DHANALAKSHMI SRINIVASAN
COLLEGE OF ARTS AND SCIENCE FOR WOMEN (AUTONOMOUS)
Affiliated to Bharathidasan University, Tiruchirappalli
(Nationally Re-Accredited with A++ Grade by NAAC)
Perambalur – 621212.

Bachelor of Science - Artificial Intelligence and Machine Learning

Choice Based Credit System-Learning Outcomes Based Curricu
Framework (CBCS-LOCF)

(Applicable to the candidates admitted from the academic year 2024-25 onwards)

Programme Pattern										
Sem	Part	Course	Course Title	Course Code	Ins.Hrs	Credit	Exam Hours	Marks		Total
								Internal	External	
I	I	Language Course-I	Tamil/Hindi/Arabic/French/ Sanskrit	24U1LT1/ 24U1LH1/ 24U1LA1/ 24U1LF1/ 24U1LS1	6	4	3	25	75	100
	II	English Language Course-I	English Communication-I	24U1EL1	6	4	3	25	75	100
	III	Core Course-I	Python Programming	24UAI1C1	5	4	3	25	75	100
		Core Course-II Practical	Python Programming Lab	24UAI1C2P	4	4	3	40	60	100
		Allied Course–I	Algebra and Calculus	24UAI1A1	4	3	3	25	75	100
		Allied Course–II	Probability and Statistics	24UAI1A2	3	_	_	_	_	_
	IV	Value Education	Value Education	24U1VED	2	2	3	25	75	100
		TOTAL			**30**	**21**		**165**	**435**	**600**
II	I	Language Course-II	Tamil/Hindi/Arabic/French/ Sanskrit	24U2LT2/ 24U2LH2/ 24U2LA2/ 24U2LF2/ 24U2LS2	6	4	3	25	75	100
	II	English Language Course– II	English Communication-II	24U2EL2	6	4	3	25	75	100
		Core Course-III	RDBMS and NoSQL	24UAI2C3	5	4	3	25	75	100

	III	Core Course-IV Practical	RDBMS and NoSQL Lab	24UAI2C4P	4	4	3	40	60	100
		Allied Course–II	Probability and Statistics	24UAI1A2	3	2	3	25	75	100
		Allied Course–III	Mathematics for Machine Learning	24UAI2A3	4	3	3	25	75	100
	IV	Environmental Studies	Environmental Studies	24U2EVS	2	2	3	25	75	100
		TOTAL			**30**	**23**		**190**	**510**	**700**
III	**I**	Language Course-II	Tamil/Hindi/Arabic/French/ Sanskrit	24U3LT3/ 24U3LH3/ 24U3LA3/ 24U3LF3/ 24U3LS3	6	4	3	25	75	100
	II	English Language Course– III	English through Literature	24U3EL3	6	4	3	25	75	100
	III	Core Course-V	Artificial Intelligence	24UAI3C5	6	5	3	25	75	100
		Core Course -VI Practical	Artificial Intelligence Lab	24UAI3C6P	4	4	3	40	60	100
		Allied Course–IV	Applied Physics-I	24UAI3A4	3	3	3	25	75	100
		Allied Course -V Practical	Applied Physics Lab	24UAI3A5P	3	–	–	–	–	–
	IV	Non-Major Elective – I	Basic of Computer Programmin	24UAI3N1A	2	2	3	25	75	100
			Working Principles of Internet	24UAI3N1B						
			Fundamentals of Information Technology	24UAI3N1C						
		TOTAL			**30**	**22**		**165**	**435**	**600**
IV	**I**	Language Course-IV	Tamil/Hindi/Arabic/French/ Sanskrit	24U4LT4/ 24U4LH4/ 24U4LA4/ 24U4LF4/ 24U4LS4	6	4	3	25	75	100
	II	English Language Course– IV	English for Competitive Examinations	24U4EL4	6	4	3	25	75	100
	III	Core Course–VII	Artificial Intelligence and IOT	24UAI4C7	6	5	3	25	75	100
		Core Course–VIII Practical	AI & IOT LAB	24UAI4C8P	4	4	3	40	60	100
		Allied Course -V Practical	Applied Physics Practical	24UAI3A5P	3	2	3	40	60	100
		Allied Course–VI	Applied Physics - II	24UAI4A6	3	3	3	25	75	100

	IV	Non-Major Elective-II	Scripting Languages	24UAI4N2A	2	2	3	25	75	100
			Office Automation	24UAI4N2B						
			PC Hardware and Trouble Shooting	24UAI4N2C						
TOTAL					**30**	**24**		**205**	**495**	**700**
V	**III**	Core Course–IX	Computer Vision	24UAI5C9	5	5	3	25	75	100
		Core Course–X	Open-Source Software	24UAI5C10	5	5	3	25	75	100
		Core Course–XI	Robotics	24UAI5C11	5	5	3	25	75	100
		Core Course–XII Practical	Robotics Lab	24UAI5C12P	6	4	3	40	60	100
		Major Based Elective - I	Virtual Reality and Augmented Reality	24UAI5MBE1A	4	3	3	25	75	100
			Fuzzy Logic and Neural Networks	24UAI5MBE1B						
			Randomized Algorithms	24UAI5MBE1C						
			Internship/Field Study/Industrial Visit	24UAI51S1	_	1				100
	IV	Skill Base Elective - I	Mobile Application Development	24UAI5SBE1A	3	2	3	25	75	100
			Big Data Analytics	24UAI5SBE1B						
			AIML Techniques for Cyber Security	24UAI5SBE1C						
		Soft skills	Soft Skills Development	24U5SS	2	2	3	25	75	100
		Self-Paced Learning -I (Online course)			_	2*				
TOTAL					**30**	**27**		**215**	**585**	**800**
VI	**III**	Core Course–XIII	Deep Learning	24UAI6C13	6	5	3	25	75	100
		Core Course–XIV	Machine Learning	24UAI6C14	5	5	3	25	75	100
		Core Course–XV	Machine Learning Techniques Lab	24UAI6C15P	6	4	3	40	60	100
		Major Based Elective - II	Natural LanguageProcessing	24UAI6MBE2A	5	4	3	25	75	100
			Data Visualization	24UAI6MBE2B						
			Generative AI	24UAI6MBE2C						

	IV	Project Work	Project Work	24UAI6PW	4	3	3	40	60	100
		Skill Based Elective - II	Cloud Computing	24UAI6SB	3	2	3	25	75	100
			Block Chain Technology	24UAI6SB E2B						
			Analytics for Service Industry	24UAI6SB E2C						
		Gender Studies	Gender Studies	24U6GS	1	1	3	25	75	100
		Self-Paced Learning -II (Online course)			_	**2***				
	TOTAL				**30**	**24**		**205**	**495**	**700**
I-VI	V	Extension Activities			_	1		_	_	_
TOTAL(Three Years)					**90(4*)**					**4100**

Semester	Course code	Title of the course	Hours	Credits
I	24UAI1C1	CC-I: PYTHON PROGRAMMING	5	4

Objective:

To develop programs using functions and pass arguments in Python.

To write programs using loops and decision statements in Python.

To design and program Python applications.

Unit- I **(15 Periods)**

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 **(15 Periods)**

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 **(20 Periods)**

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 **(20 Periods)**

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 **(20 Periods)**

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(s):

1. Jeeva Jose and P. Sojan Lal, “Introduction to Computing and Problem Solving with PYTHON”, Khanna Book Publishing Co, 2016.

2. Mark Summerfield. ― Programming in Python 3: A Complete introduction to the Python Language, Addison- Wesley Professional, 2009.

3. Martin C. Brown, ―PYTHON: The Complete Reference‖, McGraw- Hill,
2001 Wesley J. Chun, “Core Python Programming”, Prentice Hall
Publication, 2006.

Reference Book(s):

1. Timothy A Budd, “Exploring Python”, Tata McGraw Hill, New Delhi, 2011

2. Jake Vander Plas, “Python Data Science Handbook: Essential Tools for Working with Data”, O'Reilly Media, 2016.

3. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist, 2nd edition, Updated for Python 4, Shroff/O Reilly Publishers, 2016

4. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Course Outcomes:

CO NO	CO-STATEMENTS On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Understanding the basic concepts of computer characteristic and Representation of computer units	**K2**
CO2	Concepts of Memory management Technique and Algorithm	**K3**
CO3	Remember the program of C with its syntax and semantic	**K3**
CO4	Selection statement, Work with Looping and jump statements, do programs on Loops and jump statements	**K4**
CO5	Understand the programming principles in C (functions, structures, pointers and files)	**K4**

Relationship matrix for Course outcomes, Programme outcomes/ Programme specific outcomes .
Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
I	**24UAI1C1**	**CC-I: PYTHON PROGRAMMING**					**5**	**4**			
Couse outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	3	3	3	2	2	3	2	3	2	2.6
CO-2	3	3	2	3	2	2	3	2	3	2	2.5
CO-3	3	3	3	2	1	2	3	2	3	1	2.3
CO-4	3	3	3	3	2	3	2	3	2	2	2.6
CO-5	3	2	3	3	1	3	2	2	3	1	2.3
Mean overall score											**2.5(High)**

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Semester	Course code	Title of the course	Hours	Credits
I	24UAI1C2P	CC-II PRACTICAL: PYTHON PROGRAMMING LAB	4	4

Objective :

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

1. Write a python program that displays the following information: Your name, Full address Mobile number, College name, Course subjects**.** **(4 Periods)**

2. Write a python program to find the largest three integers using if-else and conditional operator. **(4 Periods)**

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 Periods)**

4. Write a python program to find the product of two matrices [A]mxp and [B]pxr **(4 Periods)**

5. Write recursive functions for GCD of two integers. **(4 Periods)**

6. Write recursive functions for the factorial of positive integer. **(4 Periods)**

7. Write recursive functions for Fibonacci Sequence up to given number n. **(4 Periods)**

8. Write recursive functions to display prime number from 2 to n. **(4 Periods)**

9. Write a python program that writes a series of random numbers to a file from 1 to n and display. **(4 Periods)**

10. Write a python program to sort a given sequence: String, List and Tuple. **(3 Periods)**

11. Write a python program to make a simple calculator **(3 Periods)**

12. Write a python program for Linear Search and Binary Search. **(3 Periods)**

Course Outcomes

CO NO	CO Statement On the successful completion of the course, students will be able to	Knowledge Level (K-Levels)
CO1	To recall and relate the features of python programming language	K1
CO2	To compare various programming mechanism used in python	K2
CO3	To construct simple programs in python using various language features	K3
CO4	To distinguish the various constructs used in python	K3
CO5	To apprise the application of object-oriented concept in python	K3

Relationship matrix for Course outcomes, Programme outcomes/ Programme specific outcomes Mapping with Programme Outcomes:

Semester	Course code		Title of the Course							Hours	Credits
I	24UAI1C2P		CC-II PRACTICAL : PYTHON PROGRAMMING LAB							4	4
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	3	1	3	2	2	2	1	2.2
CO-2	3	3	3	3	2	2	2	3	2	2	2.5
CO-3	3	3	3	2	1	2	3	2	3	1	2.3
CO-4	3	3	3	3	2	3	2	3	2	2	2.6
CO-5	3	2	3	3	1	2	2	2	2	1	2.1
Mean overall score											2.3(High)

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Semester	Course code	Title of the course	Hours	Credits
I	24UAI1A1	ALGEBRA AND CALCULUS	4	3

Objective:

To learn the basic concepts in the integration

UNITI **(12 Periods)**

Theory of Equations: Relation between roots & coefficients –Transformations of Equations – Diminishing, Increasing & multiplying the roots by a constant- Forming equations with the given roots

UNITII **(12 Periods)**

Matrices: Singular matrices– Inverse of a non-singular matrix using adjoint method -Rank of a Matrix – Characteristic equation, Eigenvalues, and Eigen vectors –Cayley Hamilton's Theorem (proof not needed)– problems.

UNITIII **(12 Periods)**

Differential Equations: Linear equations–Second order of types (a D ^{2}+ b D + c)

y =F (x) where a, b, c are constants and F (x) is one of the following types

(i) (ii) ( ) ( )(iii), n beingan integer(iv)()(v)

UNITIV **(12 Periods)**

Integration: Evaluation of integrals of types

$\int \frac{+}{^2++}$ $\int \frac{+}{\sqrt{^2++}}$ $\int \frac{}{+}$ $\int \frac{}{+}$

Evaluation using Integration by parts–Properties of definite integrals

UNITV **(12 Periods)**

Reduction Formulae

∫ ,n is a positive∫sin∫cos∫sin cos,m ,n being positive integer.

TEXT BOOK(S)

1. A. Singaravelu, Allied Mathematics Edition 2007, Meenakshi Agency

UNIT I	-	Chapter 3 (Page No: 3.1 – 3.35)
UNIT II	-	Chapter 2 (Page No: 2.1 – 2.31, 2.61 – 2.76, 2.83 – 2.89)
UNIT III	-	Chapter 8 (Page No: 8.41 – 8.70)
UNIT IV	-	Chapter 7 (Page No: 7.40 – 7.43, 7.47 – 7.49, 7.59 – 7.62, 7.70 – 7.74, 7.110 – 7.115)
UNIT V	-	Chapter 7 (Page No: 7.78 – 7.87, 7.101 – 7.103)

BOOKS FOR REFERENCE

1. T.K. Manickavasagam Pillai & others," Algebra,VolumeI",S.V Publication,1985 Revised Edition
2. S. Narayanan, T.K. Manicavachagam Pillai, "Calculus", I,S. Viswanathan Pvt Limited, 2003.

Course Outcomes:

CO NO	CO STATEMENTS On the Successful completion of the course the student would be able to	Cognitive Levels (K-Levels)
CO 1	Understand the importance of roots of real and complex polynomials and learn various methods of obtaining roots	K1
CO 2	Solve systems of linear equations by use of the matrix	K2
CO 3	Discuss and demonstrate the Linear Equations with constant coefficients, Complementary function and Particular integrals.	K3
CO 4	Solving technique of integrals.	K3
CO 5	Define and illustrate the concept of the Reduction formula.	K4

Relationship matrix for Course outcomes, Programme outcomes/ Programme specific outcomes

Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
I	224UAI1A1	ALGEBRA AND CALCULUS					4	3			
Couse outcomes	Programme outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

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Semester	Course code	Title of the course	Hours	Credits
II	24UAI2C3	CC- III RDBMS AND NoSQL	5	4

OBJECTIVE:

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.

UNIT-I **(20 Periods)**

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 **(20 Periods)**

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 Constraint sand Relational Database Schemas-Update Operations, Transactions, and Dealing with Constraint Violations

UNIT-III **(20 Periods)**

Basic SQL:SQL Data Definition and Data Types-Specifying Constraints in SQL-Basic Retrieval 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 **(15 Periods)**

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 **(15 Periods)**

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

Text Book:

1. Fundamentals of Database System By Elmasar & 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.SinghDatabaseSystem:concept,Design&Application,PearsonEducation, 2011

Reference Book:

1. leon&leon ,Database management system, Vikas publishing House,2009
2. To by J.Teorey, Sam S.Lightstone, Tom Nadeau, Database Modeling and Design: Logical Design, Elsevier India Publications, 2005
3. Gillenson ,Fundamentals of Database Management System,Wiley,2008

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	To know about databases and about database users.	**K1**
CO2	To understand the concept of Database system structure and the concept of Relational model.	**K2**
CO3	To know about SQL.	**K3**
CO4	To know about the Emergence of NoSQL.	**K3**
CO5	To understand about data models in NoSQL.	**K3**

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
I	24UAI2C3	CC- III RDBMS AND No SQL					5	4			
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	3	2	2	3	2	3	2	2.5
CO-2	3	3	3	3	1	2	3	3	2	1	2.4
CO-3	3	3	3	2	2	2	2	3	2	2	2.4
CO-4	3	3	3	2	1	3	2	2	1	1	2.1
CO-5	3	2	3	2	2	2	2	3	2	1	2.2
Mean overall score											2.32(High)

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Semester	Course code	Title of the course	Hours	Credits
II	24UAI2C4P	CC- IV PRACTICAL : RDBMS AND NoSQL LAB	4	4

OBJECTIVE:

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

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

COURSE OUTCOMES

CO NO	CO Statement On the successful completion of the course, students will be able to	Knowledge Level (K-Levels)
CO1	To work on database queries.	K1
CO2	To relate the entity relationship and join dependencies With software programs.	K2
CO3	Write queries on aggregate functions ,sub queries	K3
CO4	Create structured and unstructured data base using SQL and NoSQL	K3
CO5	Able to implement various functions of NoSQL.	K3

Relationship matrix for course outcomes , Programme outcome/Program specific outcomes Mapping with Programme Outcomes

Semester	Course code	Title of the Course					Hours				Credits
I	24UAI2C4P	CC- IV PRACTICAL RDBMS AND NoSQL LAB					4				4
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	3	3	2	2	3	2	3	2	2.6
CO-2	3	3	2	3	1	2	3	2	3	1	2.3
CO-3	3	2	3	3	2	2	3	2	3	2	2.5
CO-4	3	3	3	3	2	3	2	3	2	2	2.6
CO-5	3	2	3	3	1	3	2	2	3	1	2.3
Mean overall score											2.46 (High)

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Semester	Course code	Title of the course	Hours	Credits
II	24UAI1A2	PROBABILITY AND STATISTICS	3	2

OBJECTIVE:

To Learn the basic Concepts in statistics.

UNIT-I **(12 Periods)**

Probability-Definition, axiomatic approach to probability - Additive and Multiplicative laws of Probability (two variables only) and Conditional probability–simple problems

UNIT-II **(12 Periods)**

Test of significance– Definition of null hypothesis, alternative hypothesis, Type I and Type II errors, one tailed and two tailed tests. Large sample test for single mean, Difference between means, single proportion and difference between proportions.

UNIT-III **(12 Periods)**

Measures of Central Tendency - Arithmetic Mean, Median, Mode, Geometric mean, Harmonic mean.

UNIT-IV **(12 Periods)**

Measures of Dispersion- Range, Quartile Deviation, Mean Deviation, Standard Deviation ,Coefficient of variance.

UNIT-V **(12 Periods)**

Correlation: Meaning of Correlation, Limits for Correlation Coefficient - Types of Correlation, Coefficient of correlation–Karl's Pearson & Spearman's Rank Correlation.

TEXTBOOK(S)

1. Gupta.S.C & Kapoor, V.K, Fundamentals of Mathematical Statistics, Sultan Chand & sons, New Delhi -2002.

UNIT I - Chapter 3 (Sec: 3.8, 3.9.1, 3.10, 3.11)

UNIT II - Chapter 14 (Sec: 14.4, 14.4.1, 14.4.2, 14.4.4, 14.7, 14.7.1, 14.7.2)

UNIT III - Chapter 2 (Sec: 2.4 -2.9)

UNIT IV - Chapter 2 (Sec: 2.12 -2.14)

UNIT V - Chapter 10 (Sec: 10.2, 10.4, 10.7)

COURSE OUTCOMES:

CO No.	CO-STATEMENTS On the Successful completion of the course the student would be able to	Cognitive Levels (K-Levels)
CO 1	Understanding the concept of probability, definition, axiomatic approach to probability	K3
CO 2	Students learn how to apply mathematical concepts to practical and real life problems.	K4
CO 3	Categorize and evaluate various measures of central tendency.	K3
CO 4	Design and implement of measure of dispersion	K3
CO 5	Calculate correlation and regression.	K4

Relationship matrix for Course outcomes, Programme outcomes/ Programme specific outcomes Mapping with Programme Outcomes:

Semester	Course code		Title of the Course							Hours	Credits
II	24UAI1A2		PROBABILITY AND STATISTICS							3	2
Couse outcomes	Programme outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
II	24UAI2A3	MATHEMATICS FOR MACHINE LEARNING	4	3

OBJECTIVE:

To learn the concepts of graphs and time series.

UNIT- I **(12 Periods)**

Simple Regression: Regression co-efficient – Lines of Regression – Properties of Regression co–efficient -Problems.

UNIT- II **(12 Periods)**

Introduction - The Konigsberg Bridge Problem - Graphs and sub graphs - Definition and Examples - Degrees – Sub graphs - Isomorphism. –independent sets and coverings.

UNIT- III **(12 Periods)**

Matrices - Operations on Graphs - Walks, Trails and Paths – Connectedness and Components - Eulerian Graphs.

UNIT -IV **(12 Periods)**

Time series analysis – Components- Fitting a straight line by Method of Least Square- Moving Average

UNIT- V **(12 Periods)**

Index Number – Weighted and unweighted – Price index Numbers – types- Tests- Tests in index number Time and factor Reversal Test – Cost of Living index number – Aggregate Method – Family Budget Method.

TEXT BOOK(S)

1. Gupta .S.C & Kapoor, V.K, Fundamentals of Mathematical Statistics, Sultan Chand & sons, New Delhi -2002.
2. S. Arumugam and S. Ramachandran, "Invitation to Graph Theory", Sci Tech Publications (India) Pvt. Ltd., Chennai, 2006.
3. SL Aggarwal and SL Bharadwaj," Business Tools for Decision Making", Kalyan Publishers.

UNIT I - Chapter 11 of [1] (Sec: 11.2.1, 11.2.2)

UNIT II - Chapter 12 of [2] (Sec: 1.0, 1.1, 2.0 – 2.6)

UNIT III - Chapter 2, 4, 5 of [2] (Sec: 2.8, 2.9, 4.1, 4.2, 5.1)

UNIT IV - Chapter 14 of [3]

UNIT V - Chapter 10 of [3]

COURSE OUTCOMES:

CO NO	CO-STATEMENTS On the Successful completion of the course the student would be able to	Cognitive Levels (K-Levels)
CO 1	Evaluate the correlation and rank correlation	K4
CO 2	Plan and deliver the Konigsberg bridge problem	K4
CO 3	Understanding Relation between matrices and graph theory	K4
CO 4	Understanding the concept of Moving Average	K4
CO 5	Evaluate various type of index number	K3

Relationship matrix for Course outcomes, Programme outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits		
VI	24UAI2A3	MATHEMATICS FOR MACHINE LEARNING					4	3		
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)				Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	1	2	3	2	3	2	3	2	2.2
CO-4	1	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	1	3	3	2	2	3	2	2.2
Mean overall score											2.2(High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
III	24UAI3C5	CC-V ARTIFICIAL INTELLIGENCE	6	5

OBJECTIVE :

To gain a basic idea of AI and AI related problem solving, inference, perception, knowledge representation, and learning.

To know about the Heuristic search techniques and about knowledge representation in AI

To know about Predicate Logic and about Reasoning in AI

UNIT- I **(20 Periods)**

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 **(20 Periods)**

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 **(20 Periods)**

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

UNIT-IV: **(20 Periods)**

Symbolic Reasoning Under Uncertainty: Introduction to Non-monotonic Reasoni ng – 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 **(15 Periods)**

Semantic Nets- Frames. - Conceptual Dependency – Scripts – CYC. - Syntactic-SemanticSpectrumofRepresentation–LogicandSlot-and-FillerStructures– Other Representational Techniques.

TEXTBOOK(s):

1. Kevin Night, Elaine Rich, and Nair B.,"Artificial Intelligence ",Mc Graw Hill, 2017
2. M.TimJones,-Artificial Intelligence :A Systems Approach(Computer Science), Jones and Bartlett Publishers Inc.; First Edition, 2008.
3. NilsJ.Nilsson,-TheQuestforArtificialIntelligence,CambridgeUniversity Press, 2009.

REFERENCEBOOK(s):

1. Gerhard Welss,-Multi Agents Systems, Second Edition,2013
2. David L. Poole and Alan K. Mackworth, - Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.
3. DanW.Patterson,"IntroductiontoAIandES",PearsonEducation,2007

COURSE OUTCOMES

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO 1	To understand the basic idea of artificial intelligence and its application areas	**K1**
CO 2	To apply basic principles of AI in solutions that requires problem solving, inference, perception, knowledge representation, and learning.	**K2**
CO 3	To demonstrate awareness and a fundamental understanding of various applications of AI techniques.	**K3**
CO 4	To understand about Logic programming and about Reasoning related to AI.	**K3**
CO 5	To know about the different representational techniques in AI.	**K3**

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours				Credits
III	**24UAI3C5**	**CC-V ARTIFICIAL INTELLIGENCE**					**6**				**5**
Couse outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2	3	3	1	2	3	2	3	1	2.3
CO-2	3	3	3	3	2	2	3	2	3	2	2.6
CO-3	3	3	3	2	2	2	3	2	3	2	2.5
CO-4	3	3	3	2	1	3	2	3	2	1	2.3
CO-5	3	2	3	3	1	3	2	2	3	1	2.3
Mean overall score											**2.4 (High)**

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
III	24UAI3C6P	CC-VI PRACTICAL ARTIFICIAL INTELLIGENCE LAB	4	4

OBJECTIVES:

- To program different AI methods using a programming language
- To know how the logical operations and reason based AI problems are using programming

LIST OF PROGRAMS:

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

COURSE OUTCOME:

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO 1	Solve various kinds of problems using AI techniques	**K1**
CO 2	Solve basic AI based problems using any programming language	**K2**
CO 3	Understand to implement the various kinds of AI based algorithms.	**K3**
CO 4	Apply AI techniques to real-world problems to develop intelligent systems	**K3**
CO 5	To understand problems related to AI.	**K3**

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours				Credits
III	24UAI3C6P	CC-VI PRACTICAL ARTIFICIAL INTELLIGENCE LAB					4				4
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	3	1	2	3	2	3	1	2.3
CO-2	3	3	3	3	2	2	3	2	3	2	2.6
CO-3	3	3	3	2	1	2	3	2	3	1	2.3
CO-4	3	3	3	3	2	3	2	3	2	2	2.6
CO-5	3	2	3	3	2	3	2	2	3	2	2.5
Mean overall score											2.5(High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
III	24UAI3A4	ALLIED COURSE -IV APPLIED PHYSICS-1	3	3

OBJECTIVES:

- To provide knowledge on various number systems to inculcate the concepts of boolean algebra
- To make the students learn combinational circuits and flip-flops

Unit – I NUMBER SYSTEMS AND CODES:

Binary Number System – Binary To Decimal Conversion – Decimal To Binary Conversion – Binary Addition and Subtraction – Binary Subtraction By 1s And 2s Complement - Binary Multiplication and Division – Octal Numbers – Hexadecimal Numbers – Binary Codes – 8421 code - Error Detecting And Correcting codes.

Unit – II BOOLEAN ALGEBRA AND LOGIC GATES:

Boolean Algebra – Laws And Theorems – Min terms and Max terms — Demorgan's theorems. Logic gates: AND,OR,NOT,NAND,NOR and Exclusive or Gates – Exclusive NOR Gate – Positive and Negative Logic – Logic Characteristics – Bipolar Logic Families – Universal Building Blocks (UBB) – NAND Gate as UBB – NOR gate as UBB.

Unit – III K MAP TECHNIQUES:

Simplification of Boolean Expression using Karnaugh map with 2, 3 and 4 variables -Sum Of Products - AND-OR Network and product of sum - NAND and NOR Implementation — AND-OR-invert implementation – OR-AND- Invert Implementation – Don't care conditions – Overlapping Groups – Rolling the Map –Eliminating Redundant Group

UNIT – IV COMBINATIONAL LOGIC CIRCUITS:

Half and full adders – BCD Adder - Half and Full Subtractors – Multiplexers (4:1 line) – 1 to 4 line Demultiplexers – Decoders: BCD to Decimal , BCD to Seven Segment. Encoders: 4:2 line.

UNIT – V SEQUENTIAL LOGIC CIRCUITS:

Flip flops – RS flip flop – clocked RS flip flop – D flip flop – JK flip flop – T flip flop – Triggering of flip flops – Master slave flip flop – conversion of D flip flop and T flip flop – clock – counters and shift registers: counters – Asynchronous or Ripple counter – Ring counter.

Reference:

1. Principles of digital electronics, dr. K. Meena, phi learning private limited, new delhi, 2009.
2. Integrated electronics (analog and digital circuits and systems), jacob millman and christos c. Hal kias, tata mcgraw hill edition, new dehli.
3. Micro electronics, digital and analog circuit and system – jacob mill man
4. *Digital logic design*, m. Morris mano, pearson education, 2010
5. *Digital technology*, virendrakumar, new age international (p) ltd., publisher, new delhi, 2001.
6. Malvino and leach –digital principles and application, 2014
7. W.h. gothmann–digital electronics, prentice-hall of india pvt. Ltd
8. https://archive.org/details/digitalcomputerf00bart
9. https://www.pdfdrive.com/digital-computer-fundamentals-computer- architecture-e5719965.html

Course outcome:

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Solve various kinds of problems using AI techniques	**K1**
CO2	Solve basic AI based problems using any programming language	**K2**
CO3	Understand to implement the various kinds of AI based algorithms.	**K3**
CO4	Apply AI techniques to real-world problems to develop intelligent systems	**K3**
CO5	To understand problems related to AI.	**K3**

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
III	**24UAI3A4**	**ALLIED COURSE IV: APPLIED PHYSICS-1**					**3**	**3**			
Couse outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2	3	3	1	2	3	2	3	1	2.3
CO-2	3	3	3	3	2	2	3	2	3	2	2.6
CO-3	3	3	3	2	1	2	3	2	3	1	2.3
CO-4	3	3	3	3	2	3	2	3	2	2	2.6
CO-5	3	2	3	3	2	3	2	2	3	2	2.5
Mean overall score											**2.46 (High)**

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
III	24UAI3N1A	NME-I :BASIC OF COMPUTER PROGRAMMING	2	2

Objective: On completion of the course, the students will know the basics of computers and programming techniques.

UNIT 1: **(6 Periods)**

Introduction to computer: Introduction – Characteristics of computer – Generation of computers – Classification of computers–The computer system Application of Computer. **Computer Architecture** :Introduction–Central Processing Unit–Memory

UNIT 2: **(6 Periods)**

Computer Program: Introduction – Developing a program – Algorithm – Flow chart. **Computer Languages**: Introduction–evolution of programming languages Classification of programming languages.

UNIT 3: **(6 Periods)**

Computer Software: Introduction–Softwaredefinition– Relationshipbetweensoftwareandhardware –software categories – System Software–Application Software.

UNIT 4: **(6 Periods)**

Introduction to C– overview of computers and interpreters– structure of a C program – C Character set – C keyword – Constants – Variables – Data types – Types Conversion – Operators and Expressions.

UNIT5: **(6 Periods)**

Input and Output in C – Decision statements: IF, ELSE – IF, BREAK, CONTINUE, GOTO and SWITCH. Loop Control statements :FOR,WHILE,DO-WHILE.

Text Book(s):

1.Jennifer Sargunar,"Introduction to Computer Science", ITL Education Solution Limited, Pearson Education,2nd edition,2011 2..Ashok,N.Kamthane,**"**Programming with ANSI and TURBO C",Pearson Education,3rd Indian print,2003

Reference Book:

1.Balagurusamy.E**,"** Programming in C",TataMcGrawHill,4th Edition,2008.

Course Outcomes:

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	To Familiarize operating systems , programming languages, peripheral devices , networking, multimedia and internet.	K2
CO2	Develops the use of the C programming language to implement various algorithms ,an develops the basic concepts and terminology of programming in general.	K3
CO3	Write, compile and debug programs in C language and use different datatypes for writing the programs.	K2
CO4	Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming.	K3
CO5	Design programs connecting decision structures ,loops and functions.	K3

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
III	24UAI3N1A	NME-I : BASIC OF COMPUTER PROGRAMMING					2	2			
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	3	3	2	2	3	2	3	2	2.6
CO-2	3	2	3	2	1	2	3	2	3	1	2.2
CO-3	3	2	3	2	2	2	3	2	3	2	2.4
CO-4	3	2	3	3	2	3	2	3	2	2	2.5
CO-5	3	2	3	2	1	3	2	2	3	1	2.2
Mean overall score											2.4(High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
III	**24UAI3N1B**	**NME-I : WORKING PRINCIPLES OF INTERNET**	**2**	**2**

Objective: To understand the working Principles of Internet

Unit-I **(6 Periods)**

What is Internet? The Internet's underlying Architecture.

Unit-II **(6 Periods)**

Connecting to the Internet –Communicating on the Internet.

Unit-III **(6 Periods)**

How the World Wide Web works . Common Internet tools.

Unit-IV **(6 Periods)**

Multimedia on the Internet – Intranet and shopping on the Internet.

Unit-V **(6 Periods)**

Safe guarding the Internet.

Text Book: 1.How the Internet Works, Preston Gralla, Pearson Education, Eighth Edition, 2006

Reference Book: 1.Internet for Everyone, Alexis Leon, S.Chand (G/L)& Company Ltd; Second Edition

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Understand internet's underlying architecture	K2
CO2	Explain the different types of connection to internet	K3
CO3	Understand the concepts of how to create web pages and websites	K2
CO4	Explain about multimedia communication on internet	K3
CO5	Explain the process of web browser.	K3

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code		Title of the Course							Hours	Credits
III	24UAI3N1B		NME-I : WORKING PRINCIPLES OF INTERNET							2	2
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores
	PO1	PO 2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	3	3	1	2	3	2	3	1	2.4
CO-2	3	2	3	2	2	2	2	2	3	2	2.3
CO-3	3	2	3	2	1	2	3	2	3	1	2.2
CO-4	3	2	3	3	2	3	2	3	2	2	2.5
CO-5	3	2	3	2	1	3	2	2	2	1	2.1
Mean overall score											2.3(High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
III	24UAI3N1C	NME-I : FUNDAMENTALS OF INFORMATION TECHNOLOGY	2	2

Objective: To Provide the Basic Concepts in Information Technology

Unit-I **(6 Periods)**

Introduction to Computers- Generation of Computers- Classfication of Digital Computer- Anatomy of Digital Computer.

Unit-II **(6 Periods)**

CPU and Memory-Secondary Story Devices-Input Devices-Output Devices.

Unit-III **(6 Periods)**

Introduction to Computer Software- Programming Language- Operating Systems-Introduction to Database Management System.

Unit-IV **(6 Periods)**

Computer Networks-WWW and Internet-Email -Web Design

Unit-V **(6 Periods)**

Computers at Home, Education, Entertainment, Science, Medicine and Engineering-Introduction to Computer Security- Computer Viruses, Bombs, Worms.

Text Book:

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

Reference Book:

1.Fundamentals of Computers and Information Technology, M.NDoja,2005

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO 1	Understand basic concepts and terminology of information technology, digital computers	K2
CO 2	Have a basic understanding of personal computers and their operations	K3
CO 3	Understand the concepts of how to create web pages and websites	K2
CO 4	Explain about on internet email WWW concepts	K3
CO 5	Explain the information security virus and worms	K3

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
III	24UAI3N1C	NME-I : FUNDAMENTALS OF INFORMATION TECHNOLOGY					2	2			
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	3	3	2	2	3	2	3	2	2.6
CO-2	3	2	3	2	1	2	3	2	3	1	2.2
CO-3	3	2	3	2	2	2	3	2	3	2	2.4
CO-4	3	2	3	3	1	3	2	2	2	1	2.2
CO-5	3	2	3	2	2	3	2	2	3	2	2.4
Mean overall score											2.4 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
IV	24UAI4C7	CC-VII ARTIFICIAL INTELLIGENCE AND IOT	6	5

Objective:

Understand the Artificial intelligence problems tools ,

To develop the skill set to build to IoT systems and sensor interfacing

UNIT I:

Introduction: What is AI? Foundations of AI, History of AI, Agents and environments, The nature of the Environment, Problem solving Agents, Problem Formulation, Search Strategies

UNIT II:

Knowledge and Reasoning: Knowledge-based Agents, Representation, Reasoning and Logic, Prepositional logic, First-order logic, Using First-order logic, Inference in First-order logic, forward and Backward Chaining

UNIT III:

I Robotics: Introduction, Tasks, parts, effectors, Sensors, Architectures, Configuration spaces, Navigation and motion planning, Introduction to AI based programming Tools

UNIT IV:

Challenges in IoT Design challenges, Development challenges, Security challenges, Other challenges. Domain specific applications of IoT Home automation, Industry applications, Surveillance applications, Other IoT application

UNIT V:

Developing IoTs Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python

TEXT BOOKS:

1. Artificial Neural Networks B. Yagna Narayana, PHI
2. Artificial Intelligence , 2nd Edition, E.Rich and K.Knight (TMH).
3. Vijay Madisetti, Arshdeep Bahga, “Internet of Things”: A Hands-On Approach 2009.

REFERENCE BOOKS

1. Artificial Intelligence and Expert Systems - Patterson PHI.
2. Expert Systems: Principles and Programming- Fourth Edn, Giarrantana/ Riley, Thomson.
3. Stuart Russell, Peter Norvig: “Artificial Intelligence: A Modern Approach”,2nd Edition, Pearson Education, 200Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice.

Course Outcomes:

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Identify and apply suitable Intelligent agents for various AI applications	**K1**
CO2	Apply the suitable algorithms to solve AI problems	**K2**
CO3	Develop the skill set to build IoT systems and sensor interfacing.	**K3**
CO4	Design a simple IoT system comprising sensors by analyzing the requirements of IoT Application.	**K3**
CO5	Explain the concept of Internet of Things and identify the technologies that make up the internet of things	**K3**

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
IV	**24UAI4C7**	**CC-VII ARTIFICIAL INTELLIGENCE AND IOT**								**6**	**5**
Couse outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	3	3	3	2	2	3	2	3	2	2.6
CO-2	3	3	3	3	2	2	3	2	3	2	2.6
CO-3	3	3	3	2	1	2	3	2	2	1	2.2
CO-4	3	3	3	2	1	3	2	3	2	1	2.3
CO-5	3	2	3	2	2	3	2	2	3	2	2.4
Mean overall score											**2.4 (High)**

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
IV	24UAI4C8P	CC-VIII PRACTICAL : ARTIFICIAL INTELLIGENCE AND IOT LAB	4	4

Objective:

- Have understanding of Ardunio /Rasberry AI
- Remote Monitor Data and control devices

Exercises

1. Familiarization with Arduino/Rasberry Pi and perform Nessary Software Installation **(5 Periods)**

2. To Interface Led/Buzzer with Ardunino /Rasberry Piand write a Program To turn On Led For I Sec after Every 2 Seconds **(5 Periods)**

3. Write a Program using Arduino Ide for Blink Led **(5 Periods)**

4. Write a Program for RGB Led using Arduino **(5 Periods)**

5. Write a Program to Implement Missionaries-Cannibals Problems using Python **(5 Periods)**

6. Write a Program to implement A* Algorithm **(5 Periods)**

7. Implementation of TSP using heuristic approach **(5 Periods)**

8. Dice Game Simulation **(5 Periods)**

9. ON / OFF Control Based on Light Intensity **(5 Periods)**

Course Outcomes:

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	To Understand the concept of Artificial intelligence.	**K1**
CO2	To apply various search algorithms of artificial intelligence	**K2**
CO3	To apply knowledge representation and reasoning techniques.	**K3**
CO4	Interpret the impact and challenges posed by IoT networks leading to new architectural models	**K4**
CO5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in industry	**K5**

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course							Hours	Credits
IV	24UAI4C8P	CC-VIII PRACTICAL : ARTIFICIAL INTELLIGENCE AND IOT LAB							4	4
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)				Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	3	3	1	2	3	2	3	1	2.4
CO-2	3	3	2	3	2	2	3	2	3	2	2.5
CO-3	3	3	3	2	2	2	3	2	3	2	2.5
CO-4	3	3	3	3	2	3	2	3	2	2	2.6
CO-5	3	2	3	3	1	3	2	2	2	1	2.2
Mean overall score											2.4 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
IV	24UAI4A5P	ALLIED COURSE-V PRACTICAL: APPLIED PHYSICS LAB	3	2

1. Verification of Logic gates **(4 Periods)**
2. Construction of Half and Full adder **(4 Periods)**
3. Construction of Half and Full subtractor **(4 Periods)**
4. K-Map **(4 Periods)**
5. Arithmetic Logic Unit **(4 Periods)**
6. Study of Multiplexer and De-multiplexer **(4 Periods)**
7. Encoder and Decoder using diodes **(4 Periods)**
8. Flip-flops using NAND and NOR gate **(4 Periods)**
9. Shift Register **(4 Periods)**
10. Up Down Counters **(4 Periods)**
11. Ring Counter **(4 Periods)**
12. Johnson counter / Twisted ring counter **(4 Periods)**
13. NAND as UBB **(4 Periods)**
14. NOR as UBB **(4 Periods)**
15. Study of RAM **(4 Periods)**

Course Outcomes:

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Understand basic concepts word excel so students would be able to documents, spread sheets, make small presentations.	K1
CO2	Students would be able to understand about operating systems.	K2
CO3	Understand the formatting documents printing documents	K3
CO4	Explain about Excel sheet deleting inserting formatting	K4
CO5	Explain about Ms-Access planning data base, reports	K5

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code			Title of the Course					Hours	Credits
IV	24UAI4A5P			AC-V PRACTICAL:APPLIED PHYSICS LAB					3	2
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	2	2	3	2	2
CO-3	3	2	1	2	3	2	3	2	1	2	2.1
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	2	2	2	2	2	3	2	2	3	2	2.2
Mean overall score											2.14(High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
IV	24UAI4A6	ALLIED COURSE-VI : APPLIED PHYSICS-II	3	3

OBJECTIVES:

To gain the knowledge in computer and architecture**.**

To provide the knowledge in memory organization

To inculcate the knowledge in microprocessors.
To introduce the knowledge in 8085 Microprocessor

UNIT – I COMPUTER ORGANIZATION, ARCHITECTURE AND FUNCTIONS:

General Organization and Architecture of computers– Structure and function – Computer Component – Computer Function – Interconnection Structures – Bus Interconnections.

UNIT – II MEMORY ORGANIZATION:

Computer Memory System Overview – Cache Memory principles – Semiconductor Main Memory: Organization – DRAM and SRAM – Types of ROM – EPROM- EEPROM - Error Correction.

UNIT – III I/O MODULES:

External Devices - I/O Modules – Programmed I/O – Direct Memory Access – I/O Channels and Processors.

UNIT – IV INSTRUCTION SETS, PROCESSOR ORGANIZATION AND CONTROL UNIT:

Machine Instruction Characteristics – Types of operands – Addressing – Instruction formats – processor organization – Register Organization – instruction cycle. Control Unit: Micro Operations – Control of the processor.

UNIT – V PARALLEL PROCESSING:

Parallel Organization – Multiprocessor Organization – Symmetric multiprocessors – Multithreading and Chip Microprocessor – Non-uniform memory Access - Vector Computation.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

8085 Microprocessor – architecture – Instruction set – Assembly language programming using 8085 instructions

REFERENCE:

1. Computer Organization & Architecture Designing for Performance – William Stallings, Pearson Education, 2014
2. Mano M Morris, Computer System Architecture, Pearson Education; Third edition (30 June 2017)
3. Ramesh Gaonkar , Microprocessor Architecture, Programming and Applications with the 8085, Penram International Publishing; 6th edition (1 October 2013); Penram International Publishing India Pvt Ltd.
4. Computer Architecture and Organization : From 8085 to Core 2 Duo and Beyond, Subrata Ghoshal, Pearson Education, 2011
5. R. S.Gaonkar- Microprocessor Architecture, Programming, and Applications with the 8085, Penram International Publishing (India) Private Limited, Mumbai, 2007.

6. Stallings William, Computer Organization and Architecture: Designing for Performance, 8/e, Pearson; eighth edition (1 January 2010)
7. Linda Null, Jones and Bartlett, Essentials Of Computer Organization And Architecture, ISBN: 9781284123036, 2018.
8. https://www.pdfdrive.com/computer-organization-and-architecturepdf-e27948851.html
9. http://www.freebookcentre.net/ComputerScience-Books-Download/Computer-Organization-and-Architecture.html

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code			Title of the Course					Hours	Credits
IV	24UAI4A6			AC-VI : APPLIED PHYSICS-II					3	3
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	2	2	3	2	2
CO-3	3	2	1	2	3	2	3	2	1	2	2.1
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	2	2	2	2	2	3	2	2	3	2	2.2
Mean overall score											2.14(High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
IV	24UAI4N2A	NME-II: SCRIPTING LANGUAGES	2	2

Objective: To introduce the script programming paradigm.

Unit-I **(6Periods)**

Internet basics, introduction to HTML, list, creating tables, linking documents, frames ,graphics to HTML documents ,style sheet basics, adding styles to documents.

Unit-II **(6 Periods)**

Creating style sheet tools, style sheet properties, font, text, list, color and background color, box, display properties.

Unit-III **(6 Periods)**

Introduction to JavaScript, Advantages of JavaScript, JavaScript Syntax, data types, variables, arrays. Operators and Expressions, Looping constructors, functions, dialog box, JavaScript, document object model.

Unit-IV **(6 Periods)**

Introduction–objects in HTML, event handling, window object, document object, browser object, object methods, built-in objects, user defined objects, cookies.

Unit-V **(6 Periods)**

DHTML, cascading stylesheets, class, external stylesheets, working with JavaScript stylesheet.

Text Book(s):

1. Thomas Powell-HTML&CSS: The complete Reference, FifthEdition,2017 2."Mastering HTML, CSS & JavaScript "Web Publishing–LauraLemay,JenniferKymin-2016

Reference Book(s):

1.Web Developers Reference Guide by Joshua Johaman, Richard Zea,Talha Khan,PacketPublishing2016.

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	To master the theory behind scripting and its relationship to Classic programming. Understanding basic in html formatting links frames all in HTML.	K1
CO2	Understand basic concepts stylesheet style sheet properties formatting attributes To gain some fluency programming in Ruby, Java Script, Perl, Python, and related languages	K2
CO3	To express java scripts java script syntax, advantages document to Object functions	K3
CO4	Explain about objects in html event handling functions	K4
CO5	Explain about DHTMLCSS,java script functions	K5

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course							Hours	Credits
IV	24UAI4N2A	NME-II: SCRIPTING LANGUAGES							2	2
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	3	3	2	2	3	2	3	2	2.6
CO-2	3	3	2	3	1	2	3	2	3	1	2.3
CO-3	3	2	3	3	2	2	3	2	3	2	2.5
CO-4	3	3	3	3	1	3	2	3	2	1	2.4
CO-5	3	2	3	3	1	3	2	2	3	1	2.3
Mean overall score											2.4 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
IV	24UAI4N2B	NME-II: OFFICE AUTOMATION	2	2

Objective: To provide an in-depth training in use of office automation, internet and internet tools.

Unit-I **(6 Periods)**

Introduction to Computer: Definition - History & Generation of Computer) - Applications of Computer–Advantages of Computer–-Characteristics of Computer–Hardware & Software.

Unit-II **(6 Periods)**

Definition of Operating System - Functions of OS - Types of OS- Windows Desk top - GUI: Desk topic on sand their functions-Dialog Boxes-Task Bar-Parts of Windows. Linux Programming & Administration-Linux Commands and Utilities.

Unit-III **(6 Periods)**

MSWord-Working with Documents-Formatting Documents-Setting Page style-Creating Tables-Drawing-Tools-Printing Documents

Unit-IV **(6 Periods)**

MS Excel-Entering& Deleting Data- Setting Formula-Formatting Spreadsheets-Working with sheets-Chart. Printing. Using Tools.

Unit-V **(6 Periods)**

MS Access: Introduction, Planning a Database, Starting Access, Access Screen, Creating a New Database, Creating Tables, Working with Forms , Creating queries, Finding Information in Databases, Creating Reports, Types of Reports, Printing & Print Preview–Importing data from other databases. MS Power point: Introduction to presentation–Opening new presentation, Different presentation templates, Setting back grounds, Selecting presentation layouts. Creating a presentation-Setting Presentation style, Adding text to the Presentation.

Text Book(s):

1.Fundamentals of Computer-V. Rajaraman- Prentics- Hall of India.

Reference Book(s):

1.Microsoft Office 2007 Bible –John Walkenbach, Herb Tyson, Faithe Wempen, CaryN. Prague, Michael R.Groh,Peter G.Aitken, and Lisa A.Bucki-Wiley India Pvt ltd.

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Understand basic concepts word excel so students would be able to documents, spreadsheets, make small presentations.	**K1**
CO2	Students would be able to understand about operating systems.	**K2**
CO3	Understand the formatting documents printing documents	**K3**
CO4	Explain about Excel sheet deleting inserting formatting	**K4**
CO5	Explain about MS-Access planning data base, reports	**K5**

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code		Title of the Course							Hours	Credits
IV	**24UAI4N2B**		**NME-II: OFFICE AUTOMATION**							**2**	**2**
Couse outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	2	2	3	2	2
CO-3	3	2	1	2	3	2	3	2	1	2	2.1
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	2	2	2	2	2	3	2	2	3	2	2.2
Mean overall score											**2.14(High)**

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
IV	24UAI4N2C	NME-II: PC HARDWARE AND TROUBLE SHOOTING	2	2

Objective :

To identify the names, distinguishing features, and units for measuring different kinds of memory and storage devices.

Unit–I **(6 Periods)**

Introduction-Computer Organization–Number Systems and Codes–Memory–ALU–CU–Instruction prefetch – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor–Personal Computer Concepts–Advanced System Concepts–Microcomputer Concepts – OS–Multi tasking and Multiprogramming–Virtual Memory–Cache Memory.

Unit–II **(6 Periods)**

Peripheral Devices-Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices –FDD–HDD–Special Types of Disk Drives–Mouse and Track ball– Modem.

Unit–III **(6 Periods)**

PC Hardware Overview: Introduction–Hardware BIOS DOS Interaction–The PC family–PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers –Keyboard Interface–CRT Display interface–FDC–HDC.

Unit–IV **(6 Periods)**

Installation and Preventive Maintenance-Introduction–system configuration–preinstallation planning – Installation practice –routine checks – PC Assembling and integration – BIOS setup –Engineering versions and compatibility–preventive maintenance–DOS– Virus–Data Recovery.

Unit–V **(6 Periods)**

Troubleshooting-Introduction –computer faults–Nature of faults–Types of faults–Diagnostic programs and tools–Microprocessor and Firmware

Text Book(s):

1.B.Govindarajalu, “IBM PC Clones Hardware, Trouble shooting and Maintenance”,2/E,TMH,2002.

References Book(s):

1. Peter Abel, Niyaz Nizamuddin,“ IMBPC Assembly Language and Programming”, Pearson Education.
2. Scott Mueller, “Repairing PC's”, PHI,1992

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	To understand the concept Computer organization or DMA Controller number systems	K1
CO2	To explain peripherals devices, CRT monitors	K2
CO3	To introduce about bios and dos interaction pc family	K3
CO4	To explain about installation and pervasive maintenance	K4
CO5	Troubleshooting tools troubleshooting steps to solve Computer faults in a process systems	K5

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
IV	24UAI4N2C	NME-II: PC HARDWARE AND TROUBLE SHOOTING					2	2			
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	3	2	1	2	3	2	3	2	3	2	2.3
CO-4	2	2	2	2	2	3	2	3	2	2	2.2
CO-5	2	2	3	2	3	3	2	2	3	2	2.4
Mean overall score											2.2 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
V	24UAI5C9	CC-IX COMPUTER VISION	5	5

Objective:

To Introduce the students to the fundamental knowledge of computer security.

Unit-I **(20 Periods)**

Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture

Unit-II SHAPES AND REGIONS **(20 Periods)**

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments

Unit-III HOUGH TRANSFORM **(20 Periods)**

Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation.

Unit-IV 3D VISION AND MOTION **(15 Periods)**

Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline-based motion – optical flow – layered motion

Unit-V APPLICATIONS **(15 Periods)**

Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

Text Book(s):

1. D. L. Baggio et al., ―Mastering OpenCV with Practical Computer Vision Projects‖, Packt Publishing, 2012.
2. E. R. Davies, ―Computer & Machine Vision‖, Fourth Edition, Academic Press, 2012
3. Jan Erik Solem, ―Programming Computer Vision with Python: Tools and algorithms for analyzing images‖, O'Reilly Media, 2012.

Reference Book(s):

1. Mark Nixon and Alberto S. Aquado, ―Feature Extraction & Image Processing for Computer Vision‖, Third Edition, Academic Press, 2012..
2. R. Szeliski, ―Computer Vision: Algorithms and Applications‖, Springer 2011.
3. Simon J. D. Prince, ―Computer Vision: Models, Learning, and Inference‖, Cambridge University Press, 2012

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Implement fundamental image processing techniques required for computer vision	**K1**
CO2	Perform shape analysis.	**K2**
CO3	Apply Hough Transform for line, circle, and ellipse detections	**K3**
CO4	Apply 3D vision techniques	**K3**
CO5	Develop applications using computer vision techniques	**K3**

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
V	24UAI5C9	CC-IX COMPUTER VISION								5	5
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	2	2	1	2	2
CO-2	2	1	2	2	2	2	2	2	3	2	2
CO-3	3	2	1	2	3	2	3	2	2	2	2.2
CO-4	2	2	2	2	2	3	2	2	2	2	2.1
CO-5	2	2	3	2	3	3	2	2	3	2	2.4
Mean overall score											2.14 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
V	24UAI5C10	CC-X OPEN SOURCE SOFTWARE	5	5

COURSE OBJECTIVES:

- To explain the need and importance of open-source software
- To introduce the various open source software's like Linux, MySQL, PHP and Python
- To provide a built-in community that continuously modifies and improves the source code.

UNIT-I: (15 Periods)

Introductiontoopensources–Needofopensources–advantagesofopensources –application of open sources. Open source operating systems: LINUX: Introduction – general overview –Kernel mode and user mode–process–advanced concepts–scheduling–personalities–cloning–signals–development with Linux..

UNIT-II: (15 Periods)

MySQL: Introduction –setting up account –starting, terminating and writing your own SQL programs-record selection Technology – working with strings – Date and Time – sorting Query results – generating summary – working with meta data–using sequences– MySQL and Web.

UNIT-III: (15 Periods)

PHP: Introduction–programming in web environment–variables- constants–data types–operators–statements–functions–arrays–OOP–string manipulations and regular expression – file handling and data storage–PHP and SQL database–PHP and LDAP–PHP connectivity– sending and receiving E-mails–debugging and error handling– security–templates

UNIT-IV: (15 Periods)

Syntax and style– python objects – numbers – sequences–strings–lists and tuples–dictionaries–conditional loops–files–input and output–errors and exceptions–functions–modules–classes and OOP–execution environment

UNIT-V: (15 Periods)

Pearl back grounder – pearl overview–pearl parsing rules–variables and data– statements and control structures– subroutines-,packages and modules– working with files– data manipulation.

Text Book(s):

1. Remy Card, Eric and Frank Mevel ,The Linux Kernel Book, ,Wiley Publications, 2003 Unit-1: Chapters 1,2,3,4, 5
2. Steve Suchring, John, MySQL Bible, Wiley, 2002. Unit-2: Chapters 1,6,7,9,11 & 12
3. RasmusLerdorfandLevinTatroe,ProgrammingPHP,OReilly,2002
4. Unit-3:Chapters1,2,3,4,5,8,&12
5. WesleyJ.Chun,CorePythonProgramming,PrenticeHall,2001
6. Unit-4:Chapters1,2,3,4,5&7
7. MartinC.Brown,Perl:TheCompleteReference,2nd Edn,TMH,2009
8. Unit-5:Chapters1,2,5,6,7&8

Reference Book:

1. Vikram Vaswani, My SQL: The Complete Reference,2nd Edn, TMH,2009.

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	To explain common open source licenses and the impact of choosing a license.	**K1**
CO2	To explain open source project structure and how to successfully setup a project.	**K2**
CO3	To be competent with distributed software engineering tools and processes such as test-driven development, issues tracking, unit testing, code review, distributed version control, and continuous integration.	**K3**
CO4	To work on an open source project and will be expected to make a significant contribution.	**K3**
CO5	To study common open source software licenses, open source project structure, distributed team software development, and current events in the open source world.	**K3**

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
V	**24UAI5C10**	**CC-X OPEN SOURCE SOFTWARE**					**5**	**5**			
Couse outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	2	2	2	2	2	2	3	2	2.2
CO-2	2	1	2	2	2	2	3	2	2	2	2
CO-3	3	2	1	2	3	2	2	2	3	2	2.2
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	2	2	3	2	3	1	2	2	2	2	2.1
Mean overall score											**2.12 (High)**

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
V	24UAI5C11	CC-XI ROBOTICS	5	5

Objective

- To understand the functions of the basic components of a Robot.
- To study the use of various types of End of Effectors and Sensors

2. To impart knowledge in Robot Kinematics and Programming

UNIT-I: (15 Periods)

Robot - Definition - Robot Anatomy - Coordinate Systems, Work Envelope Types and Classification- Specifications-Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load- Robot Parts and their Functions-Need for Robots-Different Applications.

UNIT-II: (15 Periods)

Pneumatic Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives-D.C. Servo Motors, Stepper Motors, A.C. Servo Motors-Salient Features, Applications and Comparison of all these Drives, End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic- Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT-III: (15 Periods)

Requirements of a sensor, Principles and Applications of the following types of sensors- Position sensors - Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, pneumatic Position Sensors, Range Sensors Triangulations Principles, Structured, Lighting Approach, Time of Flight, Range Finders, Laser Range Meters, Touch Sensors ,binary Sensors., Analog Sensors, Wrist Sensors, Compliance Sensors, Slip Sensors, Camera, Frame Grabber, Sensing and Digitizing Image Data- Signal Conversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms, Applications- Inspection, Identification, Visual Serving and Navigation.

UNIT-IV: (15 Periods)

Forward Kinematics, Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Four Degrees of freedom (in 3 Dimension) Jacobians, Velocity and Forces-Manipulator Dynamics, Trajectory Generator, Manipulator Mechanism Design- Derivations and problems. Lead through Programming, Robot programming Languages-VAL Programming- Motion Commands, Sensor Commands, End Effector commands and simple Programs.

UNIT-V: (15 Periods)

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TEXT BOOK(s):

1. Klafter R.D., Chmielewski T.A and Negin M., "Robotic Engineering - An Integrated Approach", Prentice Hall, 2003. (Unit 1 : Chapter 1 & 2,Unit II: Chapter 4, Unit III: Chapter 5, Unit IV: Chapter 3 & 8, Unit V: Chapter 9)

REFERENCE BOOK(s):

1. Groover M.P., "Industrial Robotics -Technology Programming and Applications", McGraw Hill, 2001.
2. Craig J.J., "Introduction to Robotics Mechanics and Control", Pearson Education, 2008.

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Understand the fundamentals of robots.	**K1**
CO2	Know the concepts of sensors and machine vision.	**K2**
CO3	Understand navigation controls for operating robotics.	**K3**
CO4	Understand the planning and navigation of obstacle voidance	**K3**
CO5	Understand the implementation of robot economics.	**K3**

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours				Credits
V	24UAI5C11	CC-XI ROBOTICS					5				5
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	2	2	2.2
CO-2	2	1	2	2	2	2	2	2	3	2	2
CO-3	3	2	1	2	3	2	1	2	2	2	2
CO-4	2	2	2	2	2	3	2	3	2	2	2.2
CO-5	2	2	3	2	3	1	2	2	2	2	2.1
Mean overall score											2.1 (High)

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Semester	Course code	Title of the course	Hours	Credits
V	24UAI5C12P	CC-XII PRACTICAL: ROBOTICS LAB	6	4

Objective:

- To Impart Practical Training related to Artificial Intelligence and Robotics and various movements of robots through hands on training.
- Open-source platforms used to experiment the kinematics
- It helps to perform robotics tasks execution using computer vision.

List of Experiments:

1. Determination of maximum and minimum position of links. **(4 Periods)**
2. Verification of transformation (Position and orientation)with respect to gripper and world coordinate system. **(4 Periods)**
3. Estimation of accuracy, repeatability and resolution. **(4 Periods)**
4. Robot programming and simulation for pick and place. **(4 Periods)**
5. Robot programming and simulation for Colour identification. **(4 Periods)**
6. Robot programming and simulation for Shape identification. **(4 Periods)**
7. Robot programming and simulation for machining(cutting, welding). **(4 Periods)**
8. Robot programming and simulation for writing practice. **(4 Periods)**
9. Robot programming and simulation for anyi Industrial process(Packaging, Assembly) **(4 Periods)**
10. Robot programming and simulation for multiprocess. **(4 Periods)**

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Understand various graphical function for robot functioning.	K1
CO2	Gain more knowledge about robot	K2
CO3	Understand the implementation of open-source platforms.	K3
CO4	Implement the roboticst ask sexecution	K3
CO5	Implement kinematics-based experiment and know any robotic simulation software to model the different types of robots and calculate work volume for different robots	K3

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code		Title of the Course							Hours	Credits
V	24UAI5C12P		CC-XII ROBOTICS LAB							6	4
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	3	2	1	2	3	2	3	2	3	2	2.3
CO-4	2	2	2	2	2	3	2	3	2	2	2.2
CO-5	2	2	3	2	3	3	2	2	3	2	2.4
Mean overall score											2.2 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
V	24UAI5MBE1A	MBE-I : VIRTUAL REALITY AND AUGMENTED REALITY	4	3

OBJECTIVES:

- To introduce the relevance of this course to the existing technology through demonstrations, case studies and applications with a futuristic vision along with socio- economic impact and issues.
- To understand virtual reality, augmented reality and using them to build Biomedical engineering applications.
- To know the intricacies of these platform to develop PDA applications withbetter optimality.

UNIT-I: (15 Periods)

INTRODUCTION: The three I's of virtual reality-commercial VR technology and the five classic components of a VR system - Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation-interfaces and gesture interfaces- Output Devices: Graphics displays-sound displays & haptic feedback.

UNIT-II: (15 Periods)

VR DEVELOPMENT PROCESS: Geometric modeling- kinematics modeling- physical modeling - behavior modeling - model Management.

UNIT-III: (15 Periods)

CONTENT CREATION CONSIDERATIONS FOR VR: Methodology and terminology-user performance studies-VR health and safety issues-Usability of virtual reality system-cyber sickness -side effects of exposures to virtual reality environment

UNIT-IV: (15 Periods)

VR ON THE WEB & VR ON THE MOBILE: JS-pros and cons-building blocks (Web VR, WebGL, Three. js, device orientation events)-frameworks(A-frame, React VR)-Google VR for Android-Scripts, mobile device configuration, building to android-cameras and interaction-teleporting- spatial audio-Assessing human parameters-device development and drivers-Design Haptics.

UNIT-V: (15 Periods)

APPLICATIONS: Medical applications-military applications-robotics applications- Advanced Real time Tracking- other applications- games, movies, simulations, therapy.

TEXTBOOK(S):

1. C. Burdea & Philippe Coiffet, "Virtual Reality Technology", Second Edition, Gregory, John Wiley & Sons, Inc., 2008. Unit-1:Chapters1,2,3,Unit-2:Chapter5,Unit-3:Chapter7,Unit-4:Chapter 7, Unit-5: Chapter 8
2. Jason Jerald. 2015. The VR Book: Human-Centred Design for Virtual Reality. Association for Computing Machinery and Morgan & Claypool, New York, NY, USA.

REFERENCEBOOK(s):

1. 1. Augmented Reality: Principles and Practice (Usability) by Dieter Schmalstieg & Tobias Hollerer, Pearson Education(US),Addison-Wesley Educational PublishersInc,NewJersey,UnitedStates,2016.ISBN:9780321883575
2. Practical Augmented Reality: A Guide to the Technologies, Applications, and Human Factors for AR and VR (Usability),Steve Aukstakalnis, Addison-Wesley Professional; 1 edition, 2016

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Understand the basics of VR and AR	**K1**
CO2	Analyse & Design a system or process to meet given specifications with realistic engineering constraints.	**K2**
CO3	Identify problem statements and function as a member of an engineering design team.	**K2**
CO4	Utilize technical resources	**K3**
CO5	Propose technical documents and give technical or a presentations related to design mini project results.	**K3**

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
V	**24UAI5MBE1A**	**MBE-I : VIRTUAL REALITY AND AUGMENTED REALITY**								**4**	**3**
Couse outcomes	**Programme outcomes(POs)**					**Programme Specific Outcomes(PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	2	2	2	2	2	2	2	2	2	2
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	3	2	1	2	3	2	2	2	1	2	2
CO-4	2	2	2	2	2	3	2	3	2	2	2.2
CO-5	2	2	3	2	3	2	2	2	3	2	2.3
Mean overall score											**2.12 (High)**

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
V	24UAI5MBE1B	MBE-I : FUZZY LOGIC AND NEURAL NETWORKS	4	3

Objective:

To introduce the concepts of neural networks and fuzzy systems

- To explain the basic mathematical elements of the theory of fuzzy sets.
- Understand the context of neural networks and deep learning. Know how to use a neural.

UNIT-I: **(12 Periods)**

Introduction: What is a Neural Networks: -Artificial Neural Networks- Biological Neural Networks- Where are neural nets being used? -Signal Processing-Control-Pattern Recognition-Medicine-Speech Production-Speech Recognition-Business-How Are Neural Networks Used-Typical Architectures-Setting the Weights-Supervised training–unsupervised training–Fixed-weightnets-Common Activation Functions.

UNIT-II: **(12 Periods)**

Developing Neural Networks: The1940s: The Beginning of Neural Nets-The1950sand1960s: The First Golden Age of Neural Networks-The 1970s The Quiet years the 1980s Enthusiasm. When Neural Nets Began? - The McCulloch- Pitts Neuron: Architecture-Algorithm- Applications.

UNIT-III: **(12 Periods)**

Simple Neural Nets for Pattern Classification-General Discussion: Architecture Biases and Thresholds- Linear separability - Data Representation. Hebb Net: - Algorithm - Application. Perceptron – Architecture – Algorithm - Application Adaline: Architecture – Algorithm –Applications -Madeline.- Architecture-Algorithm-Applications.

UNIT-IV: **(12 Periods)**

Fuzzy Set Theory: Fuzzy versus Crisp. Crisp Sets: Operations on Crisp Sets Properties of Crisp sets-Partition and covering– Rule of Addition– Rule of Inclusion-Fuzzy Sets: Membership.

UNIT -V: **(12 Periods)**

Basic Fuzzy Set Operations-Properties of Fuzzy sets. Crisp Fuzzy Relations: Fuzzy Cartesian product-Operations on Fuzzy Relations. Fuzzy logic-Fuzzy Proposition Fuzzy Rule based System-Fuzzy logic- Defuzzification.

TEXT BOOK(S):

1. Fausett, L.V. (1993). Fundamentals of neural networks: Architectures, algorithms and applications: United States edition. Pearson. Unit I : Chapter1 Unit II : Chapters 1.5, 1.6, 1.7,Chapter2,UnitIII:Chapter2
2. 2. Rajasekaran, S., & Pai, G. A. V. (2007). Neural networks, fuzzy logic, and genetic algorithms: Synthesis and applications. New Delhi: Prentice Hall. Unit IV Chapter 6, Unit V: Chapters7

REFERENCE BOOK(S):

1. Haykin, S.S.(1994).Neural networks: A comprehensive foundation. Macmillan.4. Valluru, S.K.,& Rao, T.N.(2010).
2. Introduction to neural networks, fuzzy logic &genetic algorithms. Jaico Publishing House.

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Understand the basic concept of fuzzy sets, fuzzy logic defuzzification.	K1
CO2	Learn basics of Artificial Neural of theory and programming of Micro processors	K2
CO3	Analyze various techniques in feedback and feed Forward Neural networks.	K3
CO4	Understand the principle of competitive neural networks Adaptive resonance theory	K3
CO5	Learn the architecture and algorithm of Cognitron, Neocognitron The concepts of fuzzy associative memory and Fuzzy systems.	K3

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course	Hours	Credits
V	24UAI5MBE1B	MBE-I: FUZZY LOGIC AND NEURAL NETWORKS	4	3

Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	2	2	3	2	2.2
CO-2	2	1	2	2	2	2	3	2	3	2	2.1
CO-3	3	2	1	2	3	2	2	2	3	2	2.2
CO-4	2	2	2	2	2	3	2	3	2	2	2.2
CO-5	2	2	3	2	3	2	2	2	3	2	2.3
Mean overall score											2.2 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
V	24UAI5MBE1C	MBE-I : RANDOMIZEDALGORITHM	4	3

Objective :

To have an introduction to client server computing and to gain exposure on most common used servers, too very view the client server applications.

Unit I **(12 Periods)**

Introduction A Min-Cut Algorithm - Las Vegas and Monte Carlo- Binary Planar Partitions - A Probabilistic Recurrence-Game Tree Evaluation-The Minimax Principle

Unit II **(12 Periods)**

The Probabilistic Method: Overview of the Method-Maximum Satisfiability-Expanding Graphs-Oblivious Routing Revisited - The Lovasz Local Lemma- The Method of Conditional Probabilities- A 2- SAT Example -MarkovChains-RandomWalksonGraphs-ElectricalNetworks-CoverTimes.

Unit III **(12 Periods)**

Algebraic Techniques: Finger printing and Freivalds' Technique- Verifying Polynomial Identities-Perfect Matchings in Graphs- Verifying Equality of Strings - A Comparison of Fingerprinting Techniques – Pattern Matching- Interactive Proof Systems-PCP and Efficient Proof Verification.

Unit IV **(12 Periods)**

Geometric Algorithms and Linear Programming: Randomized Incremental Construction - Convex Hulls in the Plane- Duality - Half-space Intersections -Binary Space Partition-Random Sampling.-Linear Programming

Unit V - Graph Algorithms **(12 Periods)**

All-pairs Shortest Paths- The Min-Cut Problem- Minimum Spanning Trees - Groups and Fields-Quadratic Residues-The RSA Cryptosystem

TEXTBOOK:

1. Rajeev Motwani Stanford University Prabhakar Raghavan IBM Thomas J.Watson Research Center

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Understand the Randomized Algorithm	K1
CO2	Understand the method of Probalistic	K2
CO3	Explain the algebraic techniques	K3
CO4	Understand about algorithms	K3
CO5	Understand the Graph algorithms.	K3

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
V	24UAI5MBE1C	MBE-I : RANDOMIZEDALGORITHM								4	3
Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	2	2	2	2	2	2	2	2	2
CO-2	2	1	2	2	2	2	3	2	2	2	2
CO-3	3	2	1	2	3	2	2	2	3	2	2.2
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	2	2	3	2	3	2	2	2	3	2	2.3
Mean overall score											2.12 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
V	24UAI5SBE1A	SBE- I : MOBILE APPLICATION DEVELOPMENT	3	2

Objective:

Understand system requirements for mobile applications

Generate suitable design using specific mobile development frameworks

Implement the design using specific mobile development frameworks.

UNIT-I: INTRODUCTION: (6 Periods)

Introduction to mobile applications–Embedded systems- Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications

UNIT-II: BASICDESIGN: (6 Periods)

Introduction–Basics of embedded systems design–Embedded OS- Design constraints for mobile applications, both hardware and software related– Architecting mobile applications–user interfaces for mobile applications – touch events and gestures – Achieving quality constraints –performance, usability, security, availability and modifiability.

UNIT- III: ADVANCED DESIGN: (6 Periods)

Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment– Design patterns for mobile applications

UNIT-IV: TECHNOLOGYI – ANDROID: (6 Periods)

Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI– Persisting data using SQLite– Packaging and deployment–Interaction with server-side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

UNIT-V: TECHNOLOGYII – IOS: (6 Periods)

Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi -iPhone marketplace.

Text Book:

1. JeffMc Wherter and Scott Gowell," Professional Mobile Application Development", Wrox,2012
2. 2.Charlie Collins, Michael Galpin and Matthias Kappler,“ AndroidinPractice”,DreamTech,2012.

REFERENCEBOOKS:

1. James Dovey and AshFurrow,“ Beginning Objective C”, A press, 2012
2. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS 5.Development:ExploringtheiOSSDK”,Apress,2013.

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Describe the requirements for mobile applications	K1
CO2	Explain the challenges in mobile application design and development	K2
CO3	Develop design for Mobile applications for specific requirements	K3
CO4	Implement the design using Android SDK	K3
CO5	Implement the design using Objective Candi OS and deploy mobile applications in Android and I Pone marketplace for distribution	K3

Relationship matrix for course outcomes ,Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
V	24UAI5SBE1A	SBE- I : MOBILE APPLICATION DEVELOPMENT					3	2			
Course outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	2	2	3	2	2
CO-3	3	2	1	2	3	2	3	2	1	2	2.1
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	2	2	2	2	2	3	2	2	3	2	2.2
Mean overall score											2.14 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
V	24UIA5SBE1B	SBE-I : BIG DATA ANALYTICS	3	2

Objective:

It allows you to create, modify and print offline publications, such as brochures, flyers and newsletters.

Unit-I Introduction to Big Data (6 Periods)

Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics —Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications— Perception and Quantification of Value-Understanding Big Data Storage — A General Overview of High-Performance Architecture—HDFS—MapReduce and YARN — Map Reduce Programming Model

Unit-II Clustering and Classification (6 Periods)

Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method — Determining the Number of Clusters — Diagnostics — Reasons to Choose and Cautions. - Classification: Decision Trees — Overview of a Decision Tree — The General Algorithm— Decision Tree Algorithms—Evaluating a Decision Tree—Decision Trees in R —Naïve Bayes — Bayes Theorem—Naïve Bayes Classifier.

Unit - III (6 Periods)

Advanced Analytical Theory and Methods: Association Rules —Overview —Apriori Algorithm

— Evaluation of Candidate Rules — Applications of Association Rules — Finding Association & finding similarity — Recommendation System: Collaborative Recommendation- Content Based Recommendation—Knowledge Based Recommendation- Hybrid Recommendation Approaches. Working with Text

Unit - IV (6 Periods)

Introduction to Streams Concepts — Stream Data Model and Architecture — Stream Computing, Sampling Data in a Stream — Filtering Streams — Counting Distinct Elements in a Stream — Estimating moments — Counting oneness in a Window — Decaying Window — Real time Analytics Platform (RTAP) applications — Case Studies — Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics

Unit - V (6 Periods)

No SQL Databases: Schema-less Models? Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores — Tabular Stores — Object Data Stores — Graph Databases Hive —Sharding Hbase— Analyzing big data with twitter—Bigdata for E-Commerce Bigdata for blogs — Review of Basic Data Analytic Methods using R. Page Layout and Background.

Text Book :

1.Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, Second Edition, 2014.DTP Course Kit,Vikas Gupta, Dreamtech Press,2009

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	To understand the computational approaches to Modeling, Feature Extraction.	**K1**
CO2	To understand the various search algorithms applicable to Big Data.	**K2**
CO3	To analyze and interpret streaming data.	**K3**
CO4	To learn how to handle large data sets in main memory	**K3**
CO5	To learn the various clustering techniques applicable to Big Data.	**K3**

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
V	**24UIA5SBE1B**	**SBE-I: BIGDATA ANALYTICS**								**3**	**2**
Course outcomes	**Programme outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	3	2	3	2	2	3	2	3	2	2.5
CO-2	2	1	2	2	2	2	2	2	3	2	2
CO-3	3	2	1	2	3	2	3	2	1	2	2.1
CO-4	3	2	2	3	2	2	2	3	2	2	2.3
CO-5	2	2	2	2	2	3	2	2	3	2	2.2
Mean overall score											**2.22 (High)**

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
V	24UAI5SBE1C	SBE-I :AI ML TECHNIQUE FOR CYBER SECURITY	3	2

Objective:

To learn the basic of HTML and CSS.

To understand dynamic websites creation using web designing tags.

Unit–I **(6 Periods)**

Getting Started with HTML–Formatting Text by using Tags–using Lists and Backgrounds– Creating Hyperlinks and Anchors – Introduction to Style Sheets – Formatting Text by using Style Sheets– Formatting Paragraphs by using Stylesheets.

Unit–II **(6 Periods)**

CreatingTables–FormattingTables–CreatingUserForms-**TheBasicsofJavaScript:** OverviewofJavaScript– ObjectOrientedandJavaScript–GeneralSyntacticCharacteristics–Primitives, Operations, and Expressions.

Unit–III **(6 Periods)**

Screen Output and Keyboard Input–Control Statements–Object Creation and Modification. Java Script and XHTML Documents**:** The Java Script Execution Environment–The Document Object Model– Element Access in JavaScript.

Unit–IV **(6 Periods)**

Events and Event Handling: Handling Events from Body Elements–Handling Events from Button Elements- Handling Events from Text Box and Password Elements–The DOM2 Event Model– The Navigator Object–DOM Tree Traversal and Modification.

Unit–V **(6Periods)**

Introduction To XML**:** Introduction – The Syntax of XML – XML Document Structure – Document Type Definitions–Namespaces–XML Schemas–Displaying Raw XML-Documents– Displaying XML Documents With CSS–XSL Style Sheets –XML Processors.

TEXT BOOK(S):

1. Faithe Wempen, HTML5StepbyStep, MicrosoftPress,2011.

2. Robert W. Sebesta, Programming the World Wide Web, Pearson Education, FourthEdition,2009.

REFERENCE BOOK(S):

1. JoelSklar, Principles of Web Design: The Web Technologies Series, Fifth Edition,2011.

2. www.w3schools.com

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Understand HTML and it stags	K1
CO2	To explain the working Principle of Java Script codes	K2
CO3	Document object model, to create webforms	K3
CO4	Event Handling Mechanism	K3
CO5	Working with XML and style sheets	K3

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours				Credits
V	24UAI5SBE1C	SBE-I:AI ML TECHNIQUE FOR CYBER SECURITY					3				2
Course outcomes	Programme outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	3	3	2	3	2	2.4
CO-2	2	2	2	2	2	2	2	2	3	2	2.1
CO-3	3	2	1	2	3	2	3	2	1	2	2.1
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	3	3	3	2	2	3	3	2	3	2	2.6
Mean overall score											2.26 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
V	24U5SS	SS-I : SOFT SKILL DEVELOPMENT	2	2

Objective:

To encourage the all-round development of students by focusing on soft skills.

Unit I **(6 Periods)**

Know Thyself /Understanding Self Introduction to Soft skills - Self discovery -Developing positive attitude- Improving Perceptions-Forming values.

Unit II **(6 Periods)**

Interpersonal Skills /Understanding Others Developing interpersonal relationship- Teambuilding- group dynamics-Networking Improved work relationship.

Unit III **(6 Periods)**

Communication Skills/Communication with others Art of listening -Art of reading -Art of speaking- Art of writing-Art of writing e-mails-email etiquette.

Unit IV **(6 Periods)**

Corporate Skills / Working with Others Developing body language-Practicing etiquette and mannerism-Time management Stress management.

Unit V **(6 Periods)**

Selling Self /Job Hunting Writing resume/cv-interview skills-Group discussion -Mock interview- Mock GD–Goal setting -Career planning

TEXT BOOK(S):

1. Meena. K and V. Ayothi (2013) A Book on Development of Soft Skills (Soft Skills : A Road Map to Success),P.R. Publishers & Distributors, No, B-20&21,V.M.M.Complex,ChatiramBusStand,Tiruchirappalli-620002.
2. Alex K. (2012) Soft Skills – Know Yourself & Know the World, S. Chand & Company LTD, Ram Nagar, New Delhi-110055.Mobile No :9442514814(Dr. K.Alex)

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.	K1
CO2	Understand Interpersonal Relationship	K2
CO3	Effectively communicate through verbal/oral communication and improve the listening skills	K3
CO4	Time and stress management	K3
CO5	Develop Interview skills	K3

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course					Hours	Credits			
V	24U5SS	SS-I : SOFT SKILL DEVELOPMENT					2	2			
Couse outcomes	Programme outcomes(POs)					Programme Specific Outcomes(PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	2	2	3	2	2
CO-3	3	2	1	2	3	2	3	2	1	2	2.1
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	2	2	2	2	2	3	2	2	3	2	2.2
Mean overall score											2.14 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
VI	24UAI6C13	CC-XIII : DEEP LEARNING	6	5

Objective:

- To provide the fundamental concepts in deep learning.
- It provides the massive datasets and affordable computing, enabling new applications in computer vision and nature all an gauge processing.
- Students can able to design, implement, and train the remodels to solve real-world problems.

UNIT-I: **(20 Periods)**

The Neural Network–Limits of Traditional Computing–Machine Learning–Neuron–FF Neural Networks– Types of Neurons–Soft max output layers

UNIT-II: **(20 Periods)**

Tensorflow–Variables–Operations–Placeholders–Sessions–SharingVariables–Graphs–Visualization

UNIT-III: **(20 Periods)**

Convolution Neural Network–Feature Selection–Max Pooling– Filters and Feature Maps–Convolution Layer – Applications

UNIT-IV: **(15 Periods)**

Recurrent Neural Network –Memory cells–sequence analysis–STM—Memory augmented Neural Networks –NTM—Application.

Unit–V (15Periods)

Re enforcement Learning–MDP–Learning–Applications.

Text Book(s):

1. Nikhil Budiman icholas

2. Locascio, ―Fundamentals of Deep Learning: Designing Next Generation Machine Intelligence Algorithms‖ O'Reilly Media, 2017. Unit-1: Chapter 1, Unit-2: Chapter 3, Unit- 3: Chapters5 ,Unit-4:Chapters7,8Unit-5:Chapter9.

3. Lan Good fellow, YoshuaBengio, Aaron Courville, Deep Learning (Adaptive computation and Machine Learning series‖, MITPress,2017.

Reference Book(s):

1. Good fellow, Ian, Deep Learning, MITPress,2016.4.Gibson ,Adam, and Patterson ,Josh, Deep Learning :APrac titioner's 39Approach,O'ReillyMedia,2017.

2. Charniak, Eugene, Introduction to Deep Learning, MITPress,2019.

3. Locascio, Nicholas, and Buduma ,Nikhil, Fundamentals of Deep Learning: Designing Next- Generation Machine IntelligenceAlgorithms,O'ReillyMedia,2017.

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Understand the convolution, recurrent and other neural network architectures for deep learning.	**K1**
CO2	Implement deep learning models in Python using the Py Forch library and train them with real world datasets.	**K2**
CO3	Gain knowledge on various tools used for deep learning and its applications	**K3**
CO4	Understand their current neural networks with attention mechanisms for nature all an gauge classification, generation, and translation.	**K3**
CO5	Understand how to evaluate the performance of different deep learning models.	**K3**

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code		Title of the Course							Hours	Credits
VI	**24UAI6C13**		**CC-XIII: DEEP LEARNING**							**6**	**5**
Couse outcomes	**Programme outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	3	1	2	2	2	2	2	2	3	2	2.1
CO-3	3	2	2	2	3	2	3	2	1	2	2.2
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	3	2	3	2	2	3	2	2	3	2	2.4
Mean overall score											**2.22 (High)**

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Semester	Course code	Title of the course	Hours	Credits
VI	24UAI6C14	CC-XIV : MACHINE LEARNING	5	5

Objective:

To facilitate the basics of machine learning concepts.

- To learn building a machine learning model from the scratch
- To understand the evaluation of models.

UNIT-I: **(20 Periods)**

Introduction: Introduction, easy for human hard for machines, a simple predicting machine, classifying is not very different from predicting, training a simple classifier, one classifier is not enough, Types of machine learning, Applications of Machine Learning, Perspectives and issues in machine learning.

UNIT-II: **(20 Periods)**

Probabilistic and Stochastic Models: Bayesian Learning – Bayes theorem, Concept learning, Maximum likelihood, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, Expectation maximization and Gaussian Mixture Models, Hidden Markov models

UNIT-III: **(20 Periods)**

Supervised learning: Introduction, Regression, Linear regression, Classification: Decision trees, k-Nearest Neighbors, Support Vector Machine, Logistic regression, Random Forest. Artificial Neural Network: Introduction, Perceptron's, multi-layer networks and back propagation.

UNIT-IV: **(15 Periods)**

Unsupervised learning: Introduction, Supervised vs Unsupervised Cluster Analysis, K- means clustering, Hierarchical clustering. Dimension reduction: Principal Component Analysis, Linear Disc ruminant Analysis

UNIT -V: **(15 Periods)**

Modelling and evaluation: Building the model, training a model, evaluating a model, improving a model. Performance metrics - accuracy, precision, recall, sensitivity, specificity, AUC, RoC, Bias Variance decomposition.

Text Book(s):

1. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, ―Machine Learning, Pearson Education. (Unit1:Chapter1:.4,1.5,1.7,1.9; Unit2: Chapter 6; Unit 3: Chapter7,8,10; Unit4 Chapter9(9.1,9.4), Unit5: Chapter3;)
2. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Prentice Hall of India, Third Edition2014. (Unit2:Chapter7, Chapter15)
3. Tariq Rashid, "Make your own neural network", Create Space Independent Publishing Platform, US2016, ISBN:978- 1-5308-2660-5(Unit1, Part1)
4. Shai Shalev-Shwartz, Shai Ben-David, ― Understanding Machine Learning:From Theory to Algorithms, Cambridge University Press.
5. T. Hastie, R. Tibshirani andJ. Friedman, "Elements of Statistical Learning", Springer.

Reference Book(s):

1. CharuC. Aggarwal, "DATA CLUSTERING Algorithms and Applications", CRCPress,2014.
2. Bishop, "Pattern Recognition and Machine Learning", Springer.
3. Sebastian Raschka and Vahid Mirjalili, "Python Machine Learning", Pack Publishing, ThirdEdition,2019

Course Outcomes

CO NO	CO Statement On the successful completion of the course, students will be able to	Knowledge Level (K-Levels)
CO 1	Explain machine learning	**K1**
CO 2	Apply machine learning concepts in various domains	**K2**
CO 3	Implement supervised, unsupervised learning techniques	**K3**
CO 4	Differentiate supervised and unsupervised learning techniques	**K3**
CO 5	Create and evaluate models	**K3**

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code		Title of the Course							Hours	Credits
VI	24UAI6C14		CC-XIV: MACHINE LEARNING							5	5
Couse outcomes	Programme outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	3	2	3	2	3	2	2.4
CO-2	2	2	2	3	2	2	2	2	3	2	2.2
CO-3	3	2	3	2	3	2	3	2	1	2	2.3
CO-4	3	2	2	3	2	2	2	3	2	2	2.3
CO-5	3	2	2	2	2	3	2	2	3	2	2.3
Mean overall score											2.3 (High)

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Semester	Course code	Title of the course	Hours	Credits
VI	24UAI6C15P	CC-XV PRACTICAL: MACHINELEARNING TECHNIQUES LAB	6	4

Objectives:

Make use of Data sets in implementing the machine learning algorithms

To Impart Practical Training in Machine Learning.

It focuses on providing hands on training to implement various kinds applications using the tools.

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a.CSV file. **(5 Periods)**
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate- Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples. **(5 Periods)**

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample. **(5 Periods)**

4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate datasets. **(5 Periods)**

5. Write a program to implement the naïve Bayesian classifier for a sample training dataset stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets. **(5 Periods)**

6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes / API can be used to write the program. Calculate the accuracy, precision, and recall for your dataset. Enable participants to develop elegant and responsive Front- end by leveraging latest technologies.

Course Outcomes:

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Recall the fundamental concepts of ReactJS.	K1
CO2	Understanding the different types of Components.	K2
CO3	Discuss React Devand their components and Tools.	K3
CO4	Analyze different Synthetic Events and its Listeners.	K3
CO5	Examine the Form Elements and its input and outputs	K3

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes:

Semester	Course code	Title of the Course								Hours	Credits
VI	24UAI6C15P	CC-XV PRACTICAL :MACHINE LEARNING TECHNIQUES LAB								6	4
Couse outcomes	Programme outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	3	2	2	3	2	3	2	2.4
CO-2	3	1	2	2	2	2	2	2	3	2	2.1
CO-3	3	2	2	3	3	2	3	2	1	2	2.3
CO-4	3	2	2	2	2	2	2	3	2	2	2.2
CO-5	2	3	2	3	2	3	2	2	3	2	2.4
Mean overall score											2.3 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
VI	24UAI6MBE2A	MBE-II : NATURAL LANGUAGE PROCESSING	5	4

Objectives:

To learn the fundamentals of natural language processing

To understand the use of CFG and PCFG in NLP

UNIT- I: INTRODUCTION: (20 periods)

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM -Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.

UNIT-II: WORD LEVEL ANALYSIS: (20 periods)

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging–Hidden Markov and Maximum Entropy models.

UNIT- III: SYNTACTIC ANALYSIS: (20 periods)

Context-Free Grammars, Grammar rules for English, Tree banks, Normal Forms for grammar

– Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing –Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs -Feature structures, Unification of feature structures.

UNIT-IV: SEMANTICS AND PRAGMATICS: (15periods)

Requirements for representation, First-Order Logic, Description Logics–Syntax- Driven Semantic analysis, Semantic attachments– Word Senses, Relations between Senses, Thematic Roles, sectional restrictions– Word Sense Disambiguation, WSDusing Supervised, Dictionary& Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT-V: DISCOURSE ANALYSIS AND LEXICALRE SOURCES: (15 periods)

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Co-reference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, Prop Bank, Frame Net, Brown Corpus, British National Corpus (BNC).

TEXTBOOK(S):

1. Daniel Jura sky, James H. Martin-Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication,2014.
2. Breck Baldwin, ―Language Processing with Java and Ling Pipe Cookbook, AtlanticPublisher,2015.2. Richard MReese,―Natural Language Processing with Java‖,O_Reilly Medi a,2015.
3. Nitin Indurkhya and Fred. Damerau, ―Hand book of Natural Language.

REFERENCEBOOK(S):

1. Processing, Second Edition, Chapman and Hall/CRCPress,2010.
2. Tanveer Siddiqui, U.S. Tiwary―Natural Language Processing and Information Retrieval‖, Oxford UniversityPress,2008.
3. Steven Bird, Ewan Klein and Edward Loper, ―Natural Language Processing with Python‖, First Edition, O_ReillyMedia,2009.

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO 1	To tag a given text with basic Language features	K1
CO 2	To design an innovative application using NLP components	K2
CO 3	To implement a rule-based system to tackle morpho logy/syntax of a language	K3
CO 4	To design a tag set to be used for statistical processing for real-time applications	K3
CO 5	To compare and contrast the use of different statistical approaches for different types of NLP applications.	K3

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes

Semester	Course code		Title of the Course							Hours	Credits
VI	24UAI6MBE2A		MBE-II: NATURAL LANGUAGE PROCESSING							5	4
Couse outcomes	Programme outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	3	2	2	3	2	3	2	2.4
CO-2	2	2	2	2	2	2	2	2	3	2	2.1
CO-3	3	3	2	3	3	2	3	2	1	2	2.4
CO-4	2	2	2	3	2	2	2	3	2	2	2.2
CO-5	2	1	2	3	2	3	2	2	3	2	2.2
Mean overall score											2.3 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
VI	24UAI6MBE2B	MBE - II : DATA VISUALIZATION	5	4

Objectives:

To understand how to accurately represent voluminous complex dataset in web and from other data sources.

UNIT–II : Introduction (18 Periods)

Context of data visualization – Definition, Methodology, Visualization design objectives. Key Factors– Purpose, visualization function and tone, visualization design options–Data representation, Data Presentation, Seven stages of data visualization, widgets, data visualization tools.

UNIT-II : Visualization Data Methods (18 Periods)

Mapping - Time series - Connections and correlations – Indicator-Area chart-Pivot table-Scatter charts, Scatter maps - Tree maps, Space filling and non-space filling methods-Hierarchies and Recursion- NetworksandGraphs-DisplayingArbitraryGraphs-nodelinkgraph-Matrixrepresentationforgraphs- Infographics

UNIT-III : Visualization Data Process (18 Periods)

Acquiring data, - Where to Find Data, Tools for Acquiring Data from the Internet, Locating Files for Use with Processing, Loading Text Data, Dealing with Files and Folders, Listing Files in a Folder, Asynchronous Image Downloads, Advanced Web Techniques, using a Database, Dealing with a Large Number of Files. Parsing data - Levels of Effort, Tools for Gathering Clues, Text Is Best, Text Markup Languages, Regular Expressions (regexps), Grammarsand BNF Notation, Compressed Data, Vectors and Geometry, Binary Data Formats, Advanced Detective Work

UNIT-IV : Interactive Data Visualization (18 Periods)

Drawing with data–Scales–Axes–Updates, Transition and Motion–Interactivity-Layouts –Geo mapping–Exporting, Framework–T3,.js,tablo.

UNIT-V : Security Data Visualization (18 Periods)

Port scan visualization - Vulnerability assessment and exploitation - Firewall log visualization - Intrusion detection log visualization -Attacking and defending visualization systems – Creating security visualization system

TEXT BOOKS:

1. Scott Murray, “Interactive data visualization for the web” Oreilly Media, Inc.,2013.2. BenFry, “VisualizingData”,O‟ReillyMedia,Inc.,2007.
2. Curran, PaulJ;1985, Principles of Remote Sensing, Longman, London.

REFERENCE BOOKS:

1. Greg Conti, “Security Data Visualization: Graphical Techniques for Network Analysis”, NoStarchPressInc,2007.

Course Outcomes

CO NO	CO Statement On the Successful completion of the course the student would be able to	Knowledge Level (K-Levels)
CO1	Understand the representation of complex and voluminous data.	K1
CO2	Design and use various methodologies present in data visualization	K2
CO3	Understand the various process and tools used for Data visualization	K3
CO4	Use interactive data visualization to make inferences.	K3
CO5	Discuss the process involved and security issues present in data visualization.	K3

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes

Semester	Course code	Title of the Course					Hours	Credits			
VI	24UAI6MBE2B	MBE – II:DATA VISUALIZATION					5	4			
Couse outcomes	Programme outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	3	2	2	2	2	2	2	3	2	2.2
CO-3	3	2	1	2	3	2	3	2	1	1	2
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	2	2	2	2	3	3	2	2	3	2	2.3
Mean overall score											2.18 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
VI	21UAI6MBE2C	MBE- II : GENERATIVE AI	5	4

COURSEOBJECTIVES:

- To facilitate the basics of machine learning concepts.
- To learn building a machine learning model from the scratch
- To understand the evaluation of models.

(18 Periods)

UNIT-I:

Foundations of Generative AI Machine Learning (ML)Paradigms-Neural Networks, Architectures, Activation Functions, Optimization Techniques- Probabilistic Models, Bayesian Networks, Hidden Markov Models (HMMs)- Reasoning and Language Modelling and Transformer

UNIT-II: **(18 Periods)**

Sequential Data Modeling, Recurrent Neural Networks (RNNs), Encoder-DecoderModels- Natural Language Generation and Understanding-Multilingual Language Models, Cross-lingual learning- Conditional Language Generation, Text summarization, Question answering.

UNIT-III: Large Language Models **(18 Periods)**

Weight, Bias and Parameters of Language Models-Reasoning and Commonsense Knowledge Integration-Memory and Efficiency Optimization-Zero-shot and Few-shot Learning- Evaluation Metrics for LLMs.

UNIT-IV: Generative AI and LLM Frameworks **(18 Periods)**

Tensor flow and Pie Torch- Hugging Face – Lang Chain- Generative AI providers – Open AI, Cohere, Anthropic, LLM Flow - Code Generative Tools - Amazon Code Whisper, Open AI Codex- Open-source Tools and Resources for Generative AI

UNIT-V: Image Generative Models **(18 Periods)**

Autoencoder and its Variants - Generative Adversarial Networks (GANs)- Latent Diffusion Model- Stable Diffusion- Contrastive Language-Image Pre-Training (CLIP) - Hierarchical Text-Conditional Image Generation with CLIP Latent

TEXT BOOK(S)

1.Stefan Feuer Riegel and others published **Generative AI**

Course Outcomes

CO NO	CO Statement On the successful completion of the course, students will be able to	Knowledge Level (K-Levels)
CO1	To Understand the Generative AI	**K1**
CO2	Apply Models in Generative AI	**K2**
CO3	Implement Memory Optimization Techniques	**K3**
CO4	Understand the Framework of Generative AI	**K3**
CO5	Understand the Image Generative Models	**K3**

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes

Semester	Course code	Title of the Course								Hours	Credits
VI	21UAI6MBE2C	MBE- II : GENERATIVE AI								5	4
Couse outcomes	Programme outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	3	1	2	2	3	2	3	2	2.3
CO-2	2	1	2	3	2	2	2	2	3	2	2.1
CO-3	3	2	1	3	3	2	3	2	1	2	2.2
CO-4	3	2	3	2	2	2	2	3	2	2	2.3
CO-5	3	2	2	3	2	3	2	2	3	2	2.4
Mean overall score											2.26 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
VI	24UAI6SBE2A	SBE-II : CLOUD COMPUTING	3	2

Objective:

To learn the basics of cloud computing,

To implement the key concept of virtualization

To inculcate the knowledge of different cloud computing services and security and to apply Map-Reduce concept of applications and amazon webservices

- To understand how to migrate the applications in cloud

UNIT-I: **(6 Periods)**

Introduction-History of Cloud Computing–Characteristics of Cloud–Cloud Computing Model– Issues and Challenges for Cloud Computing–Advantages and disadvantages of Cloud Computing – Security Privacy and Trust – Virtualization – Threats to Cloud Computing – Next Generation of Cloud computing - Cloud Computing Architecture: Cloud Architecture – Cloud Computing Models – Comparisons of Models– Deployment Models – Identity as a Service.

UNIT-II: **(6 Periods)**

Virtualization – Implementation of virtualization – Virtualization Support at The OS Level – Middleware Support for Virtualization–Advantages of Virtualization– Virtualization Implementation Techniques–Hardware Virtualization-Types of Virtualizations– Load Balancing in Cloud Computing– Logical Cloud Computing Model– Virtualization for Data-Centre.

UNIT-III: **(6 Periods)**

Security Reference Architecture–Security Issues in Cloud Computing–Classification of Security issues - Types of Attacks – Security Risks in Cloud Computing – Security Threats against Cloud Computing- Emerging trends in Security and Privacy.

UNIT-IV: **(6 Periods)**

Amazon Web Services – Microsoft Azure - Google App Engine – Data Security - Privacy – Service Oriented Architecture Components–Design Principle of SOA–SOA Requirements–Benefits of SOA– Web Services.

UNIT -V: **(6 Periods)**

Motivations for Migration – Issues in Migrating the Applications to the Cloud– Types of Migration - Planning for Migrating the application to Cloud – Migration Road Map. To createpersonaland/orbusinesswebsitesfollowingcurrentprofessionaland/orindustrystandards.

Text Book:

1. "Cloud Computing" – V.K. Pachghare PHI Delhi Learning Private Limited, 2016. ISBN: 978-81-203-5213-1 [Unit– I: Chapter 1,2; Unit– II: Chapter 3; Unit – III: Chapter 5; Unit – IV: Chapter 7,9; Unit– V:Chapter10;]
2. 2. Sharma, Rishabh," Cloud Computing Fundamentals, Industry Approach and Trends", NewDelhi: JohnWiley,2017, ISBN:978-81-265-5306-8
3. 3. Chitra, D,"Grid and Cloud Computing ", D. Chitra and A. Kaliappan, Jodhpur: Scientific Publishers (India),2016, ISBN:978-93-85983-05-4DreamweaverCS4inSimpleSteps, Kogent Learning Solutions Inc, DreamtechPress,2010.

Course Outcomes

CO NO	CO Statement On the successful completion of the course, students will be able to	Knowledge Level (K-Levels)
CO1	To define cloud computing and memorize the different cloudservice and deployment models.	**K1**
CO2	To apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.	**K2**
CO3	To use and examine different cloud computing services.	**K3**
CO4	To design different workflows according to requirements and apply Map-Reduce programming model.	**K3**
CO5	To analyze the components of open stack& Google cloud platform Understand mobile cloud computing and migrating strategies for cloud applications design and develop website	**K3**

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes

Semester	Course code	Title of the Course					Hours	Credits			
VI	24UAI6SBE2A	SBE-II : CLOUD COMPUTING					3	2			
Couse outcomes	Programme outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	3	2	2.3
CO-2	2	1	2	2	2	2	2	2	3	2	2
CO-3	3	2	1	2	3	2	3	2	1	2	2.1
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	2	2	2	2	2	3	2	2	3	2	2.2
Mean overall score											2.14 (High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
VI	24UAI6SBE2B	SBE-II: BLOCKCHAIN TECHNOLOGY	3	2

Objective:

UNIT-I: (6 Periods)

Introduction Of Cryptography And Blockchain What is Blockchain, Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions and Blocks,P2P Systems, Keys as Identity, Digital Signatures, Hashing, and public key cryptosystems, private kevs. Public Blockchain.

UNIT-II: (6 Periods)

What is Bitcoin, The Bitcoin Network, he Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM),Merkle Tree, Double-Spend Problem, Blockchain and Digital Currency, Transactional Blocks, Impact of Blockchain Technology on Cryptocurrency.

UNIT-III: (6 Periods)

What is Ethereum, Introduction to Ethereum, Consensus Mechanisms, Meta mask Setup, Ethereum Accounts, Transactions, Receiving Ethers, Smart Contracts.

UNIT-IV: (6 Periods)

What is Hyperledger? Distributed Ledger Technology & its Challenges, Hyperledger & Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer. Solidity-Language of Smart Contracts, Installing Solidity& Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File& Structure of Smart Contracts, General Value Types.

UNIT -V: (6 Periods)

Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins.

Text Book(s):

1. Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained”, Second Edition, PacktPublishing,2018.
2. Narayanan, J. Bonneau ,E. Felten, A. Miller, S. Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction” Princeton University Press,2016
3. Antonopoulos, Mastering Bitcoin, O’Reilly Publishing,2014.

Reference Book(s):

1. Antonopoulos and G.Wood,“ Mastering Ethereum: Building Smart Contracts and D apps” O’Reilly Publishing,2018.
2. Drescher, Blockchain Basics.Apress,2017.

Course Outcomes

CO NO	CO Statement On the successful completion of the course, students will be able to	Knowledge Level (K-Levels)
CO1	This course is intended to study the basics of Blockchain technology.	**K1**
CO2	During this course the learner will explore various aspects of Blockchain technology like application in various domains.	**K2**
CO3	By implementing, learners will have idea about private and public Blockchain, and smart contract.	**K3**
CO4	Understand the concepts of Hyper Ledger	**K3**
CO5	Understand the concepts of IoT	**K3**

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes

Semester	Course code	Title of the Course								Hours	Credits
VI	24UAI6SBE2B	SBE-II : BLOCK CHAIN TECHNOLOGY								3	2
Couse outcomes	Programme outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	2	2	2	2	3	2	3	2	2.2
CO-2	2	1	2	2	2	2	2	2	3	2	2
CO-3	3	2	1	3	3	2	3	2	1	2	2.2
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	2	2	2	2	2	3	2	3	3	2	2.3
Mean overall score											2.16(High)

PREPARED BY **VERIFIED BY** **HOD**

Semester	Course code	Title of the course	Hours	Credits
VI	24UAI6SBE2C	SBE-II : ANALYTICSFOR SERVICE INDUSTRY	3	2

Objectives: To understand about the service industry analytics.

UNIT-I: **(6 Periods)**

Healthcare Analytics: Introduction to Healthcare Data Analytics Electronic Health Records– Components of EHR-Coding Systems Benefits of EHR-Barrier to Adopting HER Challenges- Phenotyping Algorithms. Biomedical Image Analysis and Signal Analysis-Genomic Data Analysis for Personalized Medicine. Review of Clinical Prediction Models

UNIT-II: **(6 Periods)**

Healthcare Analytics Applications: Applications and Practical Systems for Healthcare– Data Analytics for Pervasive Health-Fraud Detection in Healthcare- Data Analytics for Pharmaceutical Discoveries-Clinical Decision Support Systems-Computer- Assisted Medical Image Analysis Systems- Mobile Imaging and Analytics for Biomedical Data.

UNIT-III: **(6 Periods)**

HR Analytics: Evolution of HR Analytics, HR information systems and data sources, HR Metric and HR Analytics, Evolution of HR Analytics; HR Metrics and HR Analytics; Intuition versus analytical thinking; HRMS/HRIS and data sources; Analytics frameworks LAMP, HCM:21(r)Model.

UNIT-IV: **(6 Periods)**

Performance Analysis: Predicting employee performance, training requirements, evaluating training and development, Optimizing selection and promotion decisions.

UNIT-V: **(6 Periods)**

Tourism and Hospitality Analytics: Guest Analytics–Loyalty Analytics–Customer Satisfaction –Dynamic Pricing –optimized disruption management–Fraud detection in payments.

TEXTBOOK:

1. Chandan K. Reddy and Charu C Aggarwal, "Healthcare data analytics", Taylor &Francis,2015.
2. Edwards Martin R, Edwards Kirsten (2016),"Predictive HR Analytics: Mastering the HR Metric", Kogan Page Publishers.
3. "The new HR analytics: predicting the economic value of your company human capital investments", AMACOM, ISBN-13:978-0-8144-1643-34RajendraSahu, Manoj Dash and AnilKumar. Applying Predictive AnalyticsWithinthe Service Sector.

REFERENCES:

1. Hui Yang and EvaK.Lee, "Healthcare Analytics: From Data to Knowledge to Healthcare Improvement, Wiley,2016
2. Fitz-enzJac, MattoxII John (2014), "Predictive Analytics for Human Resources", Wiley, ISBN- 1118940709.WebResource

Course Outcomes

CO NO	CO Statement On the successful completion of the course, students will be able to	Knowledge Level (K-Levels)
CO1	Identify importance of the social media marketing for marketing success	**K1**
CO2	Use principles of consumer and social psychology to develop Social media content and campaigns that engage consumers	**K2**
CO3	Measure the impact of a social media campaign in terms of a Specific marketing objective.	**K3**
CO4	Demonstrate to create a blog and a social media marketing plan for a new productor service.	**K3**
CO5	Draw on knowledge about word-of-mouth marketing to develop Effective approaches for propagating ideas, messages, products, and behaviors across social networks	**K3**

Relationship matrix for course outcomes,Programme outcome/Program specific outcomes Mapping with Programme Outcomes

Semester	Course code	Title of the Course					Hours				Credits
VI	**24UAI6SBE2C**	**SBE-II : ANALYTICS FOR SERVICE INDUSTRY**					**3**				**2**
Couse outcomes	**Programme outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	3	2	2	2	2	3	2	3	2	2.4
CO-2	3	3	2	2	2	2	2	2	2	2	2.2
CO-3	3	2	1	3	2	2	3	2	1	2	2.1
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	2	3	2	2	2	3	2	2	3	2	2.3
Mean overall score											**2.22(High)**

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Semester	Course code	Title of the course	Hours	Credits
VI	24U6GS	GS-II : GENDER STUDIES	1	1

Objectives:

To make boys and girls aware of each other's strengths and Weakness.

To develop sensitivity towards both genders in order to lead an ethically enriched life.

To promote attitudinal change towards a gender balanced ambience and women empowerment.

Unit–I **(4 Periods)**

Concepts of Gender: Sex – Gender – Biological Determinism – Patriarchy – Feminism – Gender Discrimination–Gender Division of labor–Gender Stereotyping–Gender Sensitivity– Gender Equity–Equality–Gender Main streaming-Empowerment.

Unit–II **(4 Periods)**

Women's Studies vs Gender Studies: UGC's Guidelines – VII to XI Plans – Gender Studies: Beijing Conference and CEDAW–Exclusiveness and Inclusiveness.

Unit–III **(4 Periods)**

Areas of Gender Discrimination: Family – Sex Ratio – Literacy – Health – Governance – Religion Work Vs Employment – Market – Media – Politics – Law – Domestic Violence – Sexual Harassment– State Policies and Planning.

Unit–IV **(4 Periods)**

Women Development and Gender Empowerment: Initiatives–International Women's Decade

– International Women's Year – National Policy for Empowerment of Women – Women Empowerment Year2001–Mainstreaming Global Policies.

Unit–V **(4 Periods)**

Women's Movements and Safeguarding Mechanism: In India National/State Commission for Women (NCW)All Women Police Station – Family Court – Domestic Violence Act – Prevention of Sexual Harassment at Work Place Supreme Court Guidelines–Maternity Benefit Act – PNDT Act – Hindu Succession Act 2005 – Eve Teasing Prevention Act – Self Help Groups – 73rd and 74th Amendment for PRIS.

REFERENCE BOOK(S):

1. Bhasin Kamala, Understanding Gender: Gender Basics, New Delhi: Women Unlimited ,2004

2. Bhasin Kamala, Exploring Masculinity: Gender Basics, New Delhi: Women Unlimited,2004

3. Bhas in Kamala, What is Patriarchy? Gender Basics, New Delhi: Women Unlimited,1993

Course Outcomes

CO NO	CO Statement On the successful completion of the course, students will be able to	Knowledge Level (K-Levels)
CO1	Identify and analyze the links among gender, sexuality, identity, power, and Social justice	**K1**
CO2	Identify and analyze intersections among gender	**K2**
CO3	Understand and Analyze forces shaping individual experiences as well as social structure and institutions such as the family, workplace, and media	**K3**
CO4	Understand Women Development and Gender Empowerment	**K3**
CO5	Women's Safeguarding Mechanism	**K3**

Relationship matrix for course outcomes, Programme outcome/Program specific outcomes Mapping with Programme Outcomes

Semester	Course code	Title of the Course								Hours	Credits
VI	24U6GS	GENDER STUDIES								1	1
Couse outcomes	Programme outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	2	2	3	2	1	2	2.1
CO-2	2	3	2	2	2	2	2	2	2	2	2.1
CO-3	3	2	1	2	2	2	2	2	2	2	2
CO-4	2	2	2	2	2	2	2	3	2	2	2.1
CO-5	2	2	2	2	2	3	2	2	3	2	2.2
Mean overall score											2.1 (High)

PREPARED BY **VERIFIED BY** **HOD**