ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN

(AUTONOMOUS)

Re-accredited with B^{++} by NAAC in 3rd cycle

(Run by Hindu Religious and Charitable Board under the Aegis of Arulmigu Dhandayuthapani Swamy Thirukovil, Palani)

(Affiliated to Mother Teresa Women's University, Kodaikanal)

Chinnakalayamputhur (PO), Palani 624 615.

Curriculum Framework and Syllabus for Outcome Based Education in

Master of Science
(Computer Science)

(PROGRAMME CODE: PGCSS)

Degree Programme for the students admitted from the Academic year 2019-2020 Onwards

PG DEPARTMENT OF COMPUTER SCIENCE

ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN

INSTITUTIONAL VISION AND MISSION

VISION

- Enlightenment and Empowerment of Rural Women

MISSION

- To imbibe research activity and collaborative programs with our local communities.
- High quality teaching, providing learning environment with practical exposure.
- Encouragement of a questioning spirit and self-reliance.
- Strong and support education for the students employability

PG DEPARTMENT OF COMPUTER SCIENCE

VISION

- Employing women in the field of Information Technology.
- Molding rural women into Future Leaders.

MISSION

- Training students in latest trends in IT Field.
- Motivating students to organize IT related competitions.
- Conducting special lectures for the students to advance the state of the art in computer science and IT Field.
- Training students to do projects in recent technologies.

M.Sc (Computer Science)

REGULATION FOR ADMISSION

1. **Preamble**

Computer Science department was established in 1988 as self supporting department with the curriculum specifically designed to reflect the depth and breadth of computer science. To encourage young rural women students to adopt higher education, M.Sc Computer Science Programme is added in the department in 2005. Expert members from Academia and Industry provide inputs in introducing specialized courses in the curriculum to suit industry needs. To further enhance the quality of the programme, the department adheres Outcome Based Education (OBE) 2019-2020 onwards.

2. **Eligibility for Admission**

Candidates for admission to the M.Sc (Computer Science) course (Full-Time) should possess a B.Sc (Computer Science) / B.Sc(IT)/ B.Sc(CT) / BCA or any equivalent degree with a minimum aggregate of 55% marks in Part III Subjects.

3. **Duration of the Course**

Full-Time M.Sc (Computer Science) Degree course shall be divided into four semesters of two years duration.

4. **Eligibility for the Degree**

- Candidates for the degree shall besides undergoing the prescribed course of the study, do practical work like case study, project report, prescribed field training etc., under the guidance of staff members and the Head of the Department.
- No candidate shall be eligible for the degree unless she has completed the prescribed course of the study in an Institution and has passed the prescribed examinations.
- No candidate shall be admitted to the examination unless she has put in not less than 60% attendance in terms of total number of working days and has produced a certificate from the Head of the Institution where she has studied that her progress and conduct have been satisfactory.

5. **Passing Rules**

75% of marks are allotted for external evaluation and 25% of the marks are allotted for internal evaluation in each of the theory subjects.

60% of marks are allotted for external evaluation and 40% of the marks are allotted for internal evaluation in each of the practical subjects.

A Candidate is deemed to have passed in a subject if she gets a **minimum of 50%** of the total marks taking the University examination.

6. Distribution of Marks for External Examinations

Course	External (75 Marks)	Average of Passing Minimum
PG	38/75(50%)	50/100

7. Pattern of Evaluation

For each paper there will be Internal Assessment (IA) and Semester Examination (External).

	Int.	Ext.	Total
Theory	25	75	100
Practical	40	60	100
Project	50	150	200

8. Internal Assessment Components

Theory

Test	-	15
Assignment	-	5
Seminar	-	5

		25
		---

9. Content Delivery methods

- Lecture method
- Group Discussion
- ICT

10.Pattern of the Question Paper(Internal)

Maximum: 30 marks Time: 2 Hours

Part – A

I. Answer the following questions(Either or Choice) (2*5=10)

Part – B

II. Answer the following questions(Either or Choice) (2*10=20)

11.Pattern of the Question Paper(External)

Maximum: 75 marks Time: 3 Hours

Part – A

I. Answer any FIVE out of EIGHT questions (5*3=15)

Each unit must have ONE or TWO questions

Part – B

II. Answer the following questions (Either or Choice) (5*6=30)

ONE question from each unit

Part – C

III. Answer any THREE out of FIVE questions (3*10=30)

ONE question from each unit

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

K1-Knowledge; **K2**- Comprehension; **K3**- Application; **K4**-Analysis;
K5- Synthesis; **K6**-Evaluation;

1. Theory – 75 Marks

Cognitive Level	Section	Marks	Course Outcomes	Description	Total
K2, K3	A (5 Out of 8)	5 x 3 = 15	CO1,CO2	Short Answers	75
K4	B (Either or Choice)	5 x 6 = 30	CO2,CO3	Descriptive / Detailed	
K5,K6	C (3 Out of 5)	3 x 10 = 30	CO4,CO5	Descriptive / Detailed	

2. Practical Examinations:

Knowledge Level	Section	Marks
K3	Practical & Record Work	60
K4		
K5		

APAC(W), Palani M.Sc(CS) | 2019-2020 onwards

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(Affiliated to Mother Teresa Women's University, Kodaikanal)

Curriculum Framework and Syllabus for Outcome Based Education in

Master of Science

(Computer Science)

(For the students admitted from the Academic year 2019-2020)

BOARD OF STUDIES MEETING HELD ON 26.04.2019

UNIVERSITY NOMINEE:

Dr.M.P.Indra Gandhi,

Assistant Professor (SG),

Department of Computer Science,

Mother Teresa Women's University,

Kodaikanal.

Contact No.: +91 9442094960

M.P. Indragandhi 26/4/2019

SUBJECT EXPERTS:

Mr.V.Manikandan MCA.,M.Phil.,

Assistant Professor,

Department of Computer Science,

Arulmigu Palaniandavar College of Arts and Culture.

Palani.

Contact No.: +91 9751031113

Dr(Mrs.)V.Anuratha,

Head, PG Department of Computer Science,

S.T.C College,

Pollachi.

Contact No.: +91 9842973990

HOD

T. Subramanyam
Dean

PRINCIPAL

SEMESTER-WISE DISTRIBUTION OF COURSES WITH SCHEME OF VALUATION

UNDER CBCS PATTERN

OUTCOME BASED EDUCATION (OBE)

SEMESTER	SUBJECT CODE	TITLE OF THE PAPER	HOURS	CREDITS	MARKS			Exam (Hrs)
					INT.	EXT.	TOT.	
I	**MPCSC1**	**Core Paper I:**Mathematical Foundation of Computer Science	5	4	25	75	100	3
	MPCSC2	**Core Paper II:** Advanced Java Programming	5	4	25	75	100	3
	MPCSC3	**Core Paper III:** Advanced Operating System	5	4	25	75	100	3
	MPCSL1	**Core IV - Practical I:** Advanced Java Programming Lab	5	4	40	60	100	3
	MPCSL2	**Core V - Practical II:** Web Technology Lab	5	4	40	60	100	3
	MPCSE1	**Elective I**	5	4	25	75	100	3
		Total	**30**	**24**			**600**	
II	**MPCSC4**	**Core Paper VI:** Cryptography & Network Security	5	4	25	75	100	3
	MPCSC5	**Core Paper VII:** Data Mining	5	4	25	75	100	3
	MPCSC6	**Core Paper VIII:** Python Programming	5	4	25	75	100	3
	MPCSL3	**Core IX - Practical III:** Python Programming Lab	5	4	40	60	100	3
	MPCSL4	**Core X - Practical IV:** .NET Programming Lab	5	4	40	60	100	3
	MPCSE2	**Elective II**	5	4	25	75	100	3
		Total	**30**	**24**			**600**	
		Internship Training ***(15 Days)***						

III	**MPCSC7**	**Core Paper XI:** Big Data Analytics	5	4	25	75	100	3
	MPCSC8	**Core Paper XII:** Software Project Management	5	4	25	75	100	3
	MPCSC9	**Core Paper XIII:** PHP and MYSQL	5	4	25	75	100	3
	MPCSL5	**Core XIV- Practical V:** PHP and MYSQL Lab	5	4	40	60	100	3
	MPCSL6	**Core XV - Practical VI:** MATLAB	5	4	40	60	100	3
	MPCSE3	**Elective III**	5	4	25	75	100	3
		Internship Training	**-**	2	**-**	100	100	3
		Total	**30**	**26**			**700**	
IV	**MPCSC10**	**Core Paper XVI:** Digital Image Processing	5	4	25	75	100	3
	MPCSE4	**Elective IV**	5	4	25	75	100	3
	MPCSPR	**Core XVII:** Project Work	20	8	50	150	200	3
		Total	**30**	**16**			**400**	
		Grand Total	**120**	**90**			**2300**	

DISTRIBUTION OF CORE AND ELECTIVE

CORE : 17 (10 Theory + 6 Lab + 1 Project)

ELECTIVE : 04

INTERNSHIP TRAINING : 1

TOTAL MARKS : 2300

TOTAL CREDITS : 90

LIST OF ELECTIVE PAPERS

Elective I:

1. Design and Analysis of Algorithm
2. Embedded System
3. Artificial Intelligence and Machine Learning

Elective II:

1. Principles of Compiler Design
2. Client Server Computing
3. Neural Networks

Elective III:

1. Mobile Computing
2. Software Engineering
3. Robotics

Elective IV:

1. Grid and Cloud Computing
2. Internet of Things
3. Soft Computing

INTERNSHIP TRAINING

Students will undergo summer internship during the second semester holidays from first week of May to second week of June for a period of 15 days in a related organization approved by the staff co - ordinator / HOD. It will be evaluated during III semester for 100 marks.

PROGRAM OUTCOMES

Upon successful completion of the programme, the student will able to

PO1 Communicate computer science concepts, designs, and solutions effectively and professionally.

PO2 Apply knowledge of computing to produce effective designs and solutions for specific problems.

PO3 Identify, analyze, and synthesize scholarly literature relating to the field of computer science.

PO4 Use software development tools, software systems, and modern computing platforms.

PO5 Attend SET/NET exams with confidence

PROGRAM SPECIFIC OUTCOMES

Graduate with a M.Sc. in Computer Science will have the ability to

PSO1 Apply standard Computer science practices and strategies in real-time software project development using open-source programming environment or commercial environment to deliver quality product for the organization success

PSO2 Design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, Grid and cloud computing

PSO3 Able to pursue research in Data mining, Image processing and Networking areas and implement his work in MATAB and **.**Net environment .

PROGRAM EDUCATIONAL OBJECTIVES

After few years from the completion of M.Sc programme, the students will be able to

PEO1 Work productively as successful Computer professionals in diverse career paths including supportive and leadership roles on multidisciplinary teams or be active in higher studies

PEO2 Communicate effectively, recognize and incorporate societal needs and constraints in their professional endeavors and practice their profession with high regard to Ethical responsibilities

PEO3 Engage in life-long learning and to remain current in their profession to foster personal and organizational growth.

MAPPING INSTITUTION MISSION WITH PROGRAMME EDUCATIONAL OBJECTIVES

Mapping				
	IO1	**IO2**	**IO3**	**IO4**
PEO1		*		*
PEO2	*	*	*	
PEO3		*	*	*

CORE PAPER I

MPCSC1- MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Hours: 5 **Credits : 4**

Semester: I

Preamble

The main objective of this course is to introduce the basic terminology used in Computer application. This emphasizes the development of rigorous logical thinking for solving different kinds of problems that occur in computer applications. This course aims at giving adequate exposure in the theory and applications of Set theory, relations, functions, graph theory and Automata theory.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Recognize mathematical logics to solve computational problems.	Comprehension (Level K2)
CO2.	Examine the concepts of sets, relations and functions.	Application (Level K3)
CO3.	Formulate problems and solve recurrence relations.	Application(Level K3) Analysis (Level K4)
CO4.	Develop solutions for real world problems using graph theory.	Synthesis (Level K5)
CO5.	Evaluate the real world problems using graph theory.	Evaluation (Level K6)

UNIT I

Mathematical Logic: Introduction – Propositions – Connectives – Order of Precedence for Logic Connectives – Conditional and Bi-Conditional Propositions – Tautology and Contradiction –

Equivalence of Propositions – Duality Law – Algebra of Propositions – Tautological Implication – Normal Forms.

UNIT II

Set Theory: Introduction – Basic Concepts and Notations – Ordered Pairs and Cartesian Products – Set Operations.

Relations: Type of Relations – Some Operations on Relations – Composition of Relations – Properties of Relations – Partition of a Set - Matrix Representation of Relations by Graphs – Representation of Relations by Graphs.

UNIT III

Functions: Introduction – Representation of a Function – Types of Functions – Classification of Functions –Composition of Functions – Inverse of Function – Binary n-ary Operations –Properties of Binary Operations.

UNIT IV

Graph Theory: Introduction –Basic Definitions –Degree of a Vertex – Some Special Simple Graphs - Matrix Representation of Graphs – Paths, Cycles and Connectivity – Eulerian and Hamiltonian Graphs – Connectedness in Directed Graphs – Shortest Path Algorithms.

UNIT V

Formal Languages and Automata Theory: Introduction –Phrase – Structure Grammar – Types of Phrase –structure Grammar – Backus-Naur Form (BNF) .

Finite State Machine: Input and Output Strings for FSM – Finite State Automata(FSA)- Push down Automaton – Turing Machine.

TEXT BOOK

- T.Veerarajan, *Discrete Mathematics with Graph Theory and Combinatorics*, McGraw Hill, 2007.

REFERENCE BOOK

- C.L.Liu, *Elements of Discrete Mathematics*, McGraw Hill, 1985.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	H	H	M	H
CO2	M	M	H	M	H
CO3	M	H	H	M	M
CO4	H	M	H	M	H
CO5	H	H	H	H	H

***H-High; M-Medium; L-Low;**

CORE PAPER II

MPCSC2 - ADVANCED JAVA PROGRAMMING

Hours: 5 **Credits : 4**

Semester: I

Preamble

This course helps the students to understand the advanced features of java programming such as applet, servlet, java beans, RMI and JDBC.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Understand the logics of applets, AWT event handling, Servlet and RMI.	Comprehension (Level K2)
CO2.	Write Servlets to access database using Java Data Base Connectivity (JDBC).	Application(Level K3)
CO3.	Applications of database using Java Data Base Connectivity (JDBC).	Application(Level K3)
CO4.	Demonstrate capabilities of server using the concept of Servlet.	Analysis(Level K4)
CO5.	Validate remote methods in an application using Remote Method Invocation (RMI.)	Synthesis(Level K5)

UNIT I

Applet And Graphics: Applet life cycle - Applet methods - Passing parameters to Applets - getDocumentBase() and getCodeBase() - Using images - Applet interfaces - Difference between Applet and Application Program - Drawing lines and different Shapes - Clipping.

UNIT II

AWT And Event Handling: Introduction – Component – Frame - Button class - Layout Management – Insets – Canvas – Label - Text field- Check box - Check box group – Choice – List – Menu - Event handling - Adapter class.

UNIT III

Servlet: Introduction – DHTML - CGI Script - Java Servlet - Servlet Container - Servlet Life Cycle - Servlet Interface - Generic Servlet class - HttpServlet Class - HttpServlet Interface - getOutputStream method - setHeader() method - parameter passing to servlet - More about Servlet Owner - Java Web Server and Cookies.

UNIT IV

JDBC: Introduction – Introduction to SQL – Database connectivity – ODBC and JDBC API – JDBC application architecture – Steps for creating ODBC DSN – The statement object – Working with Resultset

Java Beans: Introduction – Getting started for Beans – Using BDK Demonstration Beans – Saving and restoring Beans – Building an applet from BeanBox – Create your own bean – InfoBus – Java Activation Framework – Enterprise JavaBeans – The JavaBean bridge for ActiveX – Other Bean Development Tools

UNIT V

Networking: TCP/IP - UDP/IP - IP Address – DNS – Port – URL - Socket Programming using TCP/IP and UDP/IP

RMI: Introduction - RMI Packages - Programming using RMI – RMI Enhancements

TEXT BOOK

- R.Krishnamoorthy and S.Prabhu, *Internet and Java Programming, le*, Publishers: New Age International, 2013.

REFERENCE BOOKS

- Herbert Schildt, *Java2: The Complete Reference*, Tata McGraw Hill, 2013
- Dr. C.Muthu, *Essentials of Java programming*, Vijay Nicole Imprints Pvt. Ltd.,
- K.Somasundaram, *Advanced Java Programming in Java2*, Jaico Publishing House, Mumbai, 2008

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	M	M	M
CO2	H	H	M	H	M
CO3	H	H	M	H	M
CO4	H	H	M	M	M
CO5	H	H	M	M	M

***H-High; M-Medium; L-Low;**

CORE PAPER III

MPCSC3 - ADVANCED OPERATING SYSTEMS

Hours: 5 **Credits : 4**

Semester: I

Preamble

This course intended to give students a thorough understanding of design and implementation issues for modern multicore operating systems and helps the students to learn the theoretical foundation of clock, mutual exclusion, deadlock detection, resource sharing and concurrency control in distributed environment.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Understand the concepts of distributed operating system.	Comprehension (Level K2)
CO2.	Describe the concepts of distributed operating system.	Comprehension (Level K2)
CO3.	Apply the concepts of synchronization and handle Deadlocks.	Application (Level K3)
CO4.	Examine the functionalities of distributed resource management.	Analysis (Level K4)
CO5.	Evaluate various operating systems such as multiprocessor operating system and database operating system.	Synthesis (Level K5)

UNIT I

Process Synchronization: Overview - Functions of an OS – Design approaches. **Synchronization mechanisms:** Concept of a process – concurrent process – Critical section problem – Other synchronization problems. **Process Deadlocks:** Preliminaries – Models of

Deadlocks – Models of resources – A Graph theoretic model of a system state – Systems with only reusable Resources.

UNIT II

Distributed Operating System: Communication networks – Communication primitives. **Distributed Mutual exclusion:** Preliminaries – Non- Token based and Token Based Algorithms. **Distributed Deadlock detection:** Deadlock handling strategies – Control organization for Distributed Deadlock Detection.

UNIT III

Distributed Resource Management: Architecture – Mechanisms – Design Issues – **Distributed shared memory:** Architecture – Algorithms for Implementing DSM – Memory coherence – Coherence protocols – Design Issues. **Distributed scheduling:** Issues in Load Distributing – components – Load distributing algorithms.

UNIT IV

Multiprocessor Operating Systems: Motivations – Basic Multiprocessor System Architectures – Interconnection Networks – Caching – MOS Structures – Threads – Process Synchronization – Processor Scheduling – Memory Management.

UNIT V

Database Operating Systems: Introduction – Concurrency Control: Introduction -Database Systems : Transactions – Conflicts – Transaction Processing – Serializability Theory – Distributed database systems : Transaction Processing Model - Serializability Condition in DDBS – Data Replication – Complications due to Data Replication – Fully -Replicated Database Systems.

TEXT BOOK

- Mukesh Singhal, Niranjan G.Shivaratri, *Advanced Concepts in Operating Systems: Distributed, Database and Multiprocessor Operating Systems*, TMH, 2001.

REFERENCE BOOKS

- Andrew S. Tanenbaum, *Modern Operating System*, PHI , 2003.
- Pradeep K.Sinha, *Distributed Operating System concepts and Design*, PHI, 2003

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	M	M	H	M
CO2	H	H	M	M	H
CO3	M	M	M	M	M
CO4	H	M	M	M	M
CO5	H	M	H	H	M

***H-High; M-Medium; L-Low;**

CORE IV - PRACTICAL I

MPCSL1 - ADVANCED JAVA PROGRAMMING LAB

Hours: 5 **Credits : 4**

Semester: I

Preamble

This course helps the students to develop projects using advanced features of java programming such as applet, servlet, java beans, RMI and JDBC.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Execute interactive web pages using HTML and JavaScript.	Application (Level K3)
CO2.	Apply interactive web pages using HTML and JavaScript.	Application (Level K3)
CO3.	Acquire knowledge about Servlet and RMI.	Analysis (Level K4)
CO4.	To connect java program with external database using JDBC.	Synthesis (Level K5)
CO5.	Evaluate with external database using JDBC.	Synthesis (Level K5)

PROGRAM LIST

1. Program to display life cycle of an applet.
2. Program to display digital clock using applet
3. Program to display different graphical Shapes in applet.
4. Program to display graphical bar chart by passing parameters in applet
5. Program to find factorial of N using AWT high level event handling.

6. Program to illustrate window closing using AWT low level event handling.
7. Program to find sum of digits using RMI.
8. Program to find length of the given string using RMI.
9. Program to compute factorial of N using Servlet.
10. Program to compute factorial value of N using Servlet.
11. Program to display student mark statement using Servlet and JDBC

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	M	M	H
CO2	H	H	H	H	M
CO3	H	H	M	H	M
CO4	H	H	H	M	H
CO5	H	M	M	H	H

***H-High; M-Medium; L-Low;**

CORE V - PRACTICAL II

MPCSL2 - WEB TECHNOLOGY LAB

Hours: 5 **Credits : 4**

Semester: I

Preamble

This course enable the students to learn the concepts of designing the websites using HTML, CSS, JavaScript and JSP.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Create web pages using HTML and CSS.	Application (Level K3)
CO2.	Describe web pages using HTML and CSS.	Application (Level K3)
CO3.	Apply JavaScript for interactive web pages.	Application (Level K3)
CO4.	Validate server side scripting using JSP.	Synthesis (Level K5)
CO5.	Evaluate server side scripting using JSP.	Synthesis (Level K5)

PROGRAM LIST

1. Simple HTML Page using formatting tags, table, image and frames
2. Design a web page using CSS
3. Prepare a resume using forms
4. Website Design for a Department (or) College (or) Company etc.
5. Create a Link to a CSS to display student information

6. Java Script for a Mathematical Calculator
7. Java Script – Number Puzzle
8. Java script-Games using Random number generation
9. Validation of name, mobile number, date of birth, email id using Java Script
10. Online Quiz using JSP
11. Perform Arithmetic operations using JSP
12. Generate Fibonacci series using JSP

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	M	M	H
CO2	H	H	M	M	M
CO3	H	H	M	H	M
CO4	H	H	M	M	H
CO5	H	H	M	M	H

***H-High; M-Medium; L-Low;**

ELECTIVE 1.1

MPCSE1 - DESIGN AND ANALYSIS OF ALGORITHM

Hours: 5 **Credits : 4**

Semester: I

Preamble

This course offers introduction to various common algorithm design techniques, methods for analyzing the performance of corresponding algorithms and improving their efficiency, and to provide performance guarantees.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Get the idea of working principles of different algorithms.	Comprehension (Level K2)
CO2.	Understand the concept of various searching and sorting algorithms.	Application (Level K3)
CO3.	Apply the concept of various searching and sorting algorithms.	Application (Level K3)
CO4.	Analyze various design and analysis techniques such as greedy algorithms, dynamic programming, back tracking and branch & bound.	Analysis (Level K4)
CO5.	Evaluate time complexity using Asymptotic Notation.	Synthesis (Level K5)

UNIT I

Introduction: Algorithm – Algorithm specification - Performance Analysis: Space Complexity -Time complexity– Asympotic Notation (O, Θ, Ω).

Divide and Conquer: General method - Binary search - Merge sort - Quick sort.

UNIT II

Greedy Method: The General Method – Knapsack Problem - Job Sequencing with Deadlines. M**inimum-Cost Spanning Trees:** Prim's and Kruskal's algorithms - Single Source Shortest Paths.

UNIT III

Dynamic Programming: The General Method - Multistage Graphs -All Pairs Shortest Paths - Single Source Shortest Paths-O/1 Knapsack problem-The Traveling sales-Person Problem.

UNIT IV

Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.

UNIT V

Back Tracking: The General method – The 8-Queens Problem - Sum of Subsets - Graph Coloring-Hamiltonian Cycles.

Branch-And-Bound: The Method - Least Cost(LC) Search – Bounding - FIFO Branch-and-Bound - LC Branch-and-Bound.

TEXT BOOK

- Ellis Horrowitz, Sartaj Sahini and Sanguthevar Rajasekaran, *Fundamentals of Computer Algorithms*, 2nd Edition, Universities press.

REFERENCE BOOKS

- Gilles Brassard and Paul Bratley, *Fundamentals of algorithm*, Prentice Hall of India Pvt.Ltd., 1997.
- Mark Allen Weiss, *Data Structures and Algorithms analysis in C*, Addition-Wesley, Third Indian Reprint, 2000.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	M	M	M	H
CO2	H	H	M	M	H
CO3	H	H	H	M	H
CO4	H	M	H	M	H
CO5	H	M	H	M	H

***H-High; M-Medium; L-Low;**

ELECTIVE 1.2

EMBEDDED SYSTEM

Hours: 5 **Credits : 4**

Semester: I

Preamble

This course helps the students to acquire the knowledge about principles and programming concepts of Embedded system.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Understand the basic concepts of embedded system	Comprehension (Level K2)
CO2.	Interpret the working concept of the processor and memory organization of embedded system	Application (Level K3)
CO3.	Examine the real time and embedded system operating systems	Analysis (Level K4)
CO4.	Evaluate various programming environment used to develop embedded systems	Synthesis (Level K5) Evaluation (Level K6)
CO5.	Acquire knowledge about life cycle of embedded design and its testing	Synthesis (Level K5)

UNIT I

Introduction to Embedded System: An Embedded System – Processor in the System – Other Hardware Units – Software Embedded into a System – Exemplary Embedded Systems.

UNIT II

Processor and Memory Organization: Structural Units in a Processor – Processor Selection for an Embedded System – Memory Selection for an Embedded system – Direct Memory Access – Devices and Buses for Device Networks: I/O Devices – Timer and Counting Devices – Serial Communication and Parallel Communication – Device Drivers and Interrupts Servicing Mechanism: Device Drivers – Device Drivers for Internal Programmable Timing Devices – Interrupt Servicing (Handling) Mechanism – Context, Latency and Deadline.

UNIT III

Programming Concepts and Embedded Programming in C and C++: Software Programming in Assembly Language (ALP) and in High Level Language „C" – Embedded Programming in C++ - Embedded Programming in Java – Optimization of Memory needs – Inter-Process Communication and Synchronization of Processes, Tasks and Threads: Multiple Processes in an Application – Problem of Sharing Data by Multiple Tasks and Routines – Inter Process Communication.

UNIT IV

Real Time Operating Systems: Real-Time and Embedded System Operating Systems – Interrupt Routines in RTOS Environment: Handling of Interrupt Source Call by the RTOSs - RTOS Task Scheduling Models, Interrupt Latency and Response Time of the Tasks as Performance Metrics – Performance Metric in Scheduling model for Periodic, Sporadic and Aperiodic Tasks – List of Basic Actions in a Preemptive Scheduler and Expected Times taken at a Processor – Fifteen-Point Strategy for Synchronization between the Processors, ISRs, OS Functions and Tasks and for Resource Management – Embedded Linux Internals: Linux Kernel for the Device Drivers and Embedded System – OS Security Issues.

UNIT V

Case Study of an Embedded System for a Smart Card – Hardware & Software Co-Design in an Embedded System: Embedded System Project Management – Embedded System Design and Co-Design Issues in System Development Process – Design Cycle in the Development Phase for an Embedded System – Users of Target System or its Emulator and In-Circuit Emulator(ICE) – Use of Software Tools for Development of an Embedded System – Use of Scopes and Logic Analyzers for System Hardware Tests – Issues in Embedded System Design.

TEXT BOOK

- Raj Kamal, *Embedded Systems – Architecture, Programming and Design*, Tata McGraw-Hill, 2003.

REFERENCE BOOKS

- David E. Simson, *An Embedded Software Primer*, AddisonsWesley-2001.
- Steve Heath, *Embedded Systems Design*, Elsevier, 2003.
- Frank Vahid and Tony Givargis, *Embedded System Design*, John Wiley And Sons, Inc, 2002.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	M	M	H	H
CO2	H	H	M	H	M
CO3	H	M	H	H	M
CO4	H	H	H	H	M
CO5	H	M	H	H	M

***H-High; M-Medium; L-Low;**

ELECTIVE 1.3

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Hours: 5 **Credits : 4**

Semester: I

Preamble

This course offers knowledge about fundamentals of knowledge representation for problem solving, learning methods of Artificial Intelligence. It also helps the students to understand the deeper concepts of Machine Learning and Algorithms

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Understand the basic concepts of Artificial Intelligence and machine learning algorithms	Comprehension (Level K2)
CO2.	Classify strength and weakness of different problem solving techniques	Comprehension (Level K2)
CO3.	Apply Artificial Intelligence and Machine Learning Techniques to solve real world problems	Application (Level K3) Analysis (Level K4)
CO4.	Examine the different heuristic techniques for problem solving and create new solutions	Synthesis (Level K5)
CO5.	Apply selected basic AI techniques	Application (Level K3)

UNIT I

Introduction: Definition of AI - AI Problems – Topics of AI – Production Systems – State space Representation - Applications of AI

UNIT II

Heuristic Search Techniques: Generate and Test - Hill Climbing - Search techniques - Problem Reduction – Constraint Satisfaction – Means –end- Analysis

UNIT III

Game Playing: MINIMAX Procedure – ALPHA-BETA Pruning – Combined Approach Knowledge representation: – Knowledge Management – types of Knowledge – Knowledge representation – Approaches to knowledge Representation - Issues in Knowledge representation – Reasoning

UNIT IV

Learning –Association Learning - clustering: K-means clustering – Fuzzy clustering – Hierarchical Clustering – Reinforcement Learning: Markov Decision Problem - Q- Learning – Learning Automata – Statistical Learning: Hidden Markov Models – Linear Classifiers – Quadratic Classifiers –Decision Trees – Bayesian Networks

UNIT V

Supervised Learning: Support Vector - Case-based Reasoning – Ensemble Classifiers – Nearest Neighborhood – Unsupervised Learning: Expectation maximization – Self organizing Maps – Adaptive Resonance Theory

TEXT BOOK

- S.S. Vinod Chandra, S. Anand Hareendran, *Artificial Intelligence and machine Leaning*, Eastern Economy Edition (2014), PHI Learning Private Limited, New Delhi.

REFERENCE BOOKS

- Elaine Rich and Kevin Knight, *Artificial Intelligence*, 3/e, Tata McGraw Hill (2009), New Delhi.
- Donald A. Waterman, *A Guide to Expert Systems*, Tech knowledge Series in Knowledge Engineering, (2003) New Delhi
- Charnaik, E., C.K. Reiesbeck, and D.V. McDermett, *Artificial Intelligence Programming*, Lawrence Erlbaum Associates (2000), New Jersey
- Stephen Marsland, *Machine Learning: An Algorithmic Perspective*, Chapman and Hall, 2009.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	M	M	M	H
CO2	H	M	H	M	M
CO3	H	H	H	M	M
CO4	H	H	H	M	M
CO5	H	M	H	M	M

***H-High; M-Medium; L-Low;**

CORE PAPER VI

MPCSC4 - CRYPTOGRAPHY AND NETWORK SECURITY

Hours: 5 **Credits : 4**

Semester: II

Preamble

This course provides an essential study of Computer Security Issues and Methods in Networking Systems. It also helps students to identify Ethical, Professional responsibilities, Risks and Liabilities in Computer and Network Environment.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Describe cryptography and network security concepts and its application.	Comprehension (Level K2)
CO2.	Get the idea about encryption standards.	Comprehension (Level K2)
CO3.	Examine various cryptography algorithms.	Application (Level K3)
CO4.	Validate the authentication using digital signature and authentication protocols.	Synthesis (Level K5)
CO5.	Evaluate the authentication using digital signature and authentication protocols.	Synthesis (Level K5)

UNIT I

Introduction: The OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms- **Classical Encryption Techniques** : Symmetric Cipher Model – Substitution Techniques – Transposition Techniques

UNIT II

Block Ciphers and the Data Encryption Standards : Block Cipher Principles – The Data Encryption Standard– **Advanced Encryption Standards**: Evaluation Criteria For AES – The AES Cipher

UNIT III

More on Symmetric Cipher: Multiple Encryption and Triple DES – Block Cipher models of operation. **Confidentially using Symmetric Encryption:** Placement of encryption function – Traffic confidentially – Key distribution – Random number generation

UNIT IV

Public Key Cryptography and RSA: Principles of Public Key Crypto systems – The RSA Algorithm – **Key Management** : Key Management – Diffie Hellman Key Exchange

UNIT V

Message Authentication and Hash Functions: Authentication Requirements - Authentication Functions –Message Authentication Codes – Hash Functions. **Digital Signatures and Authentication Protocols**: Digital Signatures –Authentication Protocols – Digital Signature Standards.

TEXT BOOK

- William Stallings, *Cryptography and Network Security Principles and Practices*,4th edition.

REFERENCE BOOK

- William Stallings, *Cryptography and Network Security*, Pearson Publications, 5th edition.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	M	M	H
CO2	H	M	M	M	M
CO3	H	M	H	L	M
CO4	H	M	H	H	H
CO5	H	M	H	M	M

***H-High; M-Medium; L-Low**

CORE PAPER VII

MPCSC5 - DATA MINING

Hours: 5 **Credits : 4**

Semester : II

Preamble

This course enables the students to learn the concepts of data mining tasks, classification, clustering and web mining. It also imparts the storage of heterogeneous data in data warehousing.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Understand the basic Concepts of data mining and data warehousing.	Comprehension (Level K2)
CO2.	Analyze various data mining techniques like classifications, clustering, association rule mining, prediction and related algorithm.	Analysis(Level K4)
CO3.	Choose appropriate data mining techniques to carry out simple data mining tasks.	Application(Level K3)
CO4.	Analyse data mining techniques to carry out simple data mining tasks.	Analysis(Level K4)
CO5.	Develop data mining algorithms to store heterogeneous data.	Synthesis(Level K5)

UNIT I

Data Warehousing: Introduction – Data warehouse Architecture – Dimensional Modelling-Categorisation of Hierarchies – Aggregate Function – Summarisability – Fact-Dimension Relationship – OLAP Operations – OLAP Server– ROLAP – MOLAP.

UNIT II

Data Mining: Introduction – Definition – KDD vs Data Mining – DBMS vs DM –DM Techniques – Issues and Challenges in DM – DM Application Areas.

UNIT III

Association Rules: Introduction – Methods to Discover Association Rules – A Priori algorithm – Partition Algorithm – Pincer-Search Algorithm – Incremental Algorithm – Border Algorithm – Generalized Association Rules .

UNIT IV

Clustering Techniques: Introduction – Clustering Paradigms – Partitioning Algorithms – K-Medoid Algorithms – CLARA – CLARANS- Hierarchical Clustering – DBSCAN

Decision Trees: Introduction– Tree Construction Principle – Best Split – Splitting Indices – Splitting Criteria CART – ID3.

UNIT V

Web Mining: Introduction – Web Content Mining – Web Structure Mining – Web Usage Mining – Text Mining – Hierarchy of Categories – Text Clustering.

TEXT BOOK

- Arun K Pujari, *Data Mining Techniques,* Universities Press – 2013**.**

REFERENCE BOOKS

- Jewie Han, Michelins Kamber, *Data Mining: Concepts and Techniques*
- Pang-Ning Tan, Michael Steinbach, Vipin Kumar, *Introduction to Data Mining*, 2007.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	M	H	H	H
CO2	H	H	H	M	H
CO3	H	H	H	L	H
CO4	H	M	M	M	M
CO5	H	M	M	M	M

***H-High; M-Medium; L-Low;**

CORE PAPER VIII

MPCSC6 - PYTHON PROGRAMMING

Hours: 5 **Credits : 4**

Semester: II

Preamble

This course helps the students to understand the core concepts of programming in Python such as strings, operators, conditional statements, list, tuples,dictionaries functions and files.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Get the basic knowledge about Python Programming.	Comprehension (Level K2)
CO2.	Apply essential programming concepts like strings, operators, conditional statements, functions, files and exception handling of Python in simple programs.	Application (Level K3)
CO3.	Analyze various concepts of Python.	Analysis (Level K4)
CO4.	Create applications using core concepts of Python.	Synthesis (Level K5)
CO5.	Evaluate applications using core concepts of Python.	Evaluation (Level K6)

UNIT I

Introduction to Python: Introduction – Python overview - Getting started with Python – Comments – Python identifiers – Reserved keyword-variable – Standard data types – Operators- Statements and Expressions- String operations- Boolean expressions.

Classes and Objects: Overview of OOP – Class definition – Creating objects- Objects as Arguments – Objects as return value – Build-in class attributes – Inheritance – Method overriding – Data encapsulation – Data hiding.

UNIT II

Control Statements: The for loop – While statement – if elif else statement – Input from keyboard.

Functions: Introduction – Built-in functions – Type conversion – Date and time – dir() function – help() function – User defined functions – Parameters & arguments – Function calls – The return ststement – Python recursive function – The anonymous functions – Writing python scripts.

UNIT III

Strings: Strings – Compound data type – len function – String slices – Strings are Immutable – String traversal – Escape characters – String formatting operator – String formatting functions.

Lists: Values and accessing elements – Lists are Mutable – Traversing a list – Deleting elements from list – Built-in list operators – Built in list methods.

UNIT IV

Tuples: Creating tuples – Accessing values in tuples – Tuple assignment – Tuples as return Values – Basic operations – Built-in tuple functions

Dictionaries: Creating dictionary – Accessing values in dictionary – Updating dictionary – Deleting elements from dictionary – Operations in dictionary Built-in dictionary methods.

UNIT V

Files and Exceptions: Text Files – Opening a File – Closing a File – File object attributes- Reading from a file – Writing to a file – Renaming a file – Deleting a file – File related methods – Directories – Exceptions – Built-in Exceptions – Handling Exceptions – Exception with arguments – User defined Exceptions.

TEXT BOOK

- E Balagurusamy, 2018 “Introduction to Computing and Problem solving Using Python”, McGrawHill publication.

REFERENCE BOOKS

- Mark Lutz, *Programming Python*, 4/e, O’Reilly Media (2010).
- Mark Summerfield, *Programming in Python 3*, Pearson Education.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	M	H	H	H
CO2	H	H	M	H	M
CO3	H	M	M	H	M
CO4	H	M	M	H	M
CO5	H	H	M	H	M

***H-High; M-Medium; L-Low;**

CORE IX – PRACTICAL III

MPCSL3 - PYTHON PROGRAMMING LAB

Hours: 5 **Credits : 4**

Semester: II

Preamble

This course helps the students to produce well designed programs using advanced concepts of python like regular expressions, exception handling, multithreading, web programming and database programming.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Implement various operators of Python.	Application (Level K3)
CO2.	Applications of various operators of Python.	Application (Level K3)
CO3.	Review the Python programs with variables, loop, functions and operators.	Analysis (Level K4)
CO4.	Analyze the Python programs with variables, loop, functions and operators.	Analysis (Level K4)
CO5.	Develop application with Python core concepts.	Synthesis (Level K5)

PROGRAM LIST

1. Exercises using if-else and conditional operators
2. Exercises implement Recursive and Non-Recursive functions
3. Exercises to implement String
4. Exercises to implement list

5. Exercises using Dictionary.

6. . Exercises to perform set operations.

7. . Exercises using object oriented concepts.

8. Exercises to implement File handling concept

9. Exercises using exceptional handling technique.

10.Exercise to implement Inheritance and polymorphism

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	M	H	M
CO2	H	H	M	H	M
CO3	H	H	M	H	M
CO4	H	H	M	H	M
CO5	H	H	M	H	M

***H-High; M-Medium; L-Low;**

CORE X - PRACTICAL IV

MPCSL4 -.NET PROGRAMMING LAB

Hours: 5 **Credits : 4**

Semester: II

Preamble

This course presents the practical aspects of application development using .Net framework. It also concerns about Common Language Runtime (CLR) and SQL Server concepts.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Develop simple VB.NET program using forms.	Application (Level K3)
CO2.	Apply simple VB.NET program using forms.	Application (Level K3)
CO3.	Execute VB.NET application with various controls.	Analysis (Level K4)
CO4.	Update database using SQL server.	Synthesis (Level K5)
CO5.	Evaluate database using SQL server.	Synthesis (Level K5)

PROGRAM LIST (VB.NET)

1. Write a VB.NET program to receive user feedback using Form and stored it in a database.
2. Write a simple VB.NET program to receive the text and print it using button.
3. Write an VB.NET program to design an application for dynamically populating checkbox list.
4. Create an VB.NET program to design an application using grid view control in a web page.
5. Create an VB.NET applications for

a. Hospital management
b. Hotel management,
c. Online Quiz
d. Online Shopping
e. Student Mark Processing System
f. Online Ticket reservation

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	M	M	H	M
CO2	H	H	M	H	M
CO3	H	M	M	H	M
CO4	H	H	M	H	M
CO5	H	M	M	H	M

***H-High; M-Medium; L-Low;**

ELECTIVE 2.1

MPCSE2 - PRINCIPLES OF COMPILER DESIGN

Hours: 5 **Credits : 4**

Semester: II

Preamble

This course offers knowledge about concepts and principles of compiler design. It also provide basic understanding of grammars, language definitions and phases of designing compiler.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Examine the basic function of compiler and interpreter	Comprehension (Level K2)
CO2.	Understand the core concepts of phases of compiler	Comprehension (Level K2)
CO3.	Apply Context Free Grammar for simplify the expression using different kinds of parsers	Application (Level K3)
CO4.	Interpret the code generation and optimization process	Analysis (Level K4)
CO5.	Evaluate the code generation and optimization process	Synthesis (Level K5)

UNIT I

Introduction: The structure of a Compiler – Compilers writing tools- The lexical and Syntactic Structure of a language – The role of the lexical analyzer – The design of lexical analyzers – Regular expressions – Finite automata.

UNIT II

Context-free Grammars – Derivation and parse trees – Capabilities of Context Free Grammars – Parses – Shift Reduce parsing - Operators Precedence Parsing – Top-down parsing – Predictive parsers.

UNIT III

LR Parsers – The canonical collection of LR (0) Items – Constructing SLR Parsing tables – **Symbol tables:** Data structure for Symbol tables

UNIT IV

Syntax-Directed Translation: Syntax-Directed Translation schemes –Implementation of Syntax-directed translators – Intermediate code – Postfix notation – Parse trees and syntax trees– Three-address code, quadruples and triples – Translation of assignment statements – Boolean expressions

UNIT V

Introduction To Code Optimization: The Principal source of optimization – Loop optimization – The DAG Representation of Basic Blocks – **Code Generation:** Problems in code generation – A Simple code generator

TEXT BOOK

- Alfred V. Aho Ravi Sethi Jeffrey D.Ullman, *Principles of Compiler Design*, Published by Narosa Publishing House.

REFERENCE BOOK

- Kennet C.Louden, *Compiler Construction:Principles and Practice*

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	M	H	H
CO2	H	M	M	H	H
CO3	H	M	H	H	M
CO4	H	M	H	M	M
CO5	H	H	M	H	M

***H-High; M-Medium; L-Low;**

ELECTIVE 2.2

CLIENT SERVER COMPUTING

Hours: 5 **Credits : 4**

Semester: II

Preamble

This course helps the students to acquire the knowledge about core concept of Client/Server technology.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Discuss the core concept of Client / Server technology	Comprehension (Level K2)
CO2.	Schedule the software required to establish Client/Server computing	Comprehension (Level K2) Application (Level K3)
CO3.	Appraise the Online Transaction processing tools and procedures	Application (Level K3) Analysis(Level K4)
CO4.	Set up Distributed system management components and design Client/Server Application.	Synthesis(Level K5) Evaluation (Level K6)
CO5.	To develop a Client Server based applications	Application (Level K3) Analysis(Level K4)

UNIT I

Basic concepts of Client/Server – Characteristics – File Servers – Database servers – Transaction servers- Groupware servers – Objective servers – Web servers – Fat servers or fat clients – 2 tier versus 3 tier – Client/Server building blocks – Operating system services. Base services – Extended services – Server scalability – Client Anatomy.

UNIT II

NOS Middleware – Peer-to-peer communications – RPC – MOM Middleware – MOM versus RPC - The fundamentals of SQL and relational databases – Server architecture – Stored procedures, triggers and rules.

UNIT III

Online transaction processing – Decision support systems – OLTP versus DSS: programming effort, database needs – Data warehouses – Elements - Hierarchies – Replication versus Direct access – Replication mechanism – EIS/DSS Tools – Client/server transaction processing – transaction models – TP Monitors – Transaction management standards.

UNIT IV

Groupware – Components – Distributed objects and components – CORBA: components – Object Management Architecture – Services – Business objects.

UNIT V

Client/server Distributed system management – components – Management application – The Internet Management Protocols – OSI Management Framework – The Desktop Management Interface – X/Open Management Standards – Client/Server application development tools – Client/Server Application Design.

TEXT BOOK

- Robert Orfali, Dan Harkey and Jeri Edwards, *The Essential Client Server Survival Guide*, 2nd edn. Galgotia

REFERENCE BOOKS

- Dawna Travis Dewire, *Client/Server computing*, Tata McGraw Hill.
- Jafferey D. Schank, *Novell"s guide to Client/Server Application and Architecture*, BPB Publications.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	M	H	H
CO2	H	H	M	H	M
CO3	H	M	H	H	M
CO4	H	H	H	H	H
CO5	H	M	M	H	M

***H-High; M-Medium; L-Low;**

ELECTIVE 2.3

NEURAL NETWORKS

Hours: 5 **Credits : 4**

Semester: II

Preamble

This course provides an essential study of Neural Network Techniques. It also helps the students to understand the fundamental concepts of Pattern Recognition.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Get the idea about basics of Neural network	Comprehension (Level K2)
CO2.	Describe the concepts of pattern recognition	Comprehension (Level K2) Application (Level K3)
CO3.	Examine the concept of neuron and multilayer perceptron	Analysis (Level K4)
CO4.	Analyze Kohenen Self–Organizing Networks and Hopfield Networks of Neural network	Analysis (Level K4) Synthesis (Level K5)
CO5.	Design and develop applications using Neural Networks	Application (Level K3)

UNIT I

Introduction: Humans and Computers: The structure of the Brain, Learning in Machines, the Differences.

UNIT II

Pattern Recognition: Introduction, Pattern Recognition in Perspective, Pattern recognition – a definition, feature vectors and feature space, discriminate functions, classification techniques. Linear classifiers statistical techniques, Pattern Recognition – a summary.

UNIT III

The Basic Neuron: Introduction - Modeling the single neuron, learning in simple neurons, the perception a vectorial perspective, the perception learning rule, proof, and limitations of perception.

The Multilayer Perceptron: Introduction, altering the perception model, the new model the learning rule, the multiplayer perception algorithm, the XOR problem revisited applications of multiplayer perception.

UNIT IV

Kohenen Self – Organizing Networks: Introduction, the kohenen algorithm, weight training neighborhoods, reducing the neighborhoods, learning vector quantization, the Phonetic typewriter.

Hopfield Networks: The Hopfield model, the energy landscape, the Boltzsman machine, constraint satisfaction.

UNIT V

Adaptive Resonance Theory: Adaptive resonance theory, architecture and operation, ART algorithm, training the ART network, clarification, conclusion, summary of ART. Hardware and Software implementations, Optical Computing, Optical Computing and neural networks.

TEXT BOOKS

- Adam Hilger, *Neural Computing: An introduction R.Beale&T.Jackson*, 1900.
- James A.Freeman, David, M.Skapura, *Neural Networks-Algorithm, Application and Programming techniques*, Pearson Education.

REFERENCE BOOK

- Fredic M.Ham, IvicalKostanic, *Principles of Neuro computing for science of engineering*, TMCH.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	M	M	L	H
CO2	H	M	H	M	M
CO3	H	M	H	M	M
CO4	H	M	M	H	M
CO5	H	M	M	M	M

***H-High; M-Medium; L-Low;**

CORE PAPER XI

MPCSC7 - BIG DATA ANALYTICS

Hours: 5 **Credits : 4**

Semester: III

Preamble

This course offers knowledge about concepts and challenge of big data. It also the helps students to acquire knowledge about Hadoop, NoSQL, MongoDB, MapReduce and HBase.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Understand the concept of Big data techniques, environment, framework and Hadoop ecosystem	Comprehension (Level K2)
CO2.	Apply data management concepts in MYSQL database	Application (Level K3)
CO3.	Analyze Hadoop components and their uses for big data processing	Analysis (Level K4)
CO4.	Examine the impact of big data for business decisions and strategy	Analysis (Level K4)
CO5.	Manage large-scale analytics tools to solve some open big data problems	Synthesis (Level K5)

UNIT I

OVERVIEW OF BIG DATA: Defining Big Data – Big Data Types – Analytics – Industry Examples of Big Data – Big Data and Data Risk – Big Data Technologies – Benefits of Big Data.

UNIT II

BASICS OF HADOOP: Big Data and Hadoop – Hadoop Architecture – Main Components of Hadoop Framework – Analysing Big Data with Hadoop – Benefits of Big Data.

UNIT-III

NoSQL DATABASES: NoSQL Data Management – Types of NoSQL Databases – Query Mobel for Big Data – Benefits of NoSQL – MongoDB – Advantages of MongoDB over RDBMS – Replication in MongoDB

UNIT-IV

MapReduce: Introduction to MapReduce – Working of MapReduce – Map operation – MapReduce User Interfaces.

UNIT-V

HBase, CASSANDRA and JAQL: Introduction to HBase – Row-oriented and column-oriented Data Stores – HDFS Vs HBase – HBase Architecture – HBase Data Model – Introduction to Cassandra – Features of Cassandra. Introduction to JAQL – JSON – Components of JAQL.

TEXT BOOKS

- V.K.Jain (2017), Big Data and Hadoop,Khanna Book Publishing

REFERENCE BOOKS

- Viktor Mayer, Schonberger, Kenneth Cukier, *Big Data : A Revolution That Will Transform How We Live, Work and Think*, Houghton Mifflin Harcourt publishing company.
- Tom White (2012), "Hadoop:The Definitive Guide" Third Edition , O'reilly media (For Unit IV to V)

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	M	M	H
CO2	M	H	M	M	M
CO3	H	M	H	H	M
CO4	M	H	H	M	M
CO5	H	H	H	H	M

***H-High; M-Medium; L-Low;**

CORE PAPER XII

MPCSC8 - SOFTWARE PROJECT MANAGEMENT

Hours: 5 **Credits : 4**

Semester : III

Preamble

This course provides an essential need for software project management and also highlight the different techniques for software cost estimation and activity planning.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Review the basic concepts of software project management	Comprehension (Level K2)
CO2.	Get the idea about various SDLC models.	Comprehension (Level K2)
CO3.	Apply forward pass and backward pass to find critical path.	Application (Level K3)
CO4.	Analyze the behaviours of team members in an organization.	Analysis (Level K4)
CO5.	Acquire knowledge about cost monitoring and contract management.	Synthesis (Level K5)

UNIT I

Introduction to Software Project Management: Project Definition – Contract Management and Technical Project Management – Activities Covered By Software Project Management – Overview of Project Planning – Stepwise Project Planning.

UNIT II

Selection of Appropriate Project Approach: Introduction – Build or Buy? – Choosing Methodologies and Technologies – Software Processes and Process Models – Choice of Process

Models – Structure versus Speed of Delivery – The Waterfall Model – The Spiral Model – Software Prototyping – Other ways of Categorizing Prototypes – Incremental Delivery – Rapid Application Development – Agile Methods.

UNIT III

Activity Planning: Objectives – Project Schedule – Sequencing And Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management Categories Of Risk - Risk Management

UNIT IV

Monitoring And Control: Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

UNIT V

Managing People And Organizing Teams : Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety

TEXT BOOK

- Bob Hughes, *Software Project Management,* Mike Cotterell, Rajib Mall- Fifth Edition McGraw Hill - 2002.

REFERENCE BOOKS

- Andrew Stellman and Jeniffer Greene, *Applied Software Project Management*, O'Reilly Media Inc., - 2006.
- Robert T. Futrell, Donald F. Shafer, Linda Shafer, *Quality Software Project Management*, Prentice Hall – 2002.
- Pankaj Jalote, *Software project management in practice*, Pearson Education - 2004.
- Joel Henry, *Software project management A real-world guide to success*, Pearson/Addison Wesley – 2004.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	M	M	H
CO2	H	H	H	M	H
CO3	H	L	M	M	M
CO4	H	M	M	M	M
CO5	H	M	M	M	M

***H-High; M-Medium; L-Low;**

CORE PAPER XIII

MPCSC9 - PHP AND MYSQL

Hours: 5 **Credits : 4**

Semester: III

Preamble

This course introduces the concepts of PHP, HTML and MYSQL. It provides concepts of sessions and cookies to develop web pages and the basics of data manipulation using MySQL database.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Understand the basic concepts of PHP and MYSQL.	Comprehension (Level K2)
CO2.	Describe the basic concepts of PHP and MYSQL.	Comprehension (Level K2)
CO3.	Illustrate String, array, mathematical, date and time functions in PHP	Application (Level K3)
CO4.	Examine the regular expressions and file system of PHP.	Analysis (Level K4)
CO5.	To validate database queries in PHP using MYSQL.	Synthesis (Level K5)

UNIT I

Introduction: Server - Side Web Scripting - Syntax and Variables - Control and Functions. Passing Information between Pages: GET Arguments - POST Arguments - Formatting Form Variables - PHP Super global Arrays.

UNIT II

String: Strings in PHP - String Functions-Arrays and Array Functions: Creating Arrays - Retrieving Values - Multidimensional Arrays - Inspecting Arrays - Deleting from Arrays - Iteration. Advanced Array Functions: Transformation of Arrays. Number Handling: Numerical Types – Mathematical Operators - Simple Mathematical Functions - Randomness

UNIT III

Regular Expressions: Tokenizing and parsing Functions - Regular Expressions - Perl – Compatible Regular Expressions - Advanced String Functions. Working with the File system: PHP File Permissions - File Reading and Writing Functions - File system and Directory Functions – Network Functions - Date and time Functions - Calendar Conversion Functions. Working with Sessions and Cookies: Sessions work in PHP - Session Functions - Configuration Issues - Cookies – Sending HTTP Headers

UNIT IV

Structured Query Language (SQL): Relational Database and SQL - SQL standards – The Workhorses of SQL - Database Design - Privileges and Security. PHP and MYSQL: Connecting to MySQL - Making MySQL Queries - Fetching Data Sets - Multiple Connections - Error Checking - Creating MySQL Databases with PHP - MySQL Functions

UNIT V

Performing Database Queries: HTML Tables and Database Tables - Complex mapping – Creating the sample Tables. Integrating Web Forms and Databases: HTML Forms - Basic Form Submission to a Database - Self Submission - Editing Data with an HTML Form

TEXT BOOK

- Steve Suehring, Tim Converse and Joyce Park, *PHP6 and MySQL Bible*, Wiley-India, New Delhi. (2012)

REFERENCE BOOKS

- Mike McGrath, *PHP and MySQL*, McGraw Hill Education Private Limited, India. (2012)
- Beighley, *Head First Php& MySQL*, O'Reilly Publisher. (2011)
- W. Jason Gilmore, *Beginning PHP and MYSQL: From Novice to Professional*, Dreamtech Press. (2010)

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	M	M	H	H
CO2	H	M	H	L	M
CO3	H	M	M	H	M
CO4	H	M	M	H	M
CO5	H	M	M	M	M

***H-High; M-Medium; L-Low;**

CORE XIV - PRACTICAL V

MPCSL5 - PHP AND MYSQL LAB

Hours: 5 **Credits : 4**

Semester : III

Preamble

This course helps the students to produce well designed programs using PHP and access database using MYSQL.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Describe String functions and regular expressions.	Application (Level K3)
CO2.	Apply String functions and regular expressions.	Application (Level K3)
CO3.	Demonstrate the database connectivity with MYSQL database.	Analysis (Level K4)
CO4.	Develop web pages using PHP and MYSQL.	Synthesis (Level K5)
CO5.	Evaluate web pages using PHP and MYSQL.	Synthesis (Level K5)

PROGRAM LIST

1. Exercise to pass information between web pages using GET and POST methods.
2. Exercise using arithmetic operations, String functions.
3. Exercise to apply advanced string functions to manipulate strings.
4. Exercise to implement file concepts to open, read, close and to delete a file.
5. Exercise using Regular expressions for validation.
6. Exercise to implement the date and time functions.

7. Exercise to manipulate data using different queries.
8. Exercise to implement explode and implode functions.
9. Create data base connectivity between PHP and MYSQL.
10. Create web pages with PHP and MYSQL database.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	M	H	M
CO2	H	H	M	H	M
CO3	H	H	L	H	M
CO4	H	H	H	H	H
CO5	H	M	H	H	M

***H-High; M-Medium; L-Low;**

CORE XV - PRACTICAL VI

MPCSL6 - MATLAB

Hours: 5 **Credits : 4**

Semester: III

Preamble

This course provides the practical solution for mathematical problems and do image enhancement process.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Illustrate simple mathematical functions/equations in MATLAB.	Application (Level K3)
CO2.	Interpret simple mathematical functions and operations theorem using plots or display.	Analysis (Level K4)
CO3.	Visualize simple mathematical functions and operations theorem using plots or display.	Analysis (Level K4)
CO4.	Describe the overall structure of MATLAB program to display required output.	Analysis (Level K4)
CO5.	Test the overall structure of MATLAB program to display required output.	Analysis (Level K4)

PROGRAM LIST

1. Plotting
2. Adding Two Images
3. Crop Image
4. Comparison of Two Values
5. Gray Scale to Binary Image

6. Flipping An Image
7. Image Complement
8. Adding and Reducing Noise in an Image
9. Color Space Conversion
10. Image Reduction
11. Multiply and Divide an Image
12. Image Transformation by DCT
13. Shearing an Image
14. Enhance Contrast in an Image
15. Edge Detection in an Image

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	L	H	M
CO2	H	H	M	H	M
CO3	H	L	H	H	M
CO4	H	M	H	M	M
CO5	H	H	M	M	H

***H-High; M-Medium; L-Low;**

ELECTIVE 3.1

MPCSE3 - MOBILE COMPUTING

Hours: 5 **Credits : 4**

Semester: III

Preamble

This course introduces the fundamentals of mobile computing and its architecture. It also discusses topics such as mobile communications, wireless application protocol and wireless LAN.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Understand the concept of communication medium and multiplexing in telephone network.	Comprehension (Level K2)
CO2.	Comprehend the routing mechanism and frequency allocation in GSM.	Comprehension (Level K2)
CO3.	Deploy the GPRS concept for packet data transfer in mobile by using GPRS.	Analysis (Level K4)
CO4.	Evaluate the GPRS concept for packet data transfer in mobile by using GPRS.	Synthesis (Level K5)
CO5.	Acquire the knowledge on WAP, CDMA, 3G network and spectrum techniques in wireless network.	Comprehension (Level K2) Application (Level K3)

UNIT I

Introduction: Mobility of Bits and Bytes-Wireless The beginning-Mobile computing-Dialog Control-Networks-Middleware and Gateways-Applications and Services-Developing Mobile Computing Applications –Security in Mobile Computing –Standards-why is it necessary-Standard Bodies-Players in the wireless space. **Mobile computing Architecture**: History of computers-History of Internet-Internet the Ubiquitous Network - Architecture for Mobile

computing - Three-tier Architecture - Design considerations for mobile computing - mobile computing through Internet - Making existing applications mobile-enabled.

UNIT II

Mobile Computing Through Telephony: Evolution of Telephony - Multiple Access Procedures – mobile computing through telephone – developing an IVR Application - voice XML - Telephony Application Programming Interface. **Emerging Technologies:** Introduction -Bluetooth - radio Frequency Identification – wireless broadband - mobile IP - Internet Protocol version 6 - Java card.

UNIT III

Global System For Mobile Communications: Global system for Mobile communications – GSM Architecture – GSM Entities – call routing in GSM – PLMN Interfaces – GSM address and Identifiers – Network aspects in GSM - GSM Frequency Allocation – Authentication and security. **General Packet Radio Service**: Introduction – GPRS and packet Data Network - GPRS Network operations – Data Services in GPRS – Applications for GPRS -Limitations of GPRS - Billing and charging in GPRS

UNIT IV

Wireless Application Protocol: Introduction – WAP – MMS - GPRS applications. **CDMA and 3G**: Introduction - Spread spectrum technology – IS95 – CDMA versus GSM – Wireless Data – Third Generation Networks – Applications on 3G

UNIT V

Wireless LAN: Introduction – wireless LAN advantages – IEEE 802.11 standards – wireless LAN architecture – mobility in wireless LAN **–** deploying wireless LAN – Mobile adhoc Networks and sensor Networks – Wireless LAN Security – WiFi versus 3G.

TEXT BOOK

- Asoke K Talukder, Roopa R Yavagal, *Mobile Computing, Technology Applications and Service creation,* Tata McGraw - Hill Publishing company New Delhi 2007.

REFERENCE BOOK

- Jochen Schiller, *Mobile Communication,* 2nd edition Pearson 2003.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	M	M	L	M
CO2	H	H	M	M	M
CO3	H	M	M	H	H
CO4	H	M	M	M	H
CO5	H	M	M	M	H

***H-High; M-Medium; L-Low;**

ELECTIVE 3.2

SOFTWARE ENGINEERING

Hours: 5 **Credits : 4**

Semester: III

Preamble

This course imparts the skills of developing software for various applications and systems. It discusses the various software development life cycle models and testing methodologies.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Discuss the stages of software development life cycle	Comprehension (Level K2) Application (Level K3)
CO2.	Examine various Software development life cycle models	Comprehension (Level K2)
CO3.	Analyze the role of project management including requirement gathering, planning, designing and maintenance	Analysis (Level K4)
CO4.	Evaluate various testing principles on software project for risk management	Synthesis (Level K5) Evaluation (Level K6)
CO5.	Design and communicate ideas about software system solution at different levels	Synthesis (Level K5)

UNIT I

The Evolving Role of Software – Definition of Software Engineering – The Changing Nature of Software – Software Myths – Terminologies – Software Life Cycle Models: Build and Fix Model – Evolutionary Process Models – Selection of a Life Cycle Model.

UNIT II

Requirements: Analysis and Specifications: Type of Requirements – Feasibility Studies – Requirement Elicitation: interviews, brain storming sessions, FAST – Requirement analysis: Data flow diagram, Data Dictionaries - Requirements Validation

UNIT III

Project Planning: Size Estimation – The Constructive Cost Model (COCOMO) – The Putnam Resource Allocation Model.

UNIT IV

Software Design: Design: Conceptual and Technical designs, Objectives of design – Modularity - Function Oriented Design – Software reliability: Basic concepts, software reliability, maturity levels - Software Testing: A Strategic Approach to Software Testing – Testing – Functional Testing – Structural Testing – Levels of Testing – Validation Testing.

UNIT V

Software Maintenance: Categories of Maintenance – Problems during Maintenance – Maintenance is Manageable – Potential Solutions to maintenance problems – Maintenance process – Estimation of maintenance cost

TEXT BOOK

- K.K.Agarwal, *Software Engineering*, Third Edition 2008

REFERENCE BOOK

- Richard e.Fairley, *Software Engineering Concepts*, McGrawHill

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	H	M	H
CO2	H	M	H	M	H
CO3	H	H	H	M	M
CO4	H	H	M	L	H
CO5	H	H	H	M	M

***H-High; M-Medium; L-Low;**

ELECTIVE 3.3

ROBOTICS

Hours: 5 **Credits : 4**

Semester: III

Preamble

This course introduces the basic concepts of robotic technology and its classification. It also helps the students to develop small automatic applications with the help of Robotics.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Get the idea about automation and robots	Comprehension (Level K2)
CO2.	Interpret the basic concepts of robotic technology and its classification	Application (Level K3)
CO3.	Analyze various types of grippers	Analysis (Level K4)
CO4.	Collect knowledge about robot sensor and vision	Synthesis (Level K5)
CO5.	Evaluate robot control systems and safety	Evaluation (Level K6)

UNIT I

Introduction: Objectives - automation and robots - brief history - the technology of robots – economic and social issues - present and future applications.

Robot Technology: Objectives-fundamentals general characteristics - basic components - robot anatomy-robot generations-robot selection.

Robot classification: objectives - classification-arm geometry - degrees of freedom-power sources - type of motion - path control - intelligence level

UNIT II

Robot system analysis: Objectives-robot operation - hierarchical control structures - control structure - line tracking - dynamic properties of robots - modular robot components.

Robot End Effectors: objectives - types of end effectors-mechanical grippers - gripper forces analysis - other types of grippers-special-purpose grippers-grippers selection and design-process tooling-compliance.

UNIT III

Sensors: objectives-robot sensors - sensor classification - micro switches – solid - state switches -proximity sensors - photoelectric sensors - rotary positions - usage and selection of sensors – signal processing - sensors and control integration.

Vision: objectives - Visual sensing - machine Vision - machine vision applications - other optical methods.

UNIT IV

Control systems: objectives-control systems correlation – control system requirements – programmable logic controller - PLC programming terminals – proportional – integral – derivative - computer numerical control - microprocessor UNIT - universal robot controller - interfacing - work cell control.

Programming: objectives - robot programming-programming methods - programming languages -levels of robot programming - space position programming - motion interpolation-program statements - sample programs

UNIT V

Safety: Objectives - robot safety - safety standards - system reliability-human factor issues – safety sensors and monitoring – safeguarding – training - safety guidelines - definitions.

Industrial Applications: objectives - automation in manufacturing - robot applications – material – handling applications - processing operations – assembly operations - inspection operation - evaluating the potential of a robot application - future applications - challenge for the future – innovations

TEXT BOOK

- James G.Keramas, *Robot Technology Fundamentals*, Thomson Delmar Publications, 1998.

REFERENCE BOOKS

- Robert J.Schilling, *Fundamentals of Robotics, Analysis & Control*, PHI, 2002.
- Jagannathan Kanniah, M. Fikret Ercan, Carlos A. Acosta Calderon, *Practical Robot Design: Game Playing Robots*
- Saeed B. Niku, *Introduction to Robotics: Analysis, Control, Applications*

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	M	M	H	L
CO2	H	H	H	H	M
CO3	H	M	M	L	M
CO4	H	M	M	H	M
CO5	H	M	H	H	M

CORE PAPER XVI

MPCSC10 - DIGITAL IMAGE PROCESSING

Hours: 5 **Credits : 4**

Semester: IV

Preamble

This course helps the students to understand fundamental steps in Digital image processing. It also provide knowledge about image compression and image segmentation.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Recognize the fundamental elements of DIP and representation of an image in multi dimensional aspects.	Comprehension (Level K2)
CO2.	Apply arithmetic and logical operations on image enhancement process.	Application (Level K3)
CO3.	Interpret the knowledge on compression techniques for security of an image.	Analysis (Level K4)
CO4.	Analyse the knowledge on compression techniques for security of an image.	Analysis (Level K4)
CO5.	Verify various deduction mechanisms in image segmentation.	Synthesis (Level K5)

UNIT I

Introduction: What is Digital Image Processing - Fundamental steps in Digital Image Processing - Components of an Image Processing System.

UNIT II

Digital Image Fundamentals: Elements of Visual Perception – Image Sensing and Acquisition - Image Sampling And Quantization – Some Basic Relationship between Pixels – An Introduction to the Mathematical tools used in Digital Image Processing.

UNIT III

Intensity Transformation And Spatial Filtering: Background – Some basic Intensity Transformation Functions – Histogram Processing – Fundamentals of Spatial Filtering – Smoothing Spatial Filters.

UNIT IV

Filtering In The Frequency Domain: Sampling and the Fourier Transform of Sampled Functions – The Discrete Fourier Transform (DFT) of One Variable – Image Smoothing Using Frequency Domain Filters.

Image Restoration And Reconstruction: A model of the image degradation/ Restoration Process – Restoration in the presence of Noise Only – Spatial Filtering.

UNIT V

Color Image Processing: Color Fundamentals – Color Models .

Image Compression: Fundamentals – Some Basic Compression Methods – HUFFMAN Coding – Golomb Coding – Run –Length Coding – Predictive Coding **.**

TEXT BOOK

- Rafael C Gonzalez, Richard E Woods, *Digital Image Processing,* 3rd Edition, -Pearson Education 2011.

REFERENCE BOOKS

- William K Pratt, Jhon Willey, *Digital Image Processing,* (2001).
- Millman Sonka, Vaclav hlavac, Roger Boyle ,Broos/colic, Thompson Learniy, *Image Processing Analysis and Machine Vision,* (1999)
- A.K.Jain,PHI, *Fundamentals of Digital Image Processing,* New Delhi(1995).

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	M	M	H	H
CO2	M	H	H	H	M
CO3	H	H	H	M	H
CO4	H	H	H	M	M
CO5	H	M	H	M	M

***H-High; M-Medium; L-Low;**

ELECTIVE 4.1

MPCSE4 - GRID AND CLOUD COMPUTING

Hours: 5 **Credits : 4**

Semester: IV

Preamble

This course helps the students to learn the concepts and architecture of Grid and Cloud Computing. It also covers topics such Grid monitoring, Grid security and Cloud services.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Understand the basic concepts of Grid and Cloud computing.	Comprehension (Level K2)
CO2.	Describe the architecture of Grid and Cloud computing.	Comprehension (Level K2) Application (Level K3)
CO3.	Acquire knowledge about Grid Scheduling and Cloud Computing services.	Analysis (Level K4)
CO4.	Analyse about Grid Scheduling and Cloud Computing services.	Analysis (Level K4)
CO5.	Validate Cloud services by using various cloud service providers such as Amazon, Google and Microsoft.	Synthesis (Level K5)

UNIT I

Concepts and Architecture: Introduction - Parallel and Distributed Computing - Cluster computing Grid computing - Anatomy and physiology of Grid - Review of web services – OGSA – WSRF

UNIT II

Grid Monitoring: Grid Monitoring Architecture (GMA) - An overview of Grid Monitoring systems: Grid ICE – JAMM – MDS - Network Weather Service – Other Monitoring systems: Ganglia and Grid Mon

UNIT III

Grid security: Grid Security - A Brief security primer – Cryptography -Grid security – **Grid Scheduling and Resource management:** Scheduling paradigms - Working principles of scheduling - A review of condor ,SGE, PBS and LSF - Grid scheduling with QoS

UNIT IV

Examining the Value Proposition: Defining Cloud Computing - Understanding Cloud Architecture - Understanding Services and Applications by Type

UNIT V

Using Platforms: Understanding Abstraction and Virtualization - Using Google Web Services - Using Amazon Web Services - Using Microsoft Cloud Services

TEXT BOOKS

- Maozhen Li, Mark Baker, *The Grid: Core Technologies*, John Wiley & Sum 2005
- Barrie Sosinky, *Cloud Computing Bible*, Wiley Publishing Inc, 2011

REFERENCE BOOKS

- Joshy Joseph & Craig Fellenstein, *Grid Computing*, Pearson Education, 2004
- Lars Nielsen, *The Little Book of Cloud Computing*, 2013 Edition.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	H	H	H	M	H
CO2	H	H	H	M	M
CO3	H	H	H	H	M
CO4	H	M	M	H	M
CO5	H	M	M	H	M

***H-High; M-Medium; L-Low;**

ELECTIVE 4.2

INTERNET OF THINGS

Hours: 5 **Credits : 4**

Semester: IV

Preamble

This course introduces the fundamentals of Internet of Things and required protocols. It also enables the students to apply the concepts of IoT in the real world scenario.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Understand the basic concepts of IoT	Comprehension (Level K2)
CO2.	Classify the various IoT Architecture	Comprehension (Level K2)
CO3.	Analyze various Protocols of IoT	Analysis (Level K4)
CO4.	Construct portable IoT with RASPBERRY Pi and ARDUINO	Synthesis (Level K5)
CO5.	Deploy an IoT application and connect to the cloud	Evaluation (Level K6)

UNIT I

Introduction to IoT: Internet of Things – Physical Design – Logical Design – IoT Enabling Technologies – IoT Levels & Deployment Templates – Domain Specific IoTs – IoT and M2M – IoT System Management with NETCONF – YANG – IoT Platforms Design Methodology.

UNIT II

IoT Architecture: M2M high-level ETSI Architecture – IETF Architecture for IoT – OGC Architecture – IoT Reference model – Domain model -information model - functional model – communication model - IoT Reference Architecture.

UNIT III

IoT Protocols: Protocol Standardization for IoT – Efforts – M2M and WSN Protocols - SCADA and RFID Protocols – Unified Data Standards - Protocols – IEEE 802.15.4 – BACNet Protocol - Modbus – Zigbee Architecture - Network Layer – 6LowPAN – CoAP – Security

UNIT IV

Building IoT with RASPBERRY Pi and ARDUINO: Building IoT with RASPBERRY Pi – IoT Systems – Logical Design using Python – IoT Physical Devices and Endpoints – IoT Device – Building blocks – Raspberry Pi – Board – Linux on Raspberry Pi – Raspberry Pi Interfaces - Programming Raspberry Pi with Python – Other IoT Platforms – Arduino

UNIT V

IoT Design: Home Automation, Cities, Environment, Agriculture, Productivity Applications.

Real world design constraints: Applications – Asset management, Industrial automation, smart grid ,Commercial building automation ,Smart cities – participatory sensing – Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs – Cloud for IoT – Amazon Web Services for IoT

TEXT BOOK

- Arshdeep Bahga , Vijay Madisetti, *Internet of Things –A hands –on Approach*, Universities Press 2015

REFERENCE BOOKS

- Dieter Uckelmann , Mark Harrison, Michahelles,Florian(Eds), *Architecting the Internet of Things*, Springer,2011.
- Honbo Zhou, *The Internet of Things in the cloud: A Middleware Perspective*, CRC Press,2012.
- Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis , Karnouskos Stefan Avesand , David Boyle, *From Machine – to- Machine to the Internet of Things – Introduction to a New Age of Intelligence*. Elsevier 2014.
- Olivier Hersent, David Boswarthick ,Omar Elloumi, *The Internet of things – Key applications and Protocols* ,Wiley 2012.

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	H	H	M	H
CO2	M	M	H	M	H
CO3	M	H	H	M	M
CO4	H	M	H	M	H
CO5	H	H	H	H	H

***H-High; M-Medium; L-Low;**

ELECTIVE 4.3

SOFT COMPUTING

Hours: 5 **Credits : 4**

Semester: IV

Preamble

This course offers knowledge about neural network, basis of Fuzzy logic, fuzzy relations, fuzzy inference system and defuzzification techniques.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Discuss the nature of soft computing and its applications	Comprehension (Level K2)
CO2.	Apply soft computing techniques in small applications	Application (Level K3)
CO3.	Analyze various soft computing techniques to solve real life problems	Analysis (Level K4)
CO4.	Evaluate the basis of Fuzzy logic, fuzzy relations and defuzzification techniques	Evaluation (Level K6)
CO5.	Identify and select a suitable soft computing technology to solve the problems	Application (Level K3) Evaluation (Level K6)

UNIT I

Neural Networks : Fundamentals of Neural Networks – Basic Concepts of Neural Networks – Model of an Artificial Neuron – Neural Network Architecture – Characteristics of Neural Network – Learning Methods – Taxonomy of Neural Network Architecture – Back Propagation Network – Architecture of Back Propagation Network – Back Propagation Learning

UNIT II

Neural Network Associative Memory: Auto Correlations – Hetero Correlations – Exponential BAM – Associative Memory for Real Coded Pattern Pairs – Adaptive Resonance Theory – Introduction – ART1 – ART 2 - Applications

UNIT III

Fuzzy Set Theory: Crisp Sets – Fuzzy Sets – Crisp Relations – Fuzzy Relations – Fuzzy Systems: Crisp Logic – Predicate Logic – Fuzzy Logic – Fuzzy Rule Based System – Defuzzification Method - Applications

UNIT IV

Genetic Algorithms: History – Basic Concepts – Creation of off Springs – Working Principle – Encoding – Fitness Function – Reproduction .Genetic Modeling – Inheritance Operators – Cross Over – Inversion and Deletion – Mutation Operator –Applications – Advances in Genetic Algorithm

UNIT V

Hybrid System: Integration of Neural Network – Fuzzy Logic – Genetic Algorithm-Hybrid System – Neural Network – Fuzzy Logic – Genetic Algorithm Weight Determination – Application – Fuzzy Back Propagation Network – Language Recognition Type Fuzzy Members – Fuzzy Neuron – Fuzzy Back Propagation Architecture – Learning in Fuzzy Back Propagation – Applications – Knowledge Base Evaluation

TEXT BOOK

- S.Rajasekaran and G.A.Vijayalakshmi Pai, *Neural Networks,Fuzzy Logic and Genetic Algorithms Synthesis and Application*, Prentice Hall of India,Pvt. Ltd. (2011)

REFERENCE BOOKS

- Vinoth Kumar and R. Saravana Kumar, *Neural Network and Fuzzy logic*, S.K. Katria & Sons (2012)
- Haykin Simon, *Neural Networks and Learning Machines*, 3/e, Prentice Hall of India (2011)
- Tang,Tan and Yi, *Neural Networks: Computational Models and Application*, Springer Verlag Publications, (2010)

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	H	H	M	H
CO2	M	M	H	M	H
CO3	M	H	H	M	M
CO4	H	M	H	M	H
CO5	H	H	H	H	H

***H-High; M-Medium; L-Low;**

CORE XVII

MPCSPR - PROJECT WORK

Hours : 20 **Credits : 10**

Semester : IV

Preamble

The objective of the project is to motivate the students to work in emerging/latest technologies, help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

Course Outcomes

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

CO	COURSE OUTCOMES	COGNITIVE LEVEL
CO1.	Understand the problem.	Comprehension (Level K2)
CO2.	Implement the real time application.	Application (Level K3)
CO3.	Execute the real time application.	Application (Level K3)
CO4.	Analyze various testing methods.	Analysis (Level K4)
CO5.	Verify the expected results in real time applications.	Synthesis (Level K5)

The project is of 20 hours/week for one (semester IV) semester duration and a student is expected to do planning, analyzing, designing, coding, and implementing the project. The initiation of project should be with the project proposal. The synopsis approval will be given by the project guides.

The project proposal should include the following:

- Title
- Objectives
- Input and output
- Details of modules and process logic
- Data Flow Diagram
- Limitations of the project
- Tools/platforms, Languages to be used
- Scope of future applications

Mapping					
COs & POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	M	H	H	M	H
CO2	M	M	H	M	H
CO3	M	H	H	M	M
CO4	H	M	H	M	H
CO5	H	H	H	H	H

***H-High; M-Medium; L-Low;**