code: 24UAI2CC4P | **Exam Hours: 3**

Instruction Hours: 4 | **Internal Marks:40**

Credits: 4 | **External Marks:60**

CORE COURSE - PROGRAMMING IN PYTHON LAB

Course Objectives (LO):

- To develop the Numbers, Math functions and Strings.
- To create different Decision Making statements and Functions.
- To design GUI Applications in Python.

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

CO1: To recall and relate the features of python programming language.

CO2: To compare various programming mechanism used in python.

CO3: To construct simple programs in python using various language features.

CO4: To distinguish the various constructs used in python.

CO5: To apprise the application of object oriented concept in python.

LAB EXERCISES

1. Write a python program that displays the following information:
   Your name, Full address Mobile number, College name, Course subjects.
2. Write a python program to find the largest three integers using if-else and conditional operator.
3. Write a python program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of the series) and the program should display the numbers in order and their sum.
4. Write a python program to find the product of two matrices [A]mxp and [B]pxr.
5. Write recursive functions for GCD of two integers.
6. Write recursive functions for the factorial of positive integer.
7. Write recursive functions for Fibonacci Sequence up to given number n.
8. Write recursive functions to display prime number from 2 to n.
9. Write a python program that writes a series of random numbers to a file from 1 to n and display.
10. Write a python program to sort a given sequence: String, List and Tuple.
11. Write a python program to make a simple calculator.
12. Write a python program for Linear Search and Binary Search.

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

Semester	Code	Title of the Course	Hours	Credits
I	24UAI2CC4P	PROGRAMMING IN PYTHON LAB	4	4

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□	□	□	□	□	□		□	□	□
CO2		□	□	□	□	□	□		□	□
CO3	□	□	□	□		□	□	□		
CO4	□		□		□	□	□	□	□	□
CO5	□	□	□	□	□		□	□	□	
Number of matches (□) = 40, Relationship: High										

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

SEMESTER – II

Course Code: 24UAI2SE2 **Exam Hours: 3**
Instruction Hours: 2 **Internal Marks:25**
Credits: 2 **External Marks:75**

WEB DESIGNING (NME-2)

Course Objectives

- Insert a graphic within a web page.
- Create a link within a web page.
- Create a table within a web page.
- Insert heading levels within a web page.
- Create a table within a web page.

Course Outcomes:

CO 1: Recognize and relate LPP and solving LPP using graphical method.

CO 2: Compute Simplex Algorithm, Two Phase Method and Big-M Method of LPP.

CO 3: Explain Transportation problem and Evaluate its initial basic feasible solution.

CO 4: Discuss and solve assignment problem using Hungarian algorithm.

CO 5: Describe and Construct Network and compute PERT and CPM.

Unit I:
Introduction :Web Basics: What is Internet – Web browsers – What is Web page – HTML Basics: Understanding tags.

UNIT II: Tags for Document structure(HTML, Head, Body Tag). Blocklevel text elements: Headings paragraph(<p> tag) – Font styleelements: (bold, italic, font, small, strong, strike, big tags)

UNIT III

Lists: Types of lists: Ordered, Unordered – Nesting Lists – Other 6tags: Marquee, HR, BR- Using Images – Creating Hyperlinks.

UNIT IV

Tables: Creating basic Table, Table elements, Caption – Table andcell alignment – Rowspan, Colspan – Cell padding.

UNIT V

Frames: Frameset – Targeted Links – No frame – Forms : Input,Textarea, Select, Option.

Textbooks:

1. **"MasteringHTML5andCSS3MadeEasy",TeachUCompInc.,2014.**
2. **Thomas Michaud, "Foundations of Web Design: Introduction to HTML & CSS".**

Web Resources

1. https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
   https://www.w3schools.com/html/default.asp

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

Semester	Code		Title of the Course			Hours		Credits		
II	24UAI2se2		WEB DESIGNING			2		2		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□	□	□	□	□	□		□	□	□
CO2		□		□	□		□		□	□
CO3	□	□	□	□		□	□	□		
CO4	□		□		□	□	□		□	□
CO5	□	□	□	□	□		□	□	□	
Number of matches (□) = 37, Relationship: High										

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

SEMESTER-II

Course Code: 24UAI2SE3	**Exam Hours: 3**
Instruction Hours: 2	**Internal Marks: 25**
Credits: 2	**External Marks: 75**

FUNDAMENTALS OF INFORMATION TECHNOLOGY

Course Objectives

- To make students understand the basics of computer system.
- To understand the concept of primary and secondary memory units.
- To gain the knowledge on Input and Output devices.
- Learn about different types of software and the role of operating systems.
- Explore the knowledge on Network and its technologies.

Course Outcomes (CO):

On completion of this course, students will

CO1: Demonstrate understanding of the basics of computer systems and their components.
CO2: Explain the structure and functions of primary and secondary memory units.
CO3: Analyze the operation and applications of input and output devices.
CO4: Describe different types of software and the role of operating systems.
CO5: Illustrate concepts of networking, including network types and topologies.

UNIT I

Introduction to Computer: Characteristic of Computer- Generation of computers -Classification of Digital Computer System – Block diagram of Computer.

UNIT II

Memory Units: Random Access Memory, Read Only Memory-Magnetic Disks_ Magnetic Tapes-Floppy Disk-Hard Disk.

UNIT III

Input and Output Devices: Keyboard – Mouse – Scanner - Barcode Reader- OCR- Digital Cams – Monitor – Printer – Plotters.

UNIT IV

Introduction to Software: Application Software- System Software-Operating System-Functions of Operating System-classification of Operating System.

UNIT V

Introduction to Networks: Local Area Network- Metropolitan Area Network - Wide Area Network-Topology: Star, Ring, Bus, Tree Topologies.

Text Book(s):

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

Reference Book(s):

1. Henry C.Lucas, Jr., Information Technology for Management – McGraw Hill (Part – III).
2. Williams, Sawyer, Hutchinson, Using Information Technology – McGraw Hill.

Web Resources:

https://www.khanacademy.org https://www.geeksforgeeks.org
https://www.tutorialspoint.com

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

<table>
<tr><td>Semester</td><td colspan="2">Code</td><td colspan="3">Title of the Course</td><td colspan="2">Hours</td><td colspan="3">Credits</td></tr>
<tr><td>II</td><td colspan="2">24UAI2SE3</td><td colspan="3">FUNDAMENTALS OF INFORMATION TECHNOLOGY</td><td colspan="2">2</td><td colspan="3">2</td></tr>
<tr><td rowspan="2">Course Outcomes (Cos)</td><td colspan="5">Programme Outcomes (POs)</td><td colspan="5">Programme Specific Outcomes (PSOs)</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td></tr>
<tr><td>CO1</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td></td><td>□</td><td>□</td><td>□</td></tr>
<tr><td>CO2</td><td></td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td></td><td></td><td>□</td></tr>
<tr><td>CO3</td><td>□</td><td>□</td><td>□</td><td></td><td>□</td><td>□</td><td>□</td><td>□</td><td></td><td>□</td></tr>
<tr><td>CO4</td><td>□</td><td>□</td><td>□</td><td></td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td><td>□</td></tr>
<tr><td>CO5</td><td>□</td><td>□</td><td>□</td><td>□</td><td></td><td></td><td>□</td><td></td><td>□</td><td>□</td></tr>
<tr><td colspan="11">Number of matches (□) = 40, Relationship: High</td></tr>
</table>

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

SEMESTER II

VALUE ADDED – RUBY ON RAILS

Course Code: 24UVAAI2 **Exam Hours: 2**
Instruction Hours: 30 **Internal Marks: 50**
External Marks: 50

COURSE OUTCOMES:

Upon completion of the course students will be able to
CO1 : To learn the basic Concepts of the Ruby Language
CO2 : To use Ruby in developing Web based applications
CO3: To apply the MVC architecture with Rails
CO4 :To Develop Applications using Ruby on Rails

UNIT I
INTRODUCTION TO RUBY: Introduction to Ruby: Data types - Simple input and output - Control statements.

UNIT II
Fundamentals of arrays – Hashes – Methods – Classes - Code blocks and Iterations – Date and Time – File I/O -Class – Objects – Inheritance – Polymorphism.

UNIT III
INTRODUCTION TO RAILS: Introduction – MVC Architecture - Environmental Setup – Creating Rails Application – Database Setup – Active Records

UNIT IV
MODULES: Migrations - Creating – Editing – Running Migrations – Controllers - Implementing the methods – Additional Methods– Routes - Views – Layouts

UNIT V
APPLICATION DEVELOPMENT - Validation - Scaffolding – Working with AJAX – File Uploading – Sending E-mails – Creating a Sample Application

REFERENCE BOOKS:

1. Sam Ruby, Dave Thomas, David Heinemeier Hansson, “Agile Web Development with Rails”, The Pragmatic Programmers, Fourth Edition, 2011
2. P.J.Deitel, H.M.Deitel, “Internet and World Wide Web – How to program”, Pearson Education Publishers, Fifth Edition, 2009.
3. Robert. W. Sebesta, "Programming the World Wide Web", Pearson Education, Fourth Edition, 2007.

WEB REFERENCE:

1. http://guides.rubyonrails.org
2. http://www.tutorialspoint.com

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

Semester	Code	Title of the Course				Hours		Credits		
I	24UVAAI2	RUBY ON RAILS				2		2		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□	□	□	□	□	□		□	□	□
CO2		□	□	□	□	□	□		□	□
CO3	□	□	□	□		□	□	□		
CO4	□		□		□	□	□	□	□	□
CO5	□	□	□	□	□		□	□	□	
Number of matches (□) = 40, Relationship: High										

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

SEMESTER – III

Course Code: 24UAI3CC5 **Exam Hours: 3**

Instruction Hours: 5 **Internal Marks: 25**

Credits: 4 **External Marks: 75**

CORE COURSE – RDBMS and NoSQL

COURSEOBJECTIVES:

- To know the basic concepts about database, its concepts, applications, data models, schemas and instances.
- To gain knowledge about database system architecture, the relational data model and about SQL.
- To Know about NoSQL and data models in NoSQL

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

1. To know about databases and about database users.
2. To understand the concept of Database system structure and the concept of Relational model.
3. To know about SQL.
4. To know about the Emergence of NoSQL.
5. To understand about data models in NoSQL.

UNIT-I:

Introduction to Databases : Databases and Database Users - Introduction- Example -Characteristics of the Database Approach - Actors on the Scene - Workers behind the Scene -Advantages of Using the DBMS Approach - A Brief History of Database Applications

UNIT-II:

Database System Concepts and Architecture : Data Models, Schemas, and Instances - Three-Schema Architecture and Data Independence - Database Languages and Interfaces - The Database System Environment - Centralized and Client/Server Architectures for DBMSs -Classification of Database Management Systems - The Relational Data Model and SQL : The Relational Data Model and Relational - Database Constraints - Relational Model Concepts -Relational Model Constraints and Relational Database Schemas – Update Operations, Transactions, and Dealing with Constraint Violations

UNIT-III:

BasicSQL:SQLDataDefinitionandDataTypes-SpecifyingConstraintsinSQL - BasicRetrieval Queries in SQL - INSERT, DELETE, and UPDATE Statements in SQL - Additional Features of SQL - More SQL: Complex Queries, Triggers, Views, and Schema Modification - More Complex SQL Retrieval Queries - Specifying Constraints as Assertions and Actions as Triggers - Views (Virtual Tables) in SQL –Schema Change Statements in SQL

UNIT-IV:

NoSQL : The Value of Relational Databases - Impedance Mismatch - Application and Integration Databases - Attack of the Clusters - The Emergence of NoSQL - Aggregate Data Models :Aggregates - Key-Value and Document Data Models- Column-Family Stores - Summarizing Aggregate-Oriented Databases.

UNIT-V:

Details on Data Models : Relationships – Graph Databases - Schemaless Databases – Materialized Views-Modeling for Data Access – Distribution Models : Single Server – Sharding Master Slave Replication – Peer – to – Peer Replication - Combining Sharding and Replication.

REFERENCES:

1. Fundamentals of Database System By Elmasari & Navathe- Pearson Education, 7th Edition, 2017
2. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Sadalage, P. & Fowler, Wiley Publications, 1st Edition ,2019.
3. Bipin Desai, An Introduction to Database System Galgotia Publications, 1981
4. S.K. Singh Database System: concept, Design & Application, Pearson Education, 2011
5. leon & leon, Database management system, Vikas publishing House, 2009
6. Toby J. Teorey, Sam S. Lightstone, Tom Nadeau, Database Modeling and Design: Logical Design, Elsevier India Publications, 2005
7. Gillenson, Fundamentals of Database Management System, Wiley, 2008

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

Semester	Code	Title of the Course	Hours	Credits
III	24UAI3CC5	RDBMS and NoSQL	5	4

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□	□	□	□	□	□		□	□	□
CO2		□	□	□	□	□	□		□	□
CO3	□	□	□	□		□	□	□		
CO4	□		□		□	□	□	□	□	□
CO5	□	□	□	□	□		□	□	□	
Number of matches (□) = 40, Relationship: High										

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

SEMESTER – III

Course Code: 24UAI3CC5 **Exam Hours: 3**
Instruction Hours: 3 **Internal Marks: 25**
Credits: 3 **External Marks: 75**

CORE COURSE – RDBMS and NoSQL Lab

COURSE OBJECTIVES:

- To practise the relational database functions using various operations
- To write queries in SQL to retrieve any type of information from a data base.
- To be able to understand unstructured table creation and processing using NoSQL.

COURSE OUTCOMES:

Upon successful completion of this course, the students would be able:

1. To work on database queries.
2. To relate the entity relationship and join dependencies with software programs
3. Write queries on aggregate functions, subqueires.
4. Create structured and unstructured database using SQL and NoSQL
5. Able to implement various functions of NoSQL.

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

1. Write a SQL query for creating Table, and SQL queries for inserting, deleting, updating the records in Table.
2. Write SQL Queries for AND/OR/NOT operation, Union- Intersection and Minus
3. Write SQL queries for various Join Operations.
4. Write SQL query for Sorting and Grouping the records.
5. Write Nested queries, Sub queries using SQL.
6. Write a SQL program using Built-in functions.
7. Create a view and access the view using query.
8. Creation of unstructured table contents using Nosql commands

*****

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

Semester	Code		Title of the Course				Hours		Credits	
III	24UAI3CC5		RDBMS and NoSQL Lab				3		3	
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□	□	□	□	□	□		□	□	□
CO2		□	□	□	□	□	□		□	□
CO3	□	□	□	□		□	□	□		
CO4	□		□		□	□	□	□	□	□
CO5	□	□	□	□	□		□	□	□	
Number of matches (□) = 40, Relationship: High										

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

SEMESTER – III

Course Code: 24UAI3AC1 **Exam Hours: 3**
Instruction Hours: 3 **Internal Marks: 25**
Credits: 3 **External Marks: 75**

ALLIED COURSE - MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING

Unit I

Evaluation of Microprocessors – Single Chip Microcomputer Microprocessor Applications – Programming – Digital Computers – Memory – Buses – Memory addressing capacity of CPU –Processor Architecture – Intel 8085.

Unit II

Instruction set of Intel 8085 – Instruction and Data Formats – Addressing Modes – Intel 8085 Instructions: Arithmetical group, Data transfer group, Logical group, and Branch group.

Unit III

Programming of Microprocessors – Machine language – Assembly language – High level language – Assemblers – Stacks and Subroutines – System Software – Assembly language Programming –MACRO and Microprogramming.

Unit IV

Assembly language Programming - Simple examples – Addition and Subtraction of Binary and Decimal Numbers – Complements – Shift – Masking – Finding the largest and smallest numbers in an Array –Sum of a series of Numbers.

Unit V

Peripheral Devices and Interfacing – Address Space Partitioning – Memory and I/O Interfacing – Data transfer schemes – Interrupts of Intel 8085 – Interfacing memory and I/O devices – I/O ports – Programmable peripheral Interface.

Text Book:

1. Fundamentals of Microprocessors and Microcomputers – Badri Ram – Fourth Revised and Enlarged Edition – Dhanpat Rai and Sons – 1993.

Reference Book:

1. Microprocessor Architecture, Programming and Applications with the 8085 / 8080A – Romesh S.Gaonkar – Wiley Eastern – 1990

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

Semester	Code	Title of the Course				Hours		Credits		
I	24UAI3AC1	MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING				4		3		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□	□	□	□	□	□		□	□	□
CO2		□	□		□	□	□		□	□
CO3	□	□		□		□	□	□		
CO4	□				□	□	□	□	□	□
CO5	□	□	□	□	□		□	□	□	
Number of matches (□) = 37, Relationship: High										

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

SEMESTER-III

Course Code: 24UAI3AP1 **Exam Hours: 3**
Instruction Hours: 3 **Internal Marks: 25**
Credits: 3 **External Marks: 75**

ALLIED LAB - ASSEMBLY LANGUAGE PROGRAMMING LAB

List of Exercises:

1. Addition and Subtraction
    1. 8 - bit addition
    2. 8 - bit subtraction
2. Complements
    1. 1’s complement of 8 bit.
    2. 2’s complement of 8 bit
3. Multiplication and Division
    1. 8 - bit multiplication
    2. 8 - bit division
4. Code Conversion
    1. BCD to Binary
    2. Binary to BCD
5. Sum of series
6. Arrays
    1. Largest number in an array

2. Smallest number in an array.

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

Semester	Code	Title of the Course	Hours	Credits
I	24UAI3AP1	ASSEMBLY LANGUAGE PROGRAMMING LAB	3	3

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□	□	□	□	□	□		□	□	□
CO2		□	□	□	□	□	□		□	□
CO3	□	□	□	□		□	□	□		
CO4	□		□		□	□	□	□	□	□
CO5	□	□	□	□	□		□	□	□	
Number of matches (□) = 40, Relationship: High										

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

SEMESTER-III

Course Code: 24UAI3SE4 **Exam Hours:3**
Instruction Hours: 2 **Internal Marks: 25**
Credits: 2 **External Marks: 75**

MACHINE LEARNING IN EVERY DAY LIFE

Course Objectives:

- To understand the basic concepts of machine learning (ML)
- To explore how ML is used in real-life applications like healthcare, shopping, social media, etc.
- To develop basic ML models using simple tools
- To encourage ethical and responsible use of ML

Course Outcomes:

CO1: Understand the fundamental concepts of machine learning and differentiate it from traditional programming approaches.
CO2: Identify and explain various types of machine learning (supervised and unsupervised) with practical examples from daily life.
CO3: Recognize the importance of data in machine learning and describe how different types of data are collected through everyday activities.
CO4: Use beginner-friendly tools like Google Teachable Machine or Machine Learning for Kids to build simple ML models.
CO5: Analyze ethical concerns and societal impacts of machine learning, including bias, privacy, and its role in domains like healthcare and education.

Unit I: Introduction to Machine Learning

Fundamental concept of Machine Learning - How machine learning differs from traditional programming - Real-world examples - The role of machine learning in common technologies.

Unit II: Types of Machine Learning

Overview - Types of machine learning - supervised learning - examples from daily life - Email spam filters - customer sentiment analysis - Unsupervised learning - grouping similar photos - customer segmentation in marketing. - simple visual explanations.

Unit III: Data and Its Importance in ML

Data and its central role in machine learning - Different types of data such as numbers, text, images, and sounds - How data is collected from day-to-day activities - web browsing, using GPS, - interacting on social media.

Unit IV: Simple ML Tools and Applications

Google Teachable Machine - Machine Learning for Kids - Create basic models such as image classifiers or sound recognition systems -

Unit V: Ethics and Social Impact of ML

Ethical aspects and social impact of machine learning - Algorithmic bias, fairness, privacy issues, and the consequences Role of ML in healthcare and education.

Text Books

1. "Introduction to Machine Learning" by E. Alpaydin PHI Learning Pub ISBN 978-8120354460
2. "Fundamentals of AI and ML" Chandra S.S.V S. Chand Pub ISBN 978-9355010321
3. "Introduction to AI and ML" P.S. Suresh & S. Sumathi Cengage India Pub ISBN 978-9387511806

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

Semester	Code	Title of the Course				Hours		Credits		
I	24UAI3SE4	MACHINE LEARNING IN EVERY DAY LIFE				2		2		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□	□	□	□	□	□		□	□	□
CO2		□		□	□	□	□		□	□
CO3	□	□	□	□		□	□	□		
CO4	□				□	□		□		□
CO5	□	□	□	□	□		□	□	□	
Number of matches (□) = 36, Relationship: High										

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

SEMESTER-IV

Course Code: 24UAI4CC7 | **Exam Hours: 3**
Instruction Hours: 6 | **Internal Marks: 25**
Credits: 5 | **External Marks: 75**

CORE COURSE - ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES:

- To gain a basic idea of AI and AI related problem solving, inference, perception, knowledge representation, and learning.
- To know about the Heauristic search techniques and about knowledge representation in AI
- To know about Predicate Logic and about Reasoning in AI

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

- To understand the basic idea of artificial intelligence and its application areas.
- To apply basic principles of AI in solutions that requires problem solving, inference, perception, knowledge representation, and learning.
- To demonstrate awareness and a fundamental understanding of various applications of AI techniques.
- To understand about Logic programming and about Reasoning related to AI.
- To know about the different representational techniques in AI.

UNIT - I:
Artificial Intelligence: AI Problems – Underlying Assumption – AI Technique – Level of the Model – Criteria of Success – Some General References. Problems, Problem Spaces, and Search: Defining the Problem as a State Space Search – Production Systems – Problem Characteristics – Production System Characteristics – Issues in the Design of Search Programs.

UNIT – II:
Heuristic Search Techniques: Generate and Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction – Means-ends Analysis. Knowledge Representation Issues: Representations and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation – The Frame Problem.

UNIT - III:
Using Predicate Logic: Representing Simple Facts in Logic – Representing Instance and ISA Relationships – Computable Functions and Predicates – Resolution – Natural Deduction - Representating Knowledge Using Rules: Procedural Versus Declarative Knowledge – Logic Programming – Forward Versus Backward Reasoning – Matching – Control Knowledge.

UNIT - IV:
Symbolic Reasoning Under Uncertainty: Introduction to Non-monotonic Reasoning – Logics for Non-monotonic Reasoning – Implementation Issues – Augmenting a Problem-solver – Implementation Depth First Search – Implementation Breadth First Search. Statistical Reasoning: Probability and Baye's Theorem – Certainty Factors and Rule- based Systems – Bayesian Networks – Dempster-Shafer Theory – Fuzzy Logic

UNIT - V:
Semantic Nets- Frames.- Conceptual Dependency – Scripts – CYC. - Syntactic- Semantic Spectrum of Representation – Logic and Slot-and-Filler Structures – Other Representational Techniques.

REFERENCES:

1. Kevin Night, Elaine Rich, and Nair B., “Artificial Intelligence”, McGraw Hill, 2017
2. M. Tim Jones, - Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers Inc.; First Edition, 2008.
3. Nils J. Nilsson, - The Quest for Artificial Intelligence, Cambridge University Press, 2009.
4. Gerhard Welss, - Multi Agents Systems, Second Edition, 2013
5. David L. Poole and Alan K. Mackworth, - Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.
6. Dan W. Patterson, “Introduction to AI and ES”, PearsonEducation,2007

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

Semester	Code		Title of the Course			Hours		Credits		
IV	24UAI4CC7		ARTIFICIAL INTELLIGENCE			6		5		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□	□	□	□	□	□		□	□	□
CO2				□		□	□		□	□
CO3	□	□	□	□	□	□	□	□		
CO4	□		□		□	□	□	□	□	□
CO5	□	□	□	□	□		□	□	□	
Number of matches (□) = 38, Relationship: High										

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

SEMESTER-IV

Course Code: 24UAI4CC8P **Exam Hours: 3**
Instruction Hours: 4 **Internal Marks: 40**
Credits: 4 **External Marks: 60**

CORE COURSE - ARTIFICIAL INTELLIGENCE LAB

COURSE OBJECTIVES:

- To impart knowledge about the practical aspects in Artificial Intelligence related problems
- To program different AI methods using a programming language
- To know how the logical operations and reason based AI problems are used using programming

1. Write a program to implement the Hill Climbing problem
2. Write a program to implement the Towers of Hanoi problem
3. Write a program to implement the Missionaries and Cannibals problem
4. Write a program to implement the 8 queens problem
5. Write a program to implement the A* Algorithm
6. Write a program to Implement the Breadth first algorithm
7. Write a program to implement the Depth first algorithm
8. Write a program to implement the predicate logic

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

• Solve various kinds of problems using AI techniques.
• Solve basic AI based problems using any programming language.
• Understand to implement the various kinds of AI based algorithms.
• Apply AI techniques to real-world problems to develop intelligent systems.
• To understand problems related to AI.

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

Semester	Code	Title of the Course	Hours	Credits
IV	24UAI4CC8P	ARTIFICIAL INTELLIGENCE LAB	4	3

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

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

ETHICAL HACKING

Course Code: 24UVAAI3 **Exam Hours: 3**
Internal Marks: 50 **External Marks: 50**

Course Objectives:

CO1 : Upon completion of the course students will be able to Identify the risk factors in hacking. CO 2 : Work with foot printing and scanning.
CO 3 : Hack the system.
CO 4 : Work with Trojan and Backdoor tools
CO 5 : Prevent Systems from attacks

UNITI

INTRODUCTION: Introduction Ethical Hacking: Problem Definition – Need for Security – Essential Terminology – Elements of Secu0rity – Phases – Activism – Modes of Ethical Hacking – Security Testing – Computer Crimes and Implications – Perspective (US Federal Law).

UNIT II

FOOTPRINTING AND SCANNING: Defining Footprinting: Information Gathering Methodology – Unearthing Initial Information -Tool: Sam spade – Locate the Network Range – Tool: NeoTrace , VisualRoute –Scanning: Detecting 'Live' Systems On Target. Network –Tools: War Dialers, Ping Utilities –Port Scanning – Tool: ipEye, IPSecScan, NetScan Tools Pro 2003,SuperScan 3.0,NMap(NetworkMapper) – Active Stack Fingerprinting – Passive Fingerprinting - Proxy Servers – Anonymizers.

UNIT III

ENUMERATION AND SYSTEM HACKING: Introduction to Enumeration – Net Bios Null Sessions – NetBIOS Enumeration – Hacking Tool: DumpSec, NAT, - SNMP Enumeration- Hacking Tool: GetAcct -Active Directory Enumeration - AD Enumeration countermeasures – System Hacking: Administrator, Password Guessing – Performing automated password guessing – Tool: Legion, NTInfoScan – Password Sniffing-Privilege Escalation Manual Password Cracking Algorithm - Automatic Password CrackingAlgorithm - Password Types - Types of Password Attacks.

UNIT IV

TROJANS AND BACKDOORS: Trojans and Backdoors: Working of Trojans - Various Trojan Genre – Modes of Transmission – Tools: Donald Dick, SubSeven, Back Oriffice 2000, NetBus, Beast.

UNIT V

SNIFFER AND DOS ATTACKS: Introduction to sniffers - Security Concern- Tool: Ethereal, Snort,Windump, Etherpeek – Passive Sniffing - Active Sniffing - EtherFlooddsniff - ARP Spoofing – Sniffing HTTPS and SSH – Man in the Middle Attack - Macof, MailSnarf, URLSnarf, WebSpy - Mac Changer-Iris – NetIntercept – DNS Sniffing and Spoofing – Denial Of Service Attack - Types of denial of service
attacks - Distributed Denial of Service Attacks – Ping of Death –Hacking Tool: SSPing, Land Exploit,Smurf – DDOS Attack Sequence - Preventing DoS Attacks.

REFERENCE BOOKS:
1. Kimberly Graves, Certified Ethical Hacker STUDY GUIDE, Wiley publication, 2010.
2. Michael Gregg, Certified Ethical Hacker, Pearson publication, 2014.
3. Matt Walker, All-in-one Certified Ethical Hacker Exam Guide, McGraw Hill Edition, 2012.

WEB REFERENCES:
1. http://index-of.es/Hacking-Webserver/Certified_Ethical_Hacker_3.0_Official_Course.pdf
2. http://ptgmedia.pearsoncmg.com/images/9780789751270/samplepages/9780789751270.pdf
3. https://cert.eccouncil.org/images/doc/CEH-Handbook-v2.0.pdf

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

Semester	Code		Title of the Course			Hours		Credits		
III	23UVACS4		ETHICAL HACKING			2		2		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□	□	□	□	□	□		□	□	□
CO2		□	□	□	□	□	□		□	□
CO3	□	□	□	□		□	□	□		
CO4	□		□		□	□	□	□	□	□
CO5	□	□	□	□	□		□	□	□	
Number of matches (□) = 40, Relationship: High										

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

NETWORK PROGRAMMING

Course Code: 24UVAAI4 **Exam Hours: 3**
Internal Marks: 50 **External Marks: 50**

Objective:

- This course highlights the basic concepts of networking
- This helps the student to gain knowledge of various networking protocols.
- The network security is also been focused.

Unit I:
Introduction: Components of Computer (Motherboard, System Memory, Bios, Keyboard, Monitor, Serial Port, Parallel Port, Hard disk drive Modem, CDROM Drive).-Introduction to Networking-Types of Network (WAN, LAN, MAN)Peer to Peer & Client Server model- Network Topologies (BUS, STAR, Ring)- Network devices(Hub/Switch/Repeaters/Bridge/Router) - Network Cabling(Twisted Pair, Coaxial, Fiber Optic) - NIC Card.
Unit II:

Network Reference Model: ISO-OSI Model (application, presentation Session, Transport, Network Data link, Physical) -TCP/IP Model (Application, Transport, internet work, Network interface). - Basic Concept of IP Address/MAC Address/Subnet mask-PING/TRACERT.
Unit III:

Networking Protocols: Address Resolution Protocol (ARP) - Reverse Address Resolution Protocol (RARP).
Unit IV:

Transport Layer-User datagram protocol (UDP)-Transmission Control Protocol –Congestion Control – Queuing Disciplines-Congestion Avoidance mechanism (DECbit Random Early Detection (RED) Source-Based Congestion Avoidance)
Unit V:

Domain Name System (DNS) –E-mail (SMTP)-World Wide Web (HTTP)-Simple Network management protocol (SNMP)-File Transfer Protocol (FTP)-Network Security: Firewall-Encryption and Decryption.

BOOK FOR STUDY:

1. Wendell Odom, ”Introduction to CISCO Networking Technologies”, Dorling Kindersley Publishing Inc., and Pearson Education, Inc., 2006
2. Larry L. Peterson, Bruce S.Davie,”Computer Networks: A System Approach”, Third Edition, Morgan Kauffman Publishers Inc., 2003.
3. Andrew .S. Tanenbum, “Computer Networks”, Fourth Edition, 2003

REFERENCES

1. James F. Kuross, Keith W. Boss,”Computer Networking, A Top down Approach Featuring the internet”, Third Edition, Addison Wesley, may13 2004.
2. Jain S,” Data Communication and Networking”, BPB Publications .Second Edition.

3. Benhrom Frouzan, “Introduction to Data Communication”, Fourth edition 2005

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

Semester	Code	Title of the Course				Hours		Credits		
V	23UVACS5	NETWORK PROGRAMMING				2		2		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	□	□	□	□	□	□		□	□	□
CO2		□	□	□	□	□	□		□	□
CO3	□	□	□	□		□	□	□		
CO4	□		□		□	□	□	□	□	□
CO5	□	□	□	□	□		□	□	□	
Number of matches (□) = 40, Relationship: High										

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