D.K.M COLLEGE FOR WOMEN

VELLORE-1

(AUTONOMOUS)

B.Sc Artificial Intelligence

SYLLABUS

Under

CHOICE BASED CREDIT SYSTEM (CBCS)

[With effect from the year 2023 – 2024]

D.K.M. COLLEGE FOR WOMEN (AUTONOMOUS)
DEPARTMENT OF ARTIFICIAL INTELLIGENCE

PROGRAMME EDUCATIONAL OBJECTIVES

PEO1: Graduates will have skills and knowledge to excel in their professional career in Artificial Intelligence and its related disciplines.

PEO2: Graduates will be ethically and socially responsible solution providers in Artificial Intelligence and successfully pursue higher education in reputed institutions.

PROGRAMME OUTCOME

PO1: Problem Analysis: To identify, formulate and analyze complex Artificial Intelligence and Computer Applications problems in the areas of hardware, software, theoretical Computer Science to reach significant conclusions by applying Mathematics, Natural sciences, Accounts, Computer Science and Applications principles.

PO2: Design & Development of Solutions: To design and build a system, component, process or a program for complex problems by factoring in all the requirements and various design tradeoffs, with appropriate consideration for the public health and safety, cultural, social and environmental factors

PO3: Modern Tool Usage: To create, select and apply state of the art tools and techniques in designing, developing and testing a computing system or its component.

PO4: Ethics: To apply professional ethics and cyber regulations, responsibilities and pledge to the norms of professional computing practice.

PO5:Environment and Sustainability: To demonstrate the knowledge of sustainable development of computing systems/products/solutions with an understanding of the impact of these solutions on the Society and Environment.

PO6: Life – long Learning: To spot the need for and engage in lifelong learning to cope up with the rapidly evolving disciplines of Computer Science and applications domains.

D.K.M COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE – 1

DEPARTMENT OF B.Sc., Artificial Intelligence

with effect from 2023 – 2024 CBCS

PATTERN

The course of study and scheme of Examination SEMESTER I

SEMESTER -1									
SNO	PART	COURSE TITLE	PAPER	INS/ HRS	CREDIT	TITLE OF THE PAPER	CIA	UNI. EXAM	TOTAL
1	I	Language	Paper – 1	7	4	Language	25	75	100
2	II	English	Paper – 1	6	4	Foundation English – I	25	75	100
3	III	Core(T)	Paper – 1	7	4	Problem Solving and Python Programming	25	75	100
4	III	Core Practical	Practical 1	3	3	Practical I - Problem Solving and Python Programming Lab	40	60	100
5	III	Allied	Paper – 1	6	5	Mathematics for Machine Learning	25	75	100
6	IV	EVS		2	2	EVS	25	75	100
		TOTAL		30	22		165	435	600

SEMESTER II									
SNO	PART	COURSE TITLE	PAPER	INS/ HRS	CREDIT	TITLE OF THE PAPER	CIA	UNI. EXAM	TOTAL
7	I	Language	Paper – 2	6	4	Language	25	75	100
8	II	English	Paper – 2	4	4	Foundation English – II	25	75	100
9	III	Core(T)	Paper – 2	6	4	Java Programming	25	75	100
10	III	Core practical	Practical –2	3	3	Java Programming Practical II	40	60	100
11	III	Allied	Paper – 2	6	5	Operations Research	25	75	100
12	III	VE		3	2	VE	–	50	50
13	IV	Soft skill		2	1	Soft skill for Linguistic Communication	–	50	50
		TOTAL		30	23		140	460	600

SEMESTER III

SNO	PART	COURSE TITLE	PAPER	INS/ HRS	CREDIT	TITLE OF THE PAPER	CIA	UNI. EXAM	TOTAL
14	I	Language	Paper –3	6	4	Language	25	75	100
15	II	English	Paper –3	6	4	Foundation English – III	25	75	100
16	III	Core(T)	Paper –3	5	4	Fundamentals of Tensor Flow	25	75	100
17	III	Core Practical	Practical-3	3	3	Fundamentals of Tensor Flow Lab	40	60	100
18	III	Allied	Paper – 3	6	5	Statistical Methods and their applications-I	25	75	100
19	IV	Skilled Based	Practical-1	2	2	Open-Source Software	–	50	50
20	IV	Non major	Paper –1	2	2	1. Introduction to Information Technology	–	50	50
		TOTAL		30	24		140	460	600

SEMESTER –IV

SNO	PART	COURSE TITLE	PAPER	INS/ HRS	CREDIT	TITLE OF THE PAPER	CIA	UNI. EXAM	TOTAL
21	I	Language	Paper – 4	6	4	Language	25	75	100
22	II	English	Paper – 4	6	4	Foundation English –IV	25	75	100
23	III	Core(T)	Paper – 4	5	4	Cloud Computing	25	75	100
24	III	Core practical	Practical – 4	3	3	Cloud Computing Lab	40	60	100
25	III	Allied	Paper – 4	6	5	Statistical Methods and their applications-II	25	75	100
26	III	Skill based	Practical – 2	2	2	Microprocessor	–	50	50
27	IV	Non – Major	Paper – 2	2	2	Internet and its Applications	–	50	50
		TOTAL		30	24		140	460	600

Internship Training Program during summer vocation with an extra credit = 3

SEMESTER – V

SNO	PART	COURSE TITLE	PAPER	INS/ HRS	CREDIT	TITLE OF THE PAPER	CIA	UNI. EXAM	TOTAL
28	III	Core (T)	Paper – 5	6	4	Principles of Robotics	25	75	100
29	III	Core (T)	Paper – 6	6	4	Relational Database Management System	25	75	100
30	III	Core	Practical –	3	3	Robotics Laboratory	40	60	100
31	III	Core	Practical –	3	3	Relational Database Management System Lab	40	60	100
32	III	Elective – I	Paper – 1	5	3	1. Data Communication and Network 2. wireless sensor network	25	75	100
33	III	Elective – II	Paper – 1	5	3	1. Datamining and data warehousing 2. Digital Image Processing	25	75	100
34	IV	Skill Based	Practical – 3	2	2	R Programming Lab	–	50	50
		TOTAL		30	22		180	470	650

SEMESTER –VI

SNO	PART	COURSE TITLE	PAPER	INS/ HRS	CREDIT	TITLE OF THE PAPER	CIA	UNI. EXAM	TOTAL
35	III	Core (T)	Paper – 7	6	4	Artificial intelligence and Machine Learning	25	75	100
36	III	Core (T)	Paper – 8	6	4	Natural Language Processing	25	75	100
37	III	Core	Practical –	3	3	Artificial Intelligence and Machine Learning using MATLAB Programming Lab	40	60	100
38	III	Core practical	Practical – 8	3	3	Natural Language Processing Lab	40	60	100
39	III	Elective III	Paper – 1 Paper 2	5	3	1. Ethical Hacking 2. Artificial Intelligence and Knowledge Representation	25	75	100
40	III	Elective IV	Paper – 1 Paper -2	5	3	1. Internet of Things 2. Cyber security	25	75	100
41	IV	Skill Based *Project based learning	Practical – 4	2	2	Multimedia *Project based learning	–	50	50
42		Extension activity		–	3		100	–	100
		TOTAL		30	25		280	470	750
Mini Project during summer vocation with an extra credit = 3									

TOTAL CREDITS

B.Sc [Artificial Intelligence]

PART	SUBJECT	PAPERS	CREDIT	TOTAL CREDITS	MARKS	TOTAL MARKS
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied	4	5	20	100	400
Part III	Elective	4	3	12	100	400
Part III	Core	8	4	32	100	800
Part III	Core Practical	8	3	24	100	800
Part IV	EVS	1	2	2	100	100
Part IV	Value Education	1	2	2	50	50
Part IV	Skill Based (Practical 4)	4	2	8	50	200
Part IV	Non - Major	2	2	4	50	100
Part IV	Soft Skill	1	1	1	50	50
Part V	Extension Activities	-	3	3	100	100
	Total	**41**		**140**		**3800**

TOPICS IN CORE COURSE COMPONENTS

S.No	Semester	Subjects
1.	**Semester -I**	Problem Solving and Python Programming
2.		Problem Solving and Python Programming Lab
3.	**Semester -II**	Java Programming
4.		Java Programming Lab
5.	**Semester -III**	Fundamentals of Tensor flow (P)
6.		Fundamentals of Tensor flow Lab (P)
7.	**Semester -IV**	Cloud Computing
8.		Cloud Computing Lab
9.	**Semester -V**	Principles of Robotics
10.		Principles of Robotics LAB
11.		Relational Database Management System
12.		Relational Database Management System Lab
13.	**Semester -VI**	Artificial intelligence and Machine Learning
14.		Artificial intelligence and Machine Learning LAB
15.		Natural LanguageProcessing
16.		Natural LanguageProcessing Lab

Problem solving and Python Programming

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
I		Core Paper – 1	7	105	7	105	-	-	4

COURSE OBJECTIVE

1. To understand the basics of algorithmic problem solving.
2. To learn to solve problems using Python conditionals and loops.
3. To define Python functions and use function calls to solve problems.
4. To use Python data structures – lists, tuples, dictionaries to represent complex data.
5. To do input/output with files in Python.

COURSE OUTCOME

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level (K1 – K4)
CO1	Develop algorithmic solutions to simple computational problems.	K2
CO2	Develop and execute simple Python programs. Write simple Python programs using conditionals and looping for solving problems.	K3
CO3	Decompose a Python program into functions.	K1
CO4	Represent compound data using Python lists, tuples, dictionaries etc. Develop algorithmic solutions to simple computational problems.	K2
CO5	Develop and execute simple Python programs and Read and write data from/to files in Python programs.	K3

Knowledge Level – K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze

MAPPING WITH PROGRAMME OUTCOME

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	M	S	S	S	S
CO2	S	S	S	M	S	S
CO3	S	S	M	M	S	M
CO4	S	S	S	S	S	M
CO5	S	S	S	M	S	M

S – Strong M– Medium L –Low

SYLLABUS

UNIT	Contents	No. Of. Hours
I	**COMPUTATIONAL THINKING AND PROBLEM SOLVING:** Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, and guess an integer number in a range, Towers of Hanoi.	**23 Hrs**
II	**DATA TYPES, EXPRESSIONS, STATEMENTS:** Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points	**19 Hrs**
III	**CONTROL FLOW, FUNCTIONS, STRINGS:** Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search	**21 Hrs**
IV	**LISTS, TUPLES, DICTIONARIES:** Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.	**21 Hrs**
V	**FILES, MODULES, PACKAGES:** Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).	**21 Hrs**
	TOTAL HOURS	**105 Hrs**

Distribution of Marks: Theory: 75% and Applications 25%

Textbooks	
1	Introduction to Programming in Python by Motwani Rajeev; Motwani Rajeev
2	Problem Solving and Python Programming by Kulkarani S.A
3	Problem Solving and Python Programming by Schildt Herbart
Reference Books	
1	Jake Vander Plas,"Python Data Science Handbook: Essential Tools for Working with Data", 1st Edition, O'ReillyMedia, 2016. ISBN-13:978- 1491912058
2	Charles Dierbach, "Introduction to Computer Science Using Python", 1stEdition, Wiley India Pvt Ltd, 2015.ISBN-13:978-8126556014
Web Resources	
1.	https://www.python.org/about/gettingstarted/
2.	https://www.w3schools.com/python/python_intro.asp
3.	https://www.geeksforgeeks.org/python-programming-language/
4.	https://www.coursera.org/learn/python
5.	https://www.javatpoint.com/python-tutorial

TEACHING METHODOLOGY

- Class room teaching.
- Group discussions
- Seminars
- Demo using systems
- Chart/Assignment
- Smart Classroom

SYLLABUS DESIGNERS

1. Mrs. G. Sangeetha Lakshmi , HOD, Department of Computer Science and Applications
2. Dr. M. Vasumathy , Assistant Professor, Department of Computer Science and Applications

Problem solving and Python Programming Lab

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
I		Core Practical-1	3	45	-	-	3	45	3

COURSE OBJECTIVE

1. To understand the tokens of Python.
2. To learn Multithreading in Python.
3. To learn about the concept of data interpretation and visualization concepts
4. To understand how to Visualization.

SYLLABUS

S.No	List of Programs
1	A) Create a list and perform the following methods 1) insert() 2) remove() 3) append() 4) len() 5) pop() 6) clear()
	B) Write a python program to add two numbers.
2	A) Write a python program to print a number is positive/negative using if-else.
	B) Write a python program to find largest number among three numbers.
	C) Write a python Program to read a number and display corresponding day using if_elif_else?
3	A) Write a program to create a menu with the following options 1. TO PERFORM ADDITITON 2. TO PERFORM SUBTRACTION 3. TO PERFORM MULTIPICATION 4. TO PERFORM DIVISION Accepts users input and perform the operation accordingly. Use functions with arguments.
	B) Write a python program to check whether the given string is palindrome or not.
	C) Write a python program to find factorial of a given number using functions
4	A) Write a program to double a given number and add two numbers using lambda()?
	B) Write a program for filter() to filter only even numbers from a given list
	C) Write a program for map() function to double all the items in the list?
	D) Write a program to find sum of the numbers for the elements of the list by using reduce()?

5	A) Demonstrate a python code to implement abnormal termination?

	B) Demonstrate a python code to print try, except and finally block statements
6	A) Write a python program to open and write “hello world” into a file?
	B) Write a python program to write the content “hi python programming” for the existing file
7	A) Write a program to find sum of two numbers using class and methods
	B) Write a program to read 3 subject marks and display pass or failed using class and object.
8	A) Using a numpy module create an array and check the following: 1. Type of array 2. Axes of array 3. Shape of array 4. Type of elements in array
	B) Using a numpy module create array and check the following: 1. List with type float 2. 3*4 array with all zeros 3. From tuple 4. Random values
9	A) Write a python code to set background color and pic and draw a circle using turtle module for Data Visualization
	B) Write a python code to set background color and pic and draw a square and fill the color using turtle module for Data Visualization
10	A) Write a python code to read a csv file using pandas module and print the first and last five lines of a file for Data Visualization B) Plot Data from Excel File in Matplotlib using Python

Distribution of Marks: Program Output with Viva voce: 85% and Record:15%

SYLLABUS DESIGNERS

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2. Dr. M. Vasumathy , Assistant Professor, Department of Computer Science and Applications

Java Programming

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
II		CORE PAPER-II	6	90	6	90	-	-	4

COURSE OBJECTIVE

- This paper helps the students to become proficient programmers through the java programming language.

COURSE OUTCOME

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	Object Oriented Programming with Java.	K1
CO2	Apply the OOPs concept in JAVA programming.	K2
CO3	Become proficient programmers through the java programming language.	K2
CO4	Give insight into real world applications.	K3
CO5	Get the attentions of users in user interface using graphics	K4

Knowledge Level – K1-Remember, K2- Understand, K3-Apply, K4-Analyze

MAPPING WITH PROGRAMME OUTCOME

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	S	M	M
CO2	S	S	S	S	M	S
CO3	S	M	S	S	M	M
CO4	S	S	S	M	S	S
CO5	S	S	S	M	M	S

S-Strong M-Medium L-Low

SYLLABUS

Java Programming

UNIT	Contents	No. Of. Hours
I	**Introduction:** Introduction to Java-Features of Java-Object Oriented Concepts-Software Evolution – Software Development, SDLC Models – SDLC steps – Software Testing – Software Quality – Lexical Issues-Data Types – Variables – Arrays – Operators – Control Statements – Classes – Objects –Constructors – Overloading method – Access control – static and fixed methods – Inner classes –Inheritance-Overriding Methods-Using super-Abstract class.	**18 Hrs**
II	**Packages & Threads:** Packages-Access Protection-Importing Packages-Interfaces-Exception Handling-Throw and Throws- Thread-Synchronization-Messaging- Runnable Interface-Inter thread communication-Deadlock-suspending, resuming and stopping threads-Multithreading	**19 Hrs**
III	**Input/Output & Collection API:** I/O Streams-File Streams-String Objects-String Buffer-Char Array – Java Utilities-Collections interface – Collection classes-Enumeration – Vector –Stack –Hash tables – String class.	**18 Hrs**
IV	**Networking:** Networking –Networking basics – java and the Net – Inet Address- TCP/IP Client Sockets –URL-URL Connection – TCP/IP Server Sockets – Datagrams.	**17 Hrs**
V	**Graphical User Interface in Java:** Working with windows using AWT Classes – Class Hierarchy of Window and Panel –AWT controls – Layout Managers – Menus- Menu bars - Dialog Boxes- File Dialog- Applets-Lifecycle of Applet-Types of Applets-Event handling-Applet tags - JDBC and connecting to Databases – CRUD operations.	**18 Hrs**
	TOTAL HOURS	**90 Hrs**

Distribution of Marks: Theory :80% and Problems:20%

Textbooks	
1	P.Naughton and H.Schildt (1999), Java 2 (The Complete Reference), Third Edition, Tata MCGraw Hill Edition
2	Cay S. Horstmann, Gary Cornell(2012), Core Java 2 Volume I, Fundamentals-Ninth Edition Addision Wesley
Reference Books	
1.	K.Arnold and J.Gosling, The Java Programming Language- Second Edition, ACM Press/Addison- Wesley Publishing Co. New York
2.	Eric Frick, Introduction to Java, Independently published (November 17, 2023)
Web Resources	
1.	https://www.w3schools.com/java/java_oop.asp#:~:text=OOP%20provides%20a%20clear%20structure,code%20and%20shorter%20development%20time
2.	https://www.geeksforgeeks.org/object-oriented-programming-oops-concept-in-java/
3.	https://www.javatpoint.com/java-oops-concepts
4.	https://www.coursera.org/learn/object-oriented-java
5.	https://docs.oracle.com/javase/tutorial/java/concepts/index.html

TEACHING METHODOLOGY

- Class room teaching
- Group discussions and Seminars
- Chart/Assignment
- Simulation Model
- Smart Class room

SYLLABUS DESIGNERS

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2. Dr. M. Vasumathy , Assistant Professor, Department of Computer Science and Applications

Java Programming Lab

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
II		CORE PRACTICAL – 2	3	45	-	-	45	45	3

COURSE OBJECTIVE

1. Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
2. Read and make elementary modifications to Java programs that solve real-world problems.
3. Be able to create an application using string concept.
4. Be able to create a program using files in application.
5. Be able to create an Applet to create an application.

Lab Exercises:

1. Program using Class and Object.
2. Program using Constructors.
3. Program using Command-Line Arguments.
4. Program using Random Class.
5. Program using Vectors.
6. Program using String Tokenizer Class.
7. Program using Interface.
8. Program using all forms of Inheritance.
9. Program using String class.
10. Program using String Buffer class.
11. Program using Exception Handling.
12. Implementing Thread based applications
13. Program using Packages.
14. Program using Files.

Applets:

15. Working with Colors and Fonts.16.Parameter passing technique.
16. Drawing various shapes using Graphical statements.
17. Usage of AWT components and Listener in suitable applications.

Distribution of Marks: Program Output with Viva voce: 85% and Record: 15%

SYLLABUS DESIGNERS

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2. Dr. M. Vasumathy , Assistant Professor, Department of Computer Science and Applications

Fundamentals of Tensor Flow

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
III		Core Paper – III	5	75	5	75	-	-	4

COURSE OBJECTIVE

1. To understand basic operations, constant, variables.
2. To learn the concepts of linear and nonlinear regressions.
3. To apply the basics of variable sharing principles.
4. To understand the basic of encoder and its networks
5. To comprehend the basics of language translations. .

COURSE OUTCOME

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level (K1 – K4)
CO1	The student will be able to understand the concept variables, data types, operators and expressions.	K4
CO2	The student will be able to learn the concepts of linear and nonlinear regressions.	K3
CO3	The student will be able to apply the concepts of variable sharing principle.	K2
CO4	The student will be able to understand the concepts of encoder with transformer	K2
CO5	The student will be able to comprehend the concepts of reinforcement learning in tensor flow.	K4

Knowledge Level – K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze

MAPPING WITH PROGRAMME OUTCOME

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	M	S	S	S	S
CO2	S	S	S	M	S	S
CO3	S	S	M	M	S	M
CO4	S	S	S	S	S	M
CO5	S	S	S	M	S	M

S – Strong M– Medium L –Low

SYLLABUS

UNIT	Contents	No. Of. Hours
I	**INTRODUCTION:** Overview of Tensor flow - Why Tensor flow? Graphs and Sessions. Operations: Basic operations, constants, variables, Control dependencies, Data pipeline, Tensor Board.	**15**
II	**LINEAR AND LOGISTIC REGRESSION:** Tensor Flow's Optimizers, tf.data – Birthrate - life expectancy, MNIST dataset. **Eager execution -** word2vec, linear regression	**15**
III	**VARIABLE SHARING AND MANAGING EXPERIMENTS:** Interfaces Name scope, variable Scope saver object, check points, Auto diff - word2vec. Introduction to ConvNet.	**15**
IV	**CONVNET IN TENSORFLOW:** Image classification, GANs, Variational Auto - Encoders, Recurrent Neural Networks - Character- level Language Modeling	**15**
V	**SEQ 2 SEQ and ATTENTION: ac** Neural machine translation, Beyond RNNs: Transformer, Tensor 2 Tensor: Dialogue agents, Reinforcement Learning in Tensor flow, Keras.	**15**
	TOTAL HOURS	**75**

Distribution of Marks: Theory: 75% and Applications

Textbooks	
1	Reza Bosagh Zadeh, Bharath Ramsundar, "Tensor Flow for Deep Learning", "O' Reilly Media, Inc.", 2018.
Reference Books	
1	Giancarlo Zaccone, Md. Rezaul Karim, Ahmed Menshawy, "Deep Learning with Tensorflow", 2017, CBS Publishers And Distributors Pvt Ltd.
2	Ian Goodfellow, "Deep Learning", 2016, The MIT Press.
3	Francois Chollet, "Deep Learning with Python", 2017, Simon and Schuster
Web Resources	
1.	https://www.w3schools.com/
2.	https://www.geeksforgeeks.org/introduction-to-tensorflow/
3.	https://www.guru99.com/tensorflow-tutorial.html
4.	https://www.javatpoint.com/tensorflow
5.	https://www.tutorialspoint.com/tensorflow/index.html

TEACHING METHODOLOGY

- Class room teaching.
- Group Discussions
- Seminars
- Chart/Assignment
- Smart Classroom

SYLLABUS DESIGNERS

1. Mrs. G. Sangeetha Lakshmi , HOD, Department of Computer Science and Applications
2. Dr. R. Hamsaveni, Assistant Professor, Department of Computer Science and Applications

Fundamentals of Tensor Flow Lab

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
III		Core Pract – III	3	45	-	-	3	45	3

COURSE OBJECTIVE

1. To understand basic operations, constant, variables.
2. To learn linear and nonlinear regressions.
3. To understand basics of variables haring principles.
4. To understand the basic of transformer.
5. To understand the basics of reinforcement learning in tensor flow.

SYLLABUS

1. Implement concepts of Basic operations, constants and variables.
2. Implement concepts of Control dependencies
3. Implement concepts of Data pipe line, Tensor Board
4. Implement concepts of Tensor Flow's Optimizers
5. Implement concepts of Linear regression
6. Implement concepts of Interfaces Name scope, Saver object, check points
7. Implement concepts of Auto diff Example: word2vec
8. Implement concepts of Image classification
9. Implement concepts of GANs, Variational Auto-Encoders
10. Implement concepts of Variational Auto-Encoders
11. Implement concepts of Recurrent Neural Networks
12. Implement concepts of Seq2seq and Attention: Neural machine translation
13. Implement concepts of Transformer
14. Implement concepts of Tensor 2 Tensor: Dialogue agents
15. Implement concepts of Reinforcement Learning in Tensor flow, Keras

Distribution of Marks: Program Output with Viva voce: 85% and Record: 15%

SYLLABUS DESIGNERS

1. Mrs. G.Sangeetha Lakshmi , HOD, Department of Computer Science and Applications
2. Dr.R.Hamsaveni, Assistant Professor, Department of Computer Science and Applications.

SKILL BASED PRACTICAL -OPEN SOURCE SOFTWARE

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
III		SB PRACTICAL – I	2	30	0	0	2	30	2

COURSE OBJECTIVE

1. This practical enables the student to learn open source software like HTML, CSS, JAVA SCRIPT, VB SCRIPT and XML in Web Designing.
2. It also helps to expose students to free open source software environment and introduce them to use open source packages.

COURSE OUTCOME

On the successful completion of the course, students will be able to learn

CO Number	CO Statement	Knowledge Level (K1 – K4)
CO1	Learn to create HTML web pages and their links	**K1**
CO2	Can Design various cascading Stylesheets	**K3**
CO3	Learn to implement Dynamic web pages using JAVA Script	**K2**
CO4	Apply knowledge to Create Dynamic web pages using VB Script	**K3**
CO5	Learn the basics of XML	**K2**

➢

Knowledge Level – K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze

Mapping with Programme Outcome

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	M	S	S
CO2	S	S	S	M	S	S
CO3	S	S	M	M	S	S
CO4	S	S	S	S	S	M
CO5	S	M	S	M	S	M

S – Strong M – Medium L – Low

UNIT	Contents	No. Of. Hours
I	**BASIC OF HTML** Basic- Introduction to HTML -List -Creating table -Linking document frames	**6**
II	**STYLE SHEET & ITS PROPERTIES** Graphics to HTML doc -Style sheet basic -Add style to document - Creating style sheet rule -Style sheet properties.	**7**
III	**JAVASCRIPT** **6 Hrs** Introduction to JavaScript - JavaScript syntax -Data type -Variable -Array - Operator and expression -Looping constructor - Function -Dialog box.	**5**
IV	**VB SCRIPT** VB script - Introduction to VB script -Variables - Constants - Arrays - Operators - Control structures - Functions & Methods	**6**
V	**XML** XML - Introduction to XML – Basic programming – Elements and Attributes – Document Type Definitions (DTD) – Schema.	**6**
	TOTAL HOURS	**30**

PRACTICAL EXERCISE

1. Create a static web page which defines all text formatting tags of HTML in tabular format
2. Create a web page including list, image and links.
3. Create a web page implementing Inline and Embedded Stylesheets
4. Create a web page implementing External Stylesheet.
5. Create an array, display its content using JavaScript
6. Create a web page that utilizes cookie information using JavaScript.
7. Create a dynamic web page which prints Fibonacci series from 1 to 10 in VBScript
8. Create a dynamic web page which prints factorial of a given number in VBScript
9. Create a simple XML file and also create dynamic web page in which XML tags are used.

Distribution of Marks: Program Output with Viva voce: 85% and Record: 15%

TEXT BOOKS

S.No	Authors	Title	Publishers	Year of Publication
1	Steven Holzner	HTML Black Book	ACM Digital Library	2000

REFERENCE BOOKS

S.No	Authors	Title	Publishers	Year of Publication
1.	I. Bayross	Web enable commercial application development using HTML, DHTML, Javascript	BPB publication	2000
2.	Sam Key	VBScript: Programming Success in a day	Kindle Edition	2015
3.	Jon Duckett	JavaScript & JQuery: Interactive Front-End Web Development	Wiley Publications	2008

4.	Anders Moller Michael Schwartzbach	An Introduction to XML and Web Technologies	Pearson Education	2009
5.	Deitel & deitel	Internet & World Wide Web how to program	Pearson Education	1998
6.	Williamson Heather	XML : The Complete Reference	English Paperback	1999
7.	Kathleen halata	Internet programming with VB script & Java script	Course technology publications	1999
8.	Kogent Learning Solution	Html 5.0 In Simple Steps	Dreamtech Press	2008

WEB RESOURCES

1. http://archive.oreilly.com/oreillyschool/courses/introxml/Introduction%20to%20XML%20v1. pdf
2. https://www.w3schools.com/html/
3. https://javascript.info/
4. https://www.guru99.com/vbscript-tutorials-for-beginners.html

TEACHING METHODOLOGY

- Class room teaching.
- Group discussions
- Seminars
- Demo using systems
- Chart/Assignment
- Smart Class room

SYLLABUS DESIGNERS

1. Mrs. G. SANGEETHA LAKSHMI, Assistant Professor & HOD, Dept of Computer Science & Applications
2. Mrs. S SHANTHI, Assistant Prof, Dept of Computer Science & Applications

INTRODUCTION TO INFORMATION TECHNOLOGY

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
III		Non Major Paper – 1	2	30	2	30			2

COURSE OBJECTIVE

This course develops the students to know the basic concept of hardware, software and networking in a computer system.

COURSE OUTCOME

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level (K1 – K4)
CO1	Learn the anatomy and history of Digital Computer	**K1**
CO2	Understands about storage and IO devices of computer	**K2**
CO3	Learn to use Microsoft Office Products	**K3**
CO4	Understand the usage of Multimedia	**K2**
CO5	Attain a wide knowledge regarding Internet and usage of World Wide Web.	**K3**

Knowledge Level – K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze

Mapping with Programme Outcome

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	M	S	S
CO2	S	S	S	M	S	M
CO3	S	S	M	M	S	M
CO4	S	S	S	S	S	M
CO5	L	S	S	M	S	M

S – Strong M – Medium L – Low

UNIT	Contents	No. Of. Hours
I	**BASICS OF COMPUTER** Introduction: History of Computer - Parts of Computer System - Hardware Devices - Software – Anatomy of Digital Computer.	**6**
II	**PARTS OF COMPUTER** Memory Units – Storage Devices- Input Devices-Output Devices-Number System.	**6**
III	**MS-OFFICE** Microsoft Word - Microsoft Excel - Microsoft PowerPoint-MS-Access.	**7**
IV	**WORKING WITH MULTIMEDIA** Introduction to Multimedia - Images - Sound -Video – Text- Text Generation- Multimedia Applications.	**5**
V	**INTERNET AND WORLD WIDE WEB** Introduction to Internet and World Wide Web- E-Mail Basics – Computer Networks.	**6**
	TOTAL HOURS	**30**

Distribution of Marks: Theory: 75% and Applications: 25%

TEXT BOOKS

S.No	Authors	Title	Publishers	Year of Publication
1.	Alexis Leon	Fundamentals of Information Technology	Vikas Publication	2009
2	Multimedia Magic	S.Gokul	BPB	2005
3	Ron Mansfield	Working in Microsoft Office	Tata McGraw Hill	1997

REFERENCE BOOKS

S.No	Authors	Title	Publishers	Year of Publication
1	S.Jain	MS OFFICE 2007 Training Guide	BPB Publications	2010
2	Paul Deital, Harvey Deital,Abbey Deital	Internet and World Wide Web	Pearson Education	2018
3	Gaurav Bhatnager,Shikha Mehta,Sugata Mitra	Introduction to Multimedia Systems	Academic Press	2002
4	Bittu Kumar	Microsoft Office 2010	V & S Publishers	2013
5	E.Balagurusamy	Fundamentals of Computers	McGraw Hill Edition	2009

WEB RESOURCES

1. http://www.just.edu.jo/~mqais/CIS99/PDF/Ch.01_Introduction_%20to_computers.pdf
2. https://www.lamission.edu/learningcenter/docs/LRC%20Microsoft%20Office_Word%20200 7%20Workshop.pdf
3. https://www.tutorialspoint.com/basics_of_computer_science/basics_of_computer_science__multimedia.htm

TEACHING METHODOLOGY

- Class room teaching.
- Group discussions
- Seminars
- Demo using systems
- Chart/Assignment
- Simulation Model
- Smart Class room

SYLLABUS DESIGNERS

1. Mrs. G. SANGEETHA LAKSHMI, Assistant Professor & HOD, Dept of Computer Science & Applications
2. Mrs. P SHOBANA, Assistant Prof, Dept of Computer Science & Applications

Cloud Computing

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
IV		CORE PAPER-III	5	75	5	75	-	-	4

COURSE OBJECTIVE

1. To understand the concept of cloud computing.
2. To learn the evolution of cloud from the existing technologies.
3. To have knowledge on the various issues in cloud computing.
4. To be familiar with the lead players in cloud.
5. To comprehend the emergence of cloud as the next generation computing paradigm

COURSE OUTCOME

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	Articulate the main concepts, key technologies, strengths and limitations of cloud computing.	K2
CO2	Learn the key and enabling technologies that help in the development of cloud.	K1
CO3	Develop the ability to understand and use the architecture of compute and storage cloud, service anddelivery models.	K3
CO4	Explain the core issues of cloud computing such as resource management and security.	K3
CO5	Able to install and use current cloud technologies.	K4

Knowledge Level – K1-Remember, K2- Understand, K3-Apply, K4-Analyze

MAPPING WITH PROGRAMME OUTCOME

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	M	S	S	M	M
CO2	S	S	S	S	M	S
CO3	S	M	S	S	M	M
CO4	S	S	S	M	S	S
CO5	M	S	S	M	M	S

S-Strong M-Medium L-Low

SYLLABUS

Cloud Computing

UNIT	Contents	No. Of. Hours
I	**INTRODUCTION TO CLOUD COMPUTING:** Introduction: Definition of Cloud – Evolution of Cloud Computing – Types of cloud - Public cloud - Private cloud - Community cloud - Hybrid cloud – Underlying principles of Parallel & Distributed Computing – Cloud characteristics – Elasticity in Cloud – On-demand provisioning.	**15**
II	**CLOUD ENABLING TECHNOLOGIES:** Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish - Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices – Virtualization Support andDisaster Recovery.	**15**
III	**CLOUD ARCHITECTURE, SERVICES AND STORAGE:** Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – IaaS, PaaS, SaaS. Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – Amazon S3.	**15**
IV	**REOURCE MANAGEMENT AND SECURITY IN CLOUD:** Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service. Security – Security Governance – Virtual Machine Security – IAM – Security Standards.	**15**
V	**CLOUD TECHNOLOGIES AND ADVANCEMENTS:** Hadoop – MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – FourLevels of Federation – Federated Services and Applications – Future of Federation - Case studies on Cloud.	**15**
	TOTAL HOURS	**75**

Distribution of Marks: Theory :80% and Problems:20%

Textbooks	
1	Rittinghouse, John W., and James F. Ransome, ―Cloud Computing: Implementation,Management and Security, CRC Press, 2017.
2	Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
Reference Books	
1.	Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, ―Mastering Cloud Computing,Tata Mcgraw Hill, 2013.
2.	Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach,Tata Mcgraw Hill, 2009.
3	George Reese, "Cloud Application Architectures: Building Applications and Infrastructure, "O'Reilly Media, Inc.", 2009
Web Resources	
1.	https://www.w3schools.in/cloud-computing
2.	https://www.geeksforgeeks.org/ cloud-computing/
3.	https://www.javatpoint.com/ cloud-computing
4.	https://www.coursera.org/learn/ cloud-computing
5.	https://www.guru99.com/cloud-computing-for-beginners.html

TEACHING METHODOLOGY

- Class room teaching
- Group discussions and Seminars
- Chart/Assignment
- Simulation Model
- Smart Class room

SYLLABUS DESIGNERS

1. Mrs. G.Sangeetha Lakshmi , HOD, Department of Computer Science and Applications
2. Dr.R.Hamsaveni, Assistant Professor, Department of Computer Science and Applications

Cloud Computing Lab

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
IV		CORE PRACTICAL – 3	3	45	-	-	45	45	3

COURSE OBJECTIVE

1. To develop web applications in cloud
2. To learn the design and development process involved in creating a cloud based application
3. To learn and Practice Schedule algorithm
4. Understand transfer of file form one virtual machine to another
5. To implement and use parallel programming using Hadoop

Lab Exercises:

1. Install & experiment Virtual box/VMware Workstation with different flavours of linux or windows OS withvirtualization support
2. A C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Google App Engine. Create hello world app and other simple web applications using python/java.
4. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
5. A procedure to transfer the files from one virtual machine to another virtual machine.
6. A procedure to launch virtual machine using trystack (Online Openstack Demo Version)
7. Hadoop single node cluster and run simple applications like word count.

Distribution of Marks: Program Output with Viva voce: 85% and Record: 15%

SYLLABUS DESIGNERS

1. Mrs. G.Sangeetha Lakshmi , HOD, Department of Computer Science and Applications
2. Dr.R.Hamsaveni, Assistant Professor, Department of Computer Science and Applications

MICROPROCESSOR

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
IV	21SCS41	Skill Based Practical – II	2	30	0	0	2	30	2

COURSE OBJECTIVE

1. This practical helps to introduce the students with the architecture and operation of typical microprocessors and microcontrollers.
2. To familiarize the students with the programming and interfacing of microprocessors and microcontrollers.
3. To provide strong foundation for designing real world applications using microprocessors and microcontrollers.

COURSE OUTCOME

On successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	Learn basic knowledge of microprocessor	K1
CO2	Acquire technical knowledge and perform specific technical tools,	K2
CO3	Understands the basic concept of OPCODE	K3
CO4	Use Microprocessor to perform logical and arithmetic operations	K3
CO5	Create controls for digit transactions programs	K4

Knowledge Level – K1-Remember, K2- Understand, K3-Apply, K4-Analye

MAPPING WITH PROGRAMME OUTCOME

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	M	M	M	L	L
CO2	M	M	S	M	M	M
CO3	S	S	S	S	M	S
CO4	S	S	S	S	S	S
CO5	S	S	S	S	S	S

S – Strong M – Medium L – Low

UNIT	Contents	No. Of. Hours
I	**BASICS OF MICROPROCESSOR** Introduction – 8085 Programming model – Instruction Classification – Instruction word size – OP code format.	**6**
II	**ADDRESSING MODES** Write, Assemble and Execute a Simple Program – Addressing Modes	**6**
III	**8085 INSTRUCTION SET** 8085 Instruction Set – Data Transfer Instructions – Arithmetic Instruction – Logic and Bit Manipulation Instructions – Branch Instructions – Machine Control Instructions.	**6**
IV	**MICROPROCESSOR ARCHITECHTURE** Microprocessor Architecture and its Operations.	**6**
V	**COUNTERS AND STACK** Counters and Time Delays – Stack and Subroutine	**6**
	TOTAL HOURS	**30**

MICROPROCESSOR LAB

1. 8 Bit Addition
2. 16 Bit Addition
3. 8 Bit Multiply
4. 8 Bit Division
5. BCD Addition
6. 8 Bit Subtraction
7. Arranging In Ascending Order
8. 1's Complement
9. 2's Complement
10. Arrange In Descending Order
11. Block Move
12. Binary To ASCII
13. ASCII To Binary
14. ASCII To BCD
15. BCD To ASCII

TEXT BOOKS

S.No	Authors	Title	Publishers	Year of Publication
1.	Ramesh Gaonkar	Microprocessor Architecture, Programming and Applications with the 8085	Penram International Publishing (India) Pvt Ltd Fifth Edition.	2010

REFERENCE BOOKS

S.No	Authors	Title	Publishers	Year of publication
1	Soumitra Kumar Mandal	Microprocessors and Microcontrollers Architecture, Programming and Interfacing Using 8085, 8086 and 8051	Penram International Publishing (India) Pvt LtdFirst Edition.	2011
2	Liu and Gibson	Microprocessor System the 8086 /8088 Family	Prentice hall	2011
3	R S Gaonkar	Microprocessor, Architecture, Programming and Application	Prentice hall	2012
4	Barry B. Brey	The Intel Microproessors	Mc.Graw Hill Publications	2013
5	Mohammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay	8051 Microcontroller and Embedded Systems:Using Assembly and C	Pearson Education	2011
6	M.Saravanan, N.Senthil Kumar, S.Jeevananthan	Microprocessors and Microcontrollers	Pearson Education	2010
7	A.P. Godse, D.A. Godse	Microprocessor	Technical Publications	2010
8	John Crisp	Introduction to Microprocessors and Microcontrollers	Elsevier	2005

WEB RESOURCES

1. https://docs.microsoft.com/en-us/microprocessor/tutorials
2. https://www.tutorialspoint.com/microprocessor/microprocessor_overview.html
3. https://www.geeksforgeeks.org/introduction-of-microprocessor/

TEACHING METHODOLOGY

- Class room teaching.
- Group discussions
- Seminars
- Demo using systems
- Chart/Assignment

Distribution of Marks: Program Output with Viva voce: 85% and Record: 15%

SYLLABUS DESIGNERS

1. Mrs.G.SANGEETHA LAKSHMI, Assistant Professor & HOD, Dept of Computer Science & Applications
2. Mrs.B ARULMOZHI, Assistant Prof, Dept of Computer Science & Applications

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INTERNET AND ITS APPLICATIONS

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
IV	21NCS4A	Non Major Elective - II	2	30	2	30	0	0	2

COURSE OBJECTIVE

This course helps to equip students the basics of Internet usage and prepare them for digital world. It also helps to understand internet potential applications such as e-mail, news groups, chat, video, etc.. Internet and web development processes.

COURSE OUTCOME

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level (K1- K4)
CO1	To learn Basic Concept of Internet.	K1
CO2	To learn how to use Web browser	K2
CO3	To learn how to use E-mail id -sending and Receiving mails	K3
CO4	Introduction to HTML.	K2
CO5	To learn about E-marketing	K3

Knowledge Level – K1-Remember, K2- Understand, K3-Apply, K4-Analyze

MAPPING WITH PROGRAMME OUTCOME

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	M	S	S
CO2	S	S	M	S	M	S
CO3	S	S	S	M	S	S
CO4	S	S	S	S	M	M
CO5	S	S	S	M	M	S

S-Strong M-Medium L-Low

UNIT	Contents	No. Of. Hours
I	**INTERNET BASICS** Introduction to Computers - Programming Language types - History of Internet Personal	**6**
II	**WEB BROWSERS** Web Browsers - Internet Explorer - Connecting to Internet - Features of Internet explorer - Searching the Internet- Online help and tutorials - File Transmission Protocol (FTP)- Browser settings.	**6**
III	**E-MAIL** Electronic mail - Creating an E-mail id - Sending and Receiving mails – Attaching a file - Instance messaging - Other web browsers.	**6**
IV	**HTML** Introduction to HTML headers – Linking - Images - Special characters and line breaks, Unordered lists - Simple HTML programs.	**6**
V	**DIGITAL CASH** E-marketing - Consumer tracking - Electronic advertising - Search engine – CRM - Credit card payments - Digital cash and e-wallets -Micro payments- Smart card	**6**
	TOTAL HOURS	**30**

Distribution of Marks: Theory: 80% and Applications: 20%

TEXT BOOK

S.No	Authors	Title	Publishers	Year of Publication
1.	A.M. Deitel and P.J. Deitel, A.B. Goldberg	Internet and world wide web: How to program	Pearson Education Ltd	2013

REFERENCE BOOK

S.No	Authors	Title	Publishers	Year of Publication
1.	Harley han	The Internet	TMH	2016
2.	Gretchen McCulloch	Because Internet: Understanding the New Rules of Language	PenguinPublishing Group	2019
3	Anders Moller Michael Schwartzbach	An Introduction to XML and Web Technologies	Pearson Education	2009
4	Steven Holzner	HTML Black Book	ACM Digital Library	2016
5	Kogent Learning Solution	Html 5.0 In Simple Steps	Dreamtech Press	2010
6	P.Rizwan Ahmed	Internet and its Applications	Margham Publications	2010
7	Gralla	How the Internet Works	Pearson Education	2012
8	Farrel Adrian	The Internet and its Protocols	Elsevier Science	2013

WEB RESOURCES

1. https://www.tutorialspoint.com/internet_technologies/internet_overview.htm
2. https://www.tutorialspoint.com/basics_of_computer_science/basics_of_computer_science_internet. html

TEACHING METHODOLOGY

a. Class room teaching
b. Group discussions
c. Seminars
d. Chart/Assignment
e. Smart Class room

SYLLABUS DESIGNERS

1. Mrs. G.SANGEETHA LAKSHMI, Assistant Professor & HOD, Dept of Computer Science & Applications.
2. Mrs.R SIVAGAMI, Assistant Prof, Dept of Computer Science & Applications.

SEMESTER- V

Principles of Robotics

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
V		CORE PAPER-5	6	90	6	90	-	-	4

COURSE OBJECTIVE

1. To understand the basics of robotics.
2. To learn Multithreading in Python.
3. To know about built in Web services
4. To learn about the concept of Array.
5. To understand how to Visualization.

COURSE OUTCOME

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To write simple Python programs gives basic knowledge.	K2
CO2	To understand Multithreading	K1
CO3	To create web services.	K3
CO4	To understand array.	K3
CO5	To perform visualization	K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	M	M	S	S	S	S
CO2	S	S	S	M	M	M	M	S	S	S
CO3	S	M	M	S	M	S	M	S	S	S
CO4	M	S	M	M	S	S	M	S	S	S
CO5	S	M	M	M	S	M	S	S	S	S

PO – Programme Outcome, CO – Course outcome, S – Strong, M – Medium, L – Low (may be avoided)

UNIT	Contents	No. Of. Hours
I	**HISTORY OF ROBATS** Brief History-Types of Robot-Technology-Robot Classifications and specifications-Design and control issues-Various manipulators-Sensors-work cell-Programming languages.	**18**
II	**ROBAT REPRESENTATION** Mathematical representation of Robots-Position and Orientation-Homogeneous transformation-Various joints-Representation using the Denavit Hattenberg parameters-Degrees of Freedom- Direct kinematics-Inverse Kinematics-SCARA robots-Solvability-Solution methods-Closed form solution.	**18**
III	**ROBAT OPERATIONS** Linear and angular velocities-Manipulator Jacobian-Prismatic and rotary joints-Inverse- Wrist and arm singularity-Static analysis-Force and moment Balance.	**18**
IV	**ROBAT TECHNIQUES** Definition-Joint space techniques-Use of p-degree polynomial-Cubic polynomial-Cartesian space technique-Parametric descriptions-Straight line and circular paths-Position and orientation planning.	**18**
V	**ROBATIC CONTROLS** Lagrangian mechanics-2D OF Manipulator-Lagrange Euler formulation-Dynamic model-Manipulator control problem-Linear control schemes-PID control scheme-Force control of robotic manipulator.	**18**
	TOTAL HOURS	**90**

Textbooks	
1.	R.K.Mittal and I.J.Nagrath, "Robotics and Control", Tata McGraw Hill, New Delhi, 4th Reprint, 2005.
2.	John J.Criag," Introduction to Robotics Mechanics and Control", Third Edition, Pearson Education, 2009.
3.	M.P.Groover, M.Weiss, R.N.Nageland N.G.Odrej, "Industrial Robotics", McGraw-Hill, Singapore, 1996.
Reference Books	

1.	Ashitava Ghoshal," Robotics-Fundamental Concepts and Analysis", Oxford UniversityPress, Sixth Impression, 2010.
2.	K.K.Appu Kuttan, "Robotics", I K Intenational, 2007.
3.	Edwin Wise, "Applied Robotics", Cengage Learning, 2003.
4.	B.K.Ghosh, "Control in Robotics and Automation: Sensor Based Integration", AlliedPublishers, Chennai, 1998.
5.	S.Ghoshal, "Embedded Systems and Robotics-Projects using the 8051 MicrocontrollerCengage Learning", 2009.

SYLLABUS DESIGNERS

1. Mrs. G.SANGEETHA LAKSHMI, Assistant Professor & HOD, Dept of Computer Science & Applications.
2. Mrs. S. DIVYA, Assistant Prof, Dept of Computer Science & Applications.

Robotics Laboratory

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
V		CORE PRACTICAL – 5			-	-	4	52	3

COURSE OBJECTIVE

1. To develop web applications in cloud
2. To learn the design and development process involved in creating a cloud based application
3. To learn and Practice Schedule algorithm
4. Understand transfer of file form one virtual machine to another
5. To implement and use parallel programming using Hadoop

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the concept of accuracy and resolution.	K2
CO2	To understand the concept of shape identifications.	K1
CO3	To understand the concept of multi processes.	K3
CO4	To understand the concept of industrial process	K3
CO5	To understand the concept of color identifications	K4

LAB EXERCISES

1. Estimation of accuracy, repeatability and resolution
2. Determination of maximum and minimum position of links
3. Robot Programming and Simulation for Pick and Place
4. Robot Programming and Simulation for Colour identification
5. Robot Programming and Simulation for Shape identification
6. Robot Programming and Simulation for writing practice
7. Robot Programming and Simulation for multi process
8. Robot Programming and Simulation for industrial process (Packaging, Assembly)

SYLLABUS DESIGNERS

1. Mrs. G.SANGEETHA LAKSHMI, Assistant Professor & HOD, Dept of Computer Science & Applications.
2. Mrs. S. DIVYA, Assistant Prof, Dept of Computer Science & Applications.

Relational Database Management System

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
V		CORE PAPER-6	6	90	6	90	-	-	4

COURSE OBJECTIVES

1. The students are able to understand database concepts and database management system software and have a high-level understanding of major DBMS components and their function.
2. The students are able to understand the E R model and relational model.
3. The students are able to be able to write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.
4. The students are able to Understand Functional Dependency and Functional Decomposition.
5. The students are able to understand the architecture of database management system and also understand the various different architecture such as server system architecture, parallel systems and distributed database systems.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To describe the database architecture and its applications Sketch the ER diagram for real world applications Uses various ER diagram for a similar concepts from various sources.	K2
CO2	To understand the relational algebra and calculus Construct various queries in SQL and PL/SQL Compiles various queries in SQL, Relational Calculus and Algebra.	K1
CO3	To understand the various normalization forms Apply the normalization concepts for a table of data Practices a table and implement the normalization concepts.	K3
CO4	To understand the storage and accessing of data.	K3
CO5	To understand the query processing in database management. Define the concurrency control and deadlock concept	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	M	M	S	S	M	S
CO2	S	S	S	M	M	S	M	S	S	S
CO3	S	M	M	S	M	M	M	S	S	S
CO4	S	S	M	M	S	S	S	M	M	M

CO5	S	M	M	S	M	M	M	M	S	S

PO – Programme Outcome, CO – Course outcome, S – Strong, M – Medium, L – Low (may be avoided)

UNIT	Contents	No. Of. Hours
I	**DATABASE ARCHITECTURE AND ER DIAGRAM** Database system applications - Purpose of database systems - View of data- Database languages - Database architecture - Database users and administrators - History of database systems- Entity relationship modeling: entity types, entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, sub classes; super classes, inheritance, specialization and generalization	**18**
II	**RELATIONAL DATA MODEL** Relational model concepts, Relational constraints, Relational Languages : Relational Algebra, The Tuple Relational Calculus - The Domain Relational Calculus - SQL: Basic Structure- Set Operations- Aggregate Functions-Null Value-Nested Sub Queries-Views Complex QueriesModification Of Database-Joined Relations-DDL-Embedded SQL-Dynamic SQL-Other SQL Functions- -Integrity and Security.	**18**
III	**DATA NORMALIZATION** Pitfalls in relational database design – Decomposition – Functional dependencies – Normalization – First normal form – Second normal form – Third normal form – Boyce-codd normal form –Fourth normal form – Fifth normal form.	**18**
IV	**STORAGE AND FILE ORGANIZATION** Disks - RAID -Tertiary storage - Storage Access -File Organization – organization of files –Data Dictionary storage	**18**
V	**QUERY PROCESSING AND TRANSACTION MANAGEMENT** Query Processing - Transaction Concept - Concurrency Control - Locks based protocol Deadlock Handling -Recovery Systems.	**18**
	TOTAL HOURS	**90**

Textbooks	
1.	Abraham Silberschatz, Henry Korth, S.Sudarshan," Database Systems Concepts", Sixth Edition, McGraw Hill, 2010. 2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition,2002.
Reference Books	
1.	Bipin Desai, "An Introduction to database systems", Galgotia Publications, 2010.
2.	Ramez Elamassri, Shankant B-Navathe," Fundamentals of Database Systems", Pearson, 7th Edition, 2015

SYLLABUS DESIGNERS

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Relational Database Management Laboratory

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
V		CORE PRACTICAL -6	-	-	-	-	3	13	3

COURSE OBJECTIVES

1. Gain a good understanding of the architecture and functioning of Database Management Systems as well as associated tools and techniques.
2. Understand and apply the principles of data modelling using Entity ϖ Relationship and Develop a good database design.
3. Understand the use of Structured Query Language (SQL) and its ϖ syntax.
4. Apply Normalization techniques to normalize a database.
5. Understand the need of transaction processing and learn techniques for ϖ controlling the consequences of concurrent data access.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the database architecture and ER modeling	K2
CO2	To understands the need for the relational model	K1
CO3	To understand the insights of normalization.	K3
CO4	To knows about storage and file organization.	K3
CO5	To understands the essential information regarding query processing and transaction management.	K4

LAB EXERCISES

1. Execute a single line query and group functions.
2. Execute DDL Commands.
3. Execute DML Commands.
4. Execute DCL and TCL Commands.
5. Implement the Nested Queries.
6. Implement Join operations in SQL.

7. Create views for a particular table.
8. Implement Locks for a particular table.
9. Write PL/SQL procedure for an application using exception handling.
10. Write PL/SQL procedure for an application using cursors.
11. Write a PL/SQL procedure for an application using functions.
12. Write a PL/SQL procedure for an application using package.

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Data Communication and Networking

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
V		ELECTIVE PAPER- 1	5	75	5	75	-	-	3

COURSE OBJECTIVES

1. To understand the architecture of network.
2. To learn channels and its protocols.
3. To know about routing standard in network
4. To learn about the concept transporting a packets
5. To understand the concept of transport layer in network.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To study the concepts of communication networks, protocols and their performance	K2
CO2	To study the concepts of transmission Medium and Error Control	K3
CO3	To learn about Switching Concept	K3
CO4	To study about the X.25layers	K3
CO5	To apply routing Algorithms and understand various internetworking devices.	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	M	S	S
CO2	M	S	M	S	S	M
CO3	S	S	S	L	M	S
CO4	S	M	S	M	S	L
CO5	S	M	S	M	S	M

S – Strong, M – Medium, L – Low

UNIT	Contents	No. Of. Hours
I	**BASICS OF DATA COMMUNICATION** Introduction to Data Communication, Network, Protocols & standards and standards organizations - Line Configuration - Topology - Transmission mode - Classification of Network - OSI Model - Layers of OSI Model.	**16**
II	**TRANSMISSION MEDIUM** Parallel and Serial Transmission – DTE-DCE Interface - Modems - Guided Media - Unguided Media - Types of Error - Error Detection - Error Corrections.	**15**
III	**MULTIPLEXING AND SWITCHING** Multiplexing - Types of Multiplexing - Multiplexing Application - Telephone system - Project 802 - Ethernet - Token Bus - Token Ring - Circuit Switching - Packet Switching - Message switching - Connection Oriented and Connectionless services.	**16**
IV	**ISDN AND X.25 LAYER** History of Analog and Digital Network- Access to ISDN - ISDN Layers - Broadband ISDN - X.25 Layers.	**14**
V	**NETWORING DEVICES** Repeaters - Bridges - Routers - Gateway - Routing algorithms - TCP/IP Network and Transport layer - World Wide Web.	**14**
	TOTAL HOURS	**75**

	Textbooks
1.	Behrouz a. Forouzan, “Data Communications and Networking”,TMH 1999.
	Reference Books
1.	Andrew Tanenbaum,”Computer Networks”, Tata McGraw Hill, 2000.
2.	Jean Warland, “Communication Networks(A first Course) - Second Edition “, WCB/McGraw, 1998
3.	William Stallings, “Data and Computer Communications”, Pearson Education, 2007.
4.	James F. Kurose, Keith W. Ross, “Computer Networking”, Pearson Education, 2008.
5.	Bruce S. Davie, Larry L. Peterson, “Computer Networks: A Systems approach”, Tata McGraw Hill, 2010.

6.	Moussavi, “Data Communication and Networking”, Cengage Learning, 2014.
7.	Tomasi, Wayne, “Introduction to Data Communication And Networking”, Pearson Education, 2009.
8.	Leon Garcia, “Communication Networks”, Tata McGraw Hill, 2008.

WEB RESOURCES

1. https://www.tutorialspoint.com/data_communication_computer_network/index.html
2. https://www.guru99.com/data-communication-computer-network-tutorial.html

TEACHING METHODOLOGY

- o Class room teaching.
- o Group discussions
- o Seminars
- o Demo using systems
- o Chart/Assignment
- o Simulation Model
- o Smart Class room

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Wireless sensor network

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
V		ELECTIVE-I PAPER- 2	5	75	5	75	-	-	3

COURSE OBJECTIVES

1. To understand the fundamentals of Wireless Sensor Networks
2. To understand the design and analyze network protocols for WSNs learn channels and its protocols.
3. To understand the data communication techniques in WSNs.
4. To understand and implement localization and tracking techniques
5. To understand the concepts of issuing and challenge in QoS.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the fundamentals of Wireless Sensor Networks	K2
CO2	To understand the design and analyze network protocols for WSNs learn channels and its protocols.	K3
CO3	To understand the data communication techniques in WSNs.	K3
CO4	To understand and implement localization and tracking techniques	K3
CO5	To understand the concepts of issuing and challenge in QoS.	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	M	S	S
CO2	M	S	M	S	S	M
CO3	S	S	S	L	M	S
CO4	S	M	S	M	S	L
CO5	S	M	S	M	S	M

S – Strong, M – Medium, L – Low

UNIT	Contents	No. Of. Hours
I	**INTRODUCTION** Fundamentals of wireless communication technology, the electromagnetic spectrum radio propagation, characteristics of wireless channels, modulation techniques, multiple access techniques, wireless LANs, PANs, WANs, and MANs, Wireless Internet.	**16**
II	**INTRODUCTION TO ADHOC/SENSOR NETWORKS** Key definitions of adhoc/ sensor networks, unique constraints and challenges, advantages of ad-hoc/sensor network, driving applications, issues in adhoc wireless networks, issues in design of sensor network, sensor network architecture, data dissemination and gathering.	**15**
III	**MAC PROTOCOLS** Issues in designing MAC protocols for adhoc wireless networks, design goals, classification of MAC protocols, MAC protocols for sensor network, location discovery, quality, other issues, S-MAC, IEEE 802.15.4.	**16**
IV	**ROUTING PROTOCOLS** History of Analog and Digital Network- Access to ISDN - ISDN Layers - Broadband ISDN - X.25 Layers.	**14**
V	**QOS AND ENERGY MANAGEMENT** Issues and Challenges in providing QoS, classifications, MAC, network layer solutions, QoS frameworks, need for energy management, classification, battery, transmission power, and system power management schemes.	**14**
	TOTAL HOURS	**75**

Textbooks	
1.	C. Siva Ram Murthy, and B. S. Manoj, "AdHoc Wireless networks ", Pearson Education - 2008.
Reference Books	
1.	Feng Zhao and Leonides Guibas, "Wireless sensor networks ", Elsevier publication - 2004.
2.	Jochen Schiller, "Mobile Communications", Pearson Education, 2nd Edition, 2003.
3.	William Stallings, "Wireless Communications and Networks ", Pearson Education - 2004

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Data Mining and Data Warehousing

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
V		ELECTIVE -II PAPER- I	5	75	5	75	-	-	3

COURSE OBJECTIVES

1. Introduce the concepts of data ware house and data mining and explain the methodologies used for analysis of data.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the functionality of the various data mining and data warehousing Component	K2
CO2	To describe different methodologies used in data mining and data ware housing.	K3
CO3	To Explain the analyzing techniques and Online Analytical Processing	K3
CO4	To the association rule mining and classification	K3
CO5	To study and Compare different approaches of data ware housing and data mining with various technologies routing Algorithms and understand various internetworking devices.	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	M	M	S	S	S	S
CO2	S	M	M	M	M	M	S	M	M	S
CO3	S	M	S	S	S	S	S	M	S	S
CO4	S	M	M	S	M	S	M	M	M	S
CO5	S	S	S	S	M	M	M	M	S	S

PO – Programme Outcome, CO – Course outcome, S – Strong, M – Medium, L– Low (may be avoided)

UNIT	Contents	No. Of. Hours
I	**DATA WAREHOUSING** Data warehousing Components –Building a Data warehouse - Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.	**16**
II	**BUSINESS ANALYSIS** Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.	**15**
III	**DATA MINING** Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing	**16**
IV	**ASSOCIATION RULE MINING AND CLASSIFICATION** Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction – Basic Concepts – Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.	**14**
V	**CLUSTERING AND TRENDS IN DATA MINING** Cluster Analysis – Types of Data – Categorization of Major Clustering Methods – K-means– Partitioning Methods – Hierarchical Methods – Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data – Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.	**14**
	TOTAL HOURS	**75**

Textbooks	
1.	Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", TataMcGraw – Hill Edition, Thirteenth Reprint 2008.
2.	Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.
Reference Books	
1.	Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Person Education, 2007.
2.	K.P. Soman, ShyamDiwakar and V. Aja, "Insight into Data Mining Theory and Practice", Eastern Economy Edition, Prentice Hall of India, 2006.
3.	G. K. Gupta, "Introduction to Data Mining with Case Studies", Eastern Economy Edition, Prentice Hall of India, 2006.
4.	Daniel T.Larose, "Data Mining Methods and Models", Wiley-Interscience, 2006.

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Digital Image Processing

Semester	SubjectCode	Category	Lecture Hrs		TheoryHrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
VI		Elective-II Paper -2	5	75	5	75	-	-	3

COURSE OBJECTIVES

1. To understand the basics and fundamentals of digital image processing such as digitization, sampling, quantization, and operations.
2. To gain knowledge on the various techniques for intensity transformations functions and spatial filtering for modify or enhancement of an image.
3. To Compute Discrete Fourier Transform and apply Frequency domain filters for image enhancement.
4. To Understand and Apply Color Models in Digital Image Processing.
5. To Illustrate Morphological operation and Apply image segmentation techniques for various applications.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level(K1-K4)
CO1	To understand the basics and fundamentals of digital image processing such as digitization, sampling, quantization, and operations.	K1
CO2	To gain knowledge on the various techniques for intensity transformations functions and spatial filtering for modify or enhancement of an image.	K3
CO3	To Compute Discrete Fourier Transform and apply Frequency domain filters for image enhancement.	K3
CO4	To Understand and Apply Color Models in Digital Image Processing.	K3
CO5	To Illustrate Morphological operation and Apply image segmentation techniques for various applications	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	S	S	M	S	M
CO2	S	S	S	M	M	S	S	S	S	S
CO3	M	M	M	S	S	M	M	S	M	S
CO4	M	S	M	S	S	M	M	M	M	M
CO5	M	M	S	S	S	S	S	S	M	S

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium, L– Low (may be avoided)

UNIT	Contents	No. of. Hours
I	**DIGITAL IMAGE FUNDAMENTALS** Introduction – Fundamental steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Mathematical Tools Used in Digital Image Processing. Practical Component: Find the representation of image, Reading Images, Writing Images, displaying images, handling image types, and handling operators in images using MATLAB.	**16**
II	**MORPHOLOGICAL IMAGE PROCESSING** Background - Some Basic Intensity Transformation Functions: Image Negatives, Log Transformations, Power-Law Transformations - Histogram Processing. Fundamentals of Spatial Filtering - Smoothing Spatial Filters - Sharpening Spatial Filters. Practical Component: Apply Various intensity transformations functions, Computing and plotting image histogram.s and use standard image processing toolbox Spatial filters in MATLAB	**15**
III	**IMAGE SEGMENTATION** Background - Sampling and the Fourier Transform of sampled functions – Discrete Fourier Transform (DFT) - Some Properties of the 2-D Discrete Fourier Transform - The Basics of Filtering in the Frequency Domain - Image Smoothing and Sharpening using Frequency Domain Filters - Selective Filtering. Practical Component: Compute and visualize the 2-D DFT, implement smoothing and sharpening techniques using lowpass and highpass filters in frequency domain in MATLAB.	**16**
IV	**FEATURE EXTRACTION** Color Fundamentals - Color Models: RGB, CMY, CMYK, and HSI Color Models - Pseudocolor Image Processing - Color Transformations - Color Image Smoothing and Sharpening. Practical Component: Find the representation of color image, Convert to Other Color Spaces, implement color transformations, and implement color image Smoothing and Sharpening in MATLAB.	**14**
V	**IMAGE PATTERN CLASSIFICATION** Morphological Image Processing: Fundamentals - Erosion and Dilation –	

	Opening and Closing - Some Basic Morphological Algorithms. Image Segmentation: Introduction - Point, Line, and Edge Detection– Segmentation by Region Growing and by Region Splitting and Merging. Practical Component: Implement Morphological operations, image segmentation and region-based segmentation in MATLAB.	**14**
	TOTALHOURS	**75**

Textbooks	
1.	Rafael C Gonzalez, Richard E Woods, "Digital Image Processing", 4th Edition, Pearson, 2018.
ReferenceBooks	
1.	Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, Digital Image Processing using MATLAB Pearson Education, Inc., 2011.
2.	Kenneth R. Castleman,Digital Image Processing Pearson, 2006.
3.	Anil K.Jain, "Fundamentals of Digital Image Processing", Person Educaiton, 2003.

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R programming Lab

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
V		SKILL BASED PACTICAL - 3	-	-	-	-	2	26	2

COURSE OBJECTIVES

1. To understand basics of numbers and vectors.
2. To learn how to write a program for Array and matrices.
3. To learn how to write a program for Bi variety category data
4. To learn how to write a program for 1D, 2D, 3D plots.
5. To learn how to write a program correlations.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the basic concept of numbers and vectors.	K2
CO2	To understand the concept of array and matrices.	K3
CO3	To understand the concept of Bi variety category matrices.	K3
CO4	To understand the basic concept 1D, 2D, 3D.	K3
CO5	To understand the concept of correlations.	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	M	M	M	S	S	S
CO2	S	S	M	S	M	S	S	S	S	S
CO3	S	S	M	M	M	M	M	S	S	M
CO4	S	S	M	M	M	S	M	S	S	M
CO5	S	S	M	M	M	M	S	S	S	M

PO – Programme Outcome, CO – Course outcome, S – Strong, M – Medium, L– Low (may be avoided)

LAB EXERCISES

1. Demonstrate the usage of Numbers and Vectors in R
2. Simple manipulations on Numbers and Vectors, Objects-modes and attributes, Ordered and unordered Factors
3. Implement the concepts of Arrays and Matrices
4. Demonstrate the usage of Data Frames and Lists and its attributes -attach, detach, scan and importing a file
5. Implement the concept of grouping and conditional execution on Data Frames and Lists
6. Demonstrate repetitive executions on DataFrames
7. Use a Dataset to handle the Categorical and numerical data
8. Use a Dataset to handle the Bi-variate categorical data
9. Use a Dataset to handle the Multivariate categorical data
10. Demonstrate the usage of apply() functions.
11. Implement the usage of dplyrpackage
12. Utilize a lattice package to plot 1D, 2D and 3D plots for a given dataset.
13. Utilize ggplot2 package to plot 1D, 2D and 3D plots for a given dataset.
14. Demonstrate Pearson correlation and Spearman rank correlation.

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SEMESTER - VI

Artificial Intelligence and Machine Learning

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
VI		CORE PAPER- 7	6	90	6	90	-	-	4

COURSE OBJECTIVES

1. Enable the students to learn the basic functions of AI, Heuristic Search Techniques.
2. Provide knowledge on concepts of Representations and Mappings and Predicate Logic.
3. Introducing Machine Learning with respect to Data Mining, Big Data and Cloud.
4. Study about Applications & Impact of ML.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To demonstrate AI problems and techniques	K1
CO2	To understand machine learning concepts	K3
CO3	To apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning	K3
CO4	To analyze the impact of machine learning on applications	K3
CO5	To analyze and design of AI world problem for implementation and understand the dynamic behavior of a system	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	M	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

S – Strong, M – Medium, L– Low (may be avoided)

UNIT	Contents	No. Of. Hours
I	**INTRODUCTION** Introduction: AI Problems - Al techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics - Issues in design of Search.	**18**
II	**SEARCH TECHNIQUES** Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.	**18**
III	**PREDICATE LOGIC** Using Predicate logic: Representing simple facts in logic - Representing Instance and Is a relationships-Computable functions and predicates-Resolution-Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge- Logic programming –Forward Vs Backward reasoning -Matching-Control knowledge.	**18**
IV	**MACHINE LEARNING** Understanding Machine Learning :What Is Machine Learning ?-Defining Big Data-Big Data in Context with Machine Learning-The Importance of the Hybrid Cloud-Leveraging the Power of Machine Learning-The Roles of Statistics and Data Mining with Machine Learning-Putting Machine Learning in Context-Approaches to Machine Learning.	**18**
V	**APPLICATIONS OF MACHINE LEARNING** Looking Inside Machine Learning: The Impact of Machine Learning on Applications -Data Preparation-The Machine Learning Cycle.	**18**
	TOTAL HOURS	**90**

Textbooks	
1.	Elaine Richand Kevin Knight,"Artificial Intelligence",Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991.
2.	GeorgeFLuger,"ArtificialIntelligence",4th Edition,Pearson Education Publ,2002.
Reference Books	
1.	"Machine Learning for Dummies®", IBM Limited Edition by Judith Hurwitz, Daniel Kirsch.

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NATURAL LANGUAGE PROCESSING

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
VI		CORE PAPER-8	6	90	6	90	-	-	4

COURSE OBJECTIVES

1. To understand basic techniques of NLP and its problems,
2. To understand concept of lexical analysers.
3. To understand to grammars with its level.
4. To understand the basic concepts of semantic networks.
5. To understand the concept of natural languages.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the concepts NLP and its problems	K1
CO2	To understand the concepts of lexical analysers.	K3
CO3	To understand the concepts of grammars.	K3
CO4	To understand the concepts of semantic networks.	K3
CO5	To understand the concepts of natural languages.	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	M	M	S	S	S	S
CO2	S	M	M	M	M	M	S	M	M	S
CO3	S	M	S	S	S	S	S	M	S	S
CO4	S	M	M	S	M	S	M	M	M	S
CO5	S	S	S	S	M	M	M	M	S	S

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium, L– Low (may be avoided)

UNIT	Contents	No. Of. Hours
I	**INTRODUCTION TO NLP** Application of NLP techniques and key issues-MT grammar checkers-dictation-document generation-NL interfaces-Natural language processing key issues-the different analysis level used for NLP: morpho- lexical-syntactic-semantic-pragmatic-markup (TEI, UNICODE)-finite state automata-Recursive and augmented transition networks-open problems.	**18**
II	**LEXICAL LEVEL** Error tolerant lexical processing (spelling error correction)-transducers for the design of morphologic analyzers features-towards syntax: part-of-speech tagging (BRILL, HMM)-efficient representations for linguistic resources (lexica, grammars,..) tries and finite state automata.	**18**
III	**SYNTACTIC LEVEL** Grammars (Eg: Formal/Chomsky hierarchy ,DCSGs, systematic case, unification, stochastic)-parsing(top- down, bottom up, char(early algorithm), CYK algorithm)-automated estimation of probabilistic model parameters (inside-outside algorithm)-data oriented parsing-grammar formalisms and treebanks-efficient parsing for context-free grammars (CFGs)-statistical parsing and probabilistic CFGs (PCFGs)- lexicilizedPCFGse.	**18**
IV	**SEMANTIC LEVEL** Logical forms-ambiguity resolution-semantic network and parsers-procedural semantics-montague semantics-vector space approaches-distributional semantics-lexical semantics and word sense disambiguation-compositional semantics semantic role labeling and semantic parsing.	**18**
V	**PRAGMATIC LEVEL** Knowledge representation-reasoning-plan/goal recognition-speech acts/intentions-belief models-discourse- reference. Natural language generation: Content determination-sentence planning-surface realization, subjectivity and sentiment analysis: information extraction-automatic summarization-information retrieval and question answering-named entity recognition and relation extraction-IE using sequence labeling- machine translation: Basic issues in MT-statistical translation-word alignment-phrase based translation and synchronous grammars.	**18**
	TOTAL HOURS	**90**

Textbooks	
1.	Daniel J and James H.Martin, "Speech and Language Processing, An introduction to Natural Language Processing, Computational Linguistic and Speech Recognition", Prentice Hall, 2009.
Reference Books	
1.	Lan H Written and Elbef, MarkA.Hall," Data Mining: Practical Machine Learning tools and Techniques", Morgan Kaufmann, 2013.

SYLLABUS DESIGNERS

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Machine Learning using MATLAB Programming Lab

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
VI		Core Practical -	-	-	-	-	3	39	3

COURSE OBJECTIVES

1. To understand basic concept of machine learning.
2. To understand concept of ID3 Algorithm.
3. To understand to support vector network.
4. To understand the basic concepts of K means algorithm.
5. To understand the basic concept of linear regression.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the basic concept of machine learning	K2
CO2	To understand the concept of ID3 algorithm.	K3
CO3	To understand the support vector network.	K3
CO4	To understand the basic concept of K means algorithm	K3
CO5	To understand the concept of linear regression.	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	S	M	S	S
CO2	S	S	M	M	S	M	S	M	S	S
CO3	S	M	M	M	S	M	S	M	S	S
CO4	S	S	S	M	S	S	S	S	M	S
CO5	S	M	S	S	S	S	S	S	M	S

PO – Programme Outcome, CO – Course outcome, S – Strong, M – Medium, L– Low (may be avoided)

LAB EXERCISES

1. Loading the data from a given csv file into a data frame and print the shape of the data, type of the data, number of rows-columns, feature names and the description.

2. Get the number of observations, missing values and nan values for the given data set.

3. Linear regression

4. K Nearest Neighbour

5. ID3 algorithm.

6. Naïve Bayesian classifier

7. Support vector machine

8. Bayesian network

9. PCA

10. K-Means Algorithm

SYLLABUS DESIGNERS

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Natural Language Processing Lab

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
VI		Core Practical - 8	-	-	-	-	3	39	3

COURSE OBJECTIVES

1. To understand basic techniques of NLP and its problems.
2. To understand concept of lexical analysers.
3. To understand to grammars with its level.
4. To understand the basic concepts of semantic networks.
5. To understand the concept of natural languages.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the basic concept of NLP problems.	K2
CO2	To understand the concept of lexical analysers.	K3
CO3	To understand the concept of grammar with its level.	K3
CO4	To understand the basic concept of semantic networks.	K3
CO5	To understand the concept of natural language.	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	S	S	S	S
CO2	S	S	M	S	S	S	M	M	S	S
CO3	S	M	M	S	M	M	S	M	M	S
CO4	S	S	M	M	M	S	S	S	S	S
CO5	S	S	S	S	M	M	S	S	S	S

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium, L– Low (may be avoided)

LAB EXERCISES

1. Implementing word similarity
2. Word Analysis
3. Word Generation
4. N-Grams
5. Implementing simple problems related to word disambiguation
6. Simple demonstration of part of speech tagging
7. Lexical Analyzer
8. Semantic Analyzer

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ETHICAL HACKING

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
VI		ELECTIVE -III PAPER -1	5	75	5	75	-	-	3

COURSE OBJECTIVES

1. To understand basic concept of hacking
2. To understand concept of Scanning and enumeration
3. To learn how to program for hacking.
4. To understand the fundamentals of security.
5. To understand the concept of testing and its tools.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the concepts of hacking	K1
CO2	To understand the concepts of scanning and enumeration	K3
CO3	To understand the concepts of hacking.	K3
CO4	To understand the concepts of security.	K3
CO5	To understand the concepts of testing and its tools.	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	S	S	S	S
CO2	S	S	S	S	M	M	M	S	S	S
CO3	S	S	S	S	M	S	M	S	S	S
CO4	S	M	S	M	S	S	M	S	S	S
CO5	S	S	S	S	S	M	M	M	S	S

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium, L– Low (may be avoided)

UNIT	Contents	No. Of. Hours
I	**INTRODUCTION TO HACKING** Importance of Security-Elements of Security-Phases of an Attack-Types of Hacker Attacks-Hacktivism-Vulnerability Research-Introduction to Foot printing-Information Gathering Methodology-Foot printing Tools-WHO IS Tools-DNS Information Tools-Locating the Network Range-Meta Search Engines.	**15**
II	**SCANNING AND ENUMERATION** Introduction to Scanning-Objectives-Scanning Methodology-Tools-Introduction to Enumeration – Enumeration Techniques –Enumeration Procedures-Tools	**15**
III	**SYSTEM HACKING** Introduction-Cracking Passwords-Password Cracking Websites-Password Guessing-Password Cracking Tools-Password Cracking Counter measures-Escalating Privileges-Executing Applications-Key loggers and Spyware.	**15**
IV	**PROGRAMMING FOR SECURITY PROFESSIONALS** Programming Fundamentals- C Language-HTML-PERL-Windows OS Vulnerabilities-Tools for Identifying Vulnerabilities-Counter measures-Linux OS Vulnerabilities –Tools for Identifying Vulnerabilities-Counter measures.	**15**
V	**PENETRATION TESTING** Introduction-Security Assessments-Types of Penetration Testing-Phases of Penetration Testing- Tools-Choosing Different Types of Pen-Test Tools-Penetration Testing Tools.	**15**
	TOTAL HOURS	**75**

Textbooks	
1.	" EC-Council, "Ethical Hacking and Countermeasures:Attack Phases", Cengue Learning,2010
2.	Jon Erikson,"Hacking, 2nd Edition:The Art of Exploitation", No starch Press Inc, 2008
3.	Michael T.Simpson, Kent Backman, James E.Corley, "Hands-On Ethical Hacking and Network Defense", Cengage Learniing, 2013.
Reference Books	
1.	Patrick Engebretson,"The Basics of Hacking and Penetration Testing-Ethical Hacking and Penetration Testing Made Easy", Second Edition, Elsevier, 2013.
2.	Rafay Boloch,"Ethical Hacking and Penetration Testing Guide", CRC Press, 2014

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Artificial Intelligence and Knowledge Representation

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
VI		ELECTIVE – III PAPER - 2	5	75	5	75	-	-	3

COURSE OBJECTIVES

1. To understand basics of artificial neural network.
2. To understand basics of problem solving methods.
3. To understand and develop objects and reasoning in AI
4. To understand the basic concepts of fuzzy logic.
5. To understand the concepts of speech recognition.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the concepts of artificial neural network	K1
CO2	To understand the concepts of problem solving methods	K3
CO3	To understand the objects and reasoning in AI.	K3
CO4	To understand the concepts of fuzzy logic.	K3
CO5	To understand the concepts of speech recognition.	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	M	M	S	M	M	S	M	S	S
CO4	S	S	M	S	M	M	M	S	S	S
CO5	S	S	M	M	M	S	M	S	S	S

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium, L– Low (may be avoided)

UNIT	Contents	No. Of. Hours
I	**INTRODUCTION TO ARTIFICIAL INTELLIGENCE** History of AI – Artificial Narrow Intelligence (ANI) – Artificial General Intelligence (AGI) – Artificial Super Intelligence (ASI) – Characteristics – Types of AI – Domains – Programming Languages of AI – Applications of AI – Future of AI.	**9**
II	**AI – PROBLEM SOLVING METHODS** Problem solving Methods – Search Strategies: Uninformed – Informed – Heuristics – Generate and test – hill climbing – Best first search – problem reduction – Local Search Algorithms and Optimization – Game Playing mini–max procedure – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games	**16**
III	**AI – KNOWLEDGE REPRESENTATION** Procedural Versus declarative knowledge – logic programming – Forward Versus backward reasoning –Matching – Control knowledge – Ontological Engineering– Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories –Reasoning with Default Information.	**15**
IV	**STATISTICAL REASONING AND AGENTS** Probability and Bayes Theorem – Certainty factors – Probabilistic Graphical Models – Bayesian Networks – Markov Networks – Fuzzy Logic. Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi–agent systems.	**15**
V	**BACKTRACKING & BRANCH AND BOUND** Types of Machine Learning – Neural Networks – Deep Learning – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.	**15**
	TOTAL HOURS	**75**

Textbooks	
1.	“Artificial Intelligence”, Elaine Rich, Kevin Knight, Tata McGraw Hill, II Edition.
2.	"Artificial Intelligence: A Modern Approach," Stuart Russell, Peter Norvig, Third Edition, Prentice Hall of India, New Delhi, 2010.

3.	"Prolog: Programming for Artificial Intelligence", I. Bratko, Addison – Wesley Educational Publishers Inc., Fourth edition 2011.
Reference Books	
1.	"Machine Learning for Beginners 2019", Matt Henderson, This Is Charlotte, 2019
2.	"Introduction to Artificial Intelligence and Expert Systems", Dan W. Patterson, Pearson, 2015

SYLLABUS DESIGNER

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Internet of Things

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
VI		ELECTIVE –IV PAPER – 1	5	75	5	75	-	-	3

COURSE OBJECTIVES

1. To understand the communication technologies in IOT, know the various applications of IOT.
2. To understand the network operator requirements and smart applications.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand basic technologies and concepts of IoT	K2
CO2	To understand the concepts of Applications based on IoT.	K3
CO3	To understand the smart applications of IoT.	K3
CO4	To understand the Health based applications of IoT.	K4
CO5	To understand about the network operator requirements and connectivity.	K3

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	M	S	S
CO2	M	S	M	S	S	M
CO3	S	S	S	L	M	S
CO4	S	M	S	M	S	L
CO5	S	S	S	S	S	S

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium, L– Low (may be avoided)

UNIT	Contents	No. Of. Hours
I	**IOT Introduction** Introduction to Internet of Things: Definition – Characteristics of IOT – Physical Design of IOT – Things in IOT – IOT Protocols – Logical Design of IOT – IOT Functional Blocks – IOT Communication Models – IOT Communication APIs – IOT Enabling Technologies	**16**
II	**Domain Specific IOT 1** Domain Specific IOT – I : Smart Lighting – Smart Appliances – Intrusion Detection – Smoke/ Gas Detection – Smart Parking – Smart Roads – Structural Health Monitoring – Surveillance – Emergency Response – Weather Monitoring	**15**
III	**Domain Specific IOT II** Domain Specific IOT – II : Air Pollution Monitoring – Noise Pollution Monitoring – Forest Fire Detection – River Flood Detection – Smart Grids- Smart Vending Machines – Route Generation & Scheduling – Fleet Tracking – Shipment Monitoring.	**14**
IV	**Domain Specific IOT III** Domain Specific IoT – III: Remote Vehicle Diagnostics – Smart Irrigation - Green House Control – Machine Diagnosis & Prognosis – Indoor Air Quality Monitoring – Health & Fitness Monitoring – Wearable Electronics	**16**
V	**IOT and M2M** IOT And M2M: M2M – Difference Between IOT And M2M – SDN And NFV For IOT – IOT System Management With NETCONF – YANG : Need For IOT Systems Management – SNMP- Network Operator Requirements.	**14**
	TOTAL HOURS	**75**

Textbooks	
1.	Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann, “Interconnecting Smart Objects with IP: TheNext Internet”, MK Publishers, 2010
Reference Books	
1.	P.Rizwan Ahmed,”Internet of Things”, Margham Publications,2010.
2.	Adrian McEwen,” Designing the Internet of Things”, Hakim Cassimally, 2013.
3.	Cuno Pfister,” Getting Started with the Internet of Things”, O'Reilly Publications, 2011.

4.	Maciej Kranz, “Building the Internet of Things”, Wiley Publications, 2016.
5.	Bruce Sinclair, “IoT Inc: How Your Company Can Use The Internet of Things toWin in the Outcome Economy”, Mc-Graw Hill Professional, 2017.
6.	Raj Kamal, “Internet of Things”, Mc-Graw Hill Professional, 2018.
7.	Olivier Hersent,David Boswarthick ,” Internet of Things:KeyApplications and Protocols”, Wiley Publications, 2015
8.	John Rossman,” The Amazon Way On IoT”, Brilliance Audio Publications, 2016.

WEB RESOURCES

1. https://lecturenotes.in/subject/370/internet-of-things-iot
2. https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf

SYLLABUS DESIGNER

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Cyber Security

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
VI		ELECTIVE – IV PAPER - 2	5	75	5	75	-	-	3

COURSE OBJECTIVES

1. To understand the basic concept of symmetric chipper
2. To understand block chipper and data encryption standard
3. To understand the concepts of asymmetric chipper
4. To understand the concepts of cryptographic data integrity algorithm
5. To understand the concepts of network and internet security

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the basic concept of symmetric chipper	K1
CO2	To understand block chipper and data encryption standard	K3
CO3	To understand the concepts of asymmetric chipper	K3
CO4	To understand the concepts of cryptographic data integrity algorithm	K3
CO5	To understand the concepts of network and internet security	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	M	M	S	M	M	S	M	S	S
CO4	S	S	M	S	M	M	M	S	S	S
CO5	S	S	M	M	M	S	M	S	S	S

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium, L– Low (may be avoided)

UNIT	Contents	No. Of. Hours
I	**Basics of Cyber crime** Introduction - Cyber Threat – Definition of Cyber Crime – Classification – Current Threats and Trends – Diversity of Cyber Crime – Cyber Hate Crimes – Cyber Terrorism - Need for cyber security.	**12**
II	**Responding to Cyber crime** Cyber Strategy – National Security Strategy – Cyber Security Strategy – Organized Crime Strategy – Cyber Crime Strategy - Policy Cyber Crime – International Response – National Cyber Security Structure – Strategic Policy Requirements – Police and Crime Commissioners.	**15**
III	**Investigating Cyber crime** Preventing Cyber Crime – Password Protection – Get Safe Online – Cyber Security Guidance for Business - Cyber Crime Investigation Skills – Criminal Investigation – Code of Ethics – Evidence – Hi-Tech Investigations – Capturing and Analyzing Digital Evidence.	**18**
IV	**Foundations of Digital Forensics** Introduction to Digital Forensics - Forensic Software and Hardware - Analysis and Advanced Tools - Forensic Technology and Practices - Forensic Ballistics and Photography - Face-Iris and Fingerprint Recognition - Audio Video Analysis - Windows System Forensics - Linux System Forensics - Network Forensics.	**18**
V	**Case Studies** Latest Study Topics on Cyber Crime and Investigations - Recent Cyber Crime Cases – Recent Digital Forensics Cases – Bridging the Gaps in Cyber Crime Investigations between the Cyber security stake holders.	**12**
	TOTAL HOURS	**75**

Textbooks	
1.	Thomas Halt, Adam M. Bossler and Kathryn C. Seigfried Spellar, (2017), "Cybercrime and Digital Forensics: An Introduction", Routledge Taylor and Francis Group.
Reference Books	
1.	Bernadette H Schell, Clemens Martin, (2004), "Cybercrime", ABC – ClioInc, California.

SYLLABUS DESIGNER

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Multimedia

Semester	Subject Code	Category	Lecture Hrs		Theory Hrs		Practical		Credits
			Per week	Per Sem	Per week	Per Sem	Per week	Per Sem	
VI		SB PRACTICAL - IV	2	30	-	-	2	30	2

COURSE OBJECTIVES

1. To motivate the students to develop the project using Multimedia concept.
2. To obtain the knowledge about the flash environment which helps them to develop the projects.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	Learning the fundamental concepts of Multimedia in flash	K1
CO2	To familiarize the student with the tools of flash.	K2
CO3	To allow student to gain expertise in some specific areas of multimedia and flash.	K2 & K3
CO4	Understanding the importance of flash UI components.	K2
CO5	Analyse the technique of interactive flash tools.	K4

Mapping with Programme Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	M	S	M	S	S
CO2	L	S	M	M	S	M
CO3	S	M	S	M	S	S
CO4	S	S	M	S	M	M
CO5	M	S	S	M	M	M

PO – Programme Outcome, CO – Course outcome S – Strong, M – Medium, L– Low (may be avoided)

UNIT	Contents	No. Of. Hours
I	**FLASH INTRODUCTION** Introducing Flash – Basics – Creating Objects – Editing Objects.	**6**
II	**WORKING WITH COLORS AND FONT** Color and Text – Symbols and Instances – Library – Bitmaps, Sound, Video.	**6**
III	**WORKING WITH FRAMES AND LAYERS** Frames and Layers – Animation Basics – Understanding animation – Scenes – Frame –by- Frame Animation – Onion Skinning.	**6**
IV	**WORKING WITH ANIMATIONS** Text Animation – Motion Tweening – Shape tweening – Motion guide – Movie clips.	**6**
V	**WORKING WITH MOVIES** Making Buttons – Creating an animated button – Creating Linear Movies	**6**
	TOTAL HOURS	**30**

	Textbooks
1.	Nick Van Dome, "Flash MX: In easy Steps", Dreamtech Publications, 2000.
	Reference Books
1.	Tay Vaughen, "Multimedia Making it Work", McGraw Hill Publications, 2000.
1.	Ze-Nian Li, Mark S.Drew, Jiangchuan LiU, "Fundamentals of Multimedia", Springer Publications,2004.
2.	Richard E.Mayer,"Multimedia Learning", CambridgeUniversity Press, 2001.
3.	John F. Koegel Buford,"Multimedia Systems", Pearson Education, 2006.
4.	Ralf Steinmetz,"Multimedia", Springer Publications, 1994
5.	Sugata Mitra,"Introduction to Multimedia Systems", Academic Press,Inc., 2001.

PRACTICAL EXERCISE

1. Creating and Editing Objects
2. Text Manipulation
3. Frame By Frame Animation
4. Motion Tweening
5. Shape Tweening
6. Animating Text
7. Movie Clips
8. Creating Buttons

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