M.Sc. (Computer Science)

PO1: Will have the ability to communicate computer science concepts, designs, and solutions effectively and professionally. Apply knowledge of computing to produce effective designs and solutions for specific problems. Identify, analyze, and synthesize scholarly literature relating to the field of computer science; and use software development tools, software systems, and modern computing platforms.

PO2: Work in a collaborative manner with others on a team, contributing to the management, planning and implementation of a computer system.

PO3: Independently propose a small scale research project, plan its execution, undertake its development, evaluate its outcome and report on its results in a professional manner.

PO4: Advance knowledge through innovation and knowledge creation. Pursue life-long learning in practice. Interpret and present theoretical issues and empirical findings.

PSO1: Gains understanding about techniques, technologies and methods used in managing and implementing information technology systems.

PSO2: Widens and deepens understanding of computing technologies and covers high level concept that enable the effective management and planning of IT project and services.

PSO3: High level strategy and design in-depth technical specializations, management and planning of IT project and services.

COURSE OUTCOMES

COURSE NAME: Advanced Data Structures (MCS-101)

CLASS - M.ScComputer Science SEMESTER – I

Objectives of Course:

- To provide the foundations of the practical implementation and usage of Algorithms and Data Structures.
- To ensure that the student evolves into a competent programmer capable of designing and analyzing implementations of algorithms and data structures for different kinds of problems.
- To expose the student to the algorithm analysis techniques, to the theory of reductions.

Course Outcomes

At the end of this course the student shall be able to:

- Design and analyze programming problem statements.
- Choose appropriate data structures and algorithms, understand the ADT/libraries, and use it to design algorithms for a specific problem.
- Understand the necessary mathematical abstraction to solve problems.
- Come up with analysis of efficiency and proofs of correctness
- Comprehend and select algorithm design approaches in a problem specific manner.

COURSE NAME: Advanced Computer Architecture (MCS-102)

CLASS - M.ScComputer Science SEMESTER – I

Objectives of the Course:

Students will get familiar with

1. Conceptualize the basics of organizational and architectural issues of a digital computer.
2. Analyze processor performance improvement using instruction level parallelism.
3. Learn the function each element of a memory hierarchy.
4. Study various data transfer techniques in digital computer.
5. Acquainting the students with principles and concepts of parallel processing including parallel computer architectures, performance metrics, the scheduling problem and parallel algorithms.

Program Learning Outcomes:

(Knowledge and Understanding, Intellectual Skills, practical Skills, Transferable skills).

A. Knowledge and Understanding):

Students will be able to

- Define the basics of Computer Systems.
- Demonstrate the basics of Computer Components.
- Articulate design issues in the development of processor or other components that satisfy design requirements and objectives.

B. Intellectual(Cognitive/ Analytical) Skills:

Students will be try to

- Recognize and assemble components.
- Develop Analytical Skills.
- Compare methods with data.

C. Practical Skills

Students will be able to

- Choose the appropriate Operating system.
- Develop computer-based systems.
- Evaluate systems in terms of quality attributes.

D. <u>Transferable Skills</u> :

Students will be able to

- Use different Problem Solving techniques.
- Follow Analytical Thinking.
- Follow Creative Thinking.
- Practice Designing skills in software projects.
- Practice Engineering skills for software development

COURSE NAME: Network Design & Performance Analysis (MCS-103)

CLASS - M.ScComputer Science SEMESTER – I

<u>Objectives of Course:</u>

1. To teach students how to evaluate a network situation,

2. To help students to identify the most important network aspects that need to be monitored and analysed.

3. Teach network modelling and simulation

COURSE OUTCOMES

At the end of this course the student shall be able to:

- Describe and develop a network model using analysis and simulation
- Design a new network model to meet requirements for new and existing networks.
- Use quantitative and qualitative techniques to design or upgrade a network
- Make decisions on the proper network technologies, routing protocols, network topologies, node placement, etc.
- Troubleshoot and diagnose network problems
- Identify network issues, risks, bottlenecks, etc

COURSE NAME: Discrete Structures (MCS-104)

CLASS - M.ScComputer Science SEMESTER – I

Objective of the course:

To successfully complete this course, student able to understand the concept of:

- Set, Relation and Function.

- Graph Theory and its use in computer science
- Basic counting principles Permutations and combinations, Recurrence relations, generating Function.
- Rings, Subrings and quotient rings.
- Boolean algebra and its application in logic circuits and switching functions.

Course Outcomes:

Students will be able to:

- Understand the basic principles of sets and operations in sets.
- Prove basic set equalities.
- Apply counting principles to determine probabilities.
- Demonstrate an understanding of relations and functions and be able to determine their properties.
- Solve problem regarding Recurrence relations and Generating Function.
- Determine when a function is 1-1 and "onto".
- Demonstrate different traversal methods for trees and graphs.
- Solve problem regarding Rings, Subrings and quotient rings.
- Solve problem regarding Boolean algebra

COURSE NAME: Soft Computing (MCS-105)

CLASS - M.ScComputer Science SEMESTER – I

Course Objectives

- To enable students to understand theneural network theory and fuzzy logic theory.
- To introduce the students about Artificial Neural Networks and fuzzy theory from an engineering perspective

Course Outcomes

Upon completion of the course, the student will be able to:

- Understand the Neural Network and its various architectures and models and its applications.

- Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
- Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic.
- To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations.
- Reveal different applications of these models to solve engineering and other problems.
- Relate the probabilistic concepts with fuzzy logic.

COURSE NAME: MCS–201 Theory of Computation
CLASS - M.ScComputer Science SEMESTER – II

Objectives of Course:

The goal of this course is to provide students with an understanding of basic concepts in the theory of computation. At the end of this course students will:

1. To construct finite state machines and the equivalent regular expressions.
2. To prove the equivalence of languages described by finite state machines and regular expressions.
3. To construct pushdown automata and the equivalent context free grammars.
4. To prove the equivalence of languages described by pushdown automata and context free grammars.
5. To construct Turing machines and Post machines.
6. To prove the equivalence of languages described by Turing machines.

COURSE OUTCOMES:

After completing this course, students will be able to:

1. Analyze and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.
2. Demonstrate the understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving.
3. Prove the basic results of the Theory of Computation.

Learning Outcomes:

A. Knowledge and Understanding:

Knowledge and Understanding Skills On successful completion of the course, graduates should be able to:

1. Describe characteristics of a Turing machine and computational complexity.
2. Define Turing machine and other computational models.
3. Demonstrate computability or non-computability using a Turing machine.
4. Identify the essential mathematics relevant to computer science.
5. Discuss the notions of undesirability and completeness.
6. Identify complexity classes and the methodology of complexity theory
7. Categorize the problems into appropriate complexity classes.

B. Practical Skills:

1. Systematically apply appropriate methods to develop an appropriate algorithm.
2. Design Turing machine to solve simple problems.
3. Specify and design computer-based systems.
4. Evaluate systems in terms of general quality attributes and possible tradeoffs presented within the given problem.

COURSE NAME: MCS–202 Image Processing
CLASS - M.ScComputer Science SEMESTER – II

Objectives of the Course:

This course is designed to give Postgraduate students all the fundamentals in 2-D digital image processing with emphasis in image processing techniques, image filtering design and applications.

Course module objectives:

To understand and gain complete knowledge about

1. The fundamentals of digital image processing
2. Image transform used in digital image processing
3. Image enhancement techniques used in digital image processing
4. Image restoration techniques and methods used in digital image processing
5. Image compression and Segmentation used in digital image processing

Course outcomes:

1. Have a clear understanding of the principals the Digital Image Processing terminology used to describe features of images.
2. Have a good understanding of the mathematical foundations for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing, compression and analysis. 3.
3. Be able to write programs for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression.
4. Have knowledge of the Digital Image Processing Systems.
5. Learn and understand the Image Enhancement in the Spatial Domain.
6. Learn and understand the Image Enhancement in the Frequency Domain.

Understand the Image Restoration, Compression, Segmentation, Recognition, Representation and Description.

COURSE NAME: MCS–203 Design & Analysis of Algorithms
CLASS - M.ScComputer Science SEMESTER – II

Objectives:

This course aims to introduce the classic algorithms in various domains, and techniques for designing efficient algorithms. Algorithm design and analysis provide the theoretical backbone of computer science and are a must in the daily work of the successful programmer. The goal of

this course is to provide a solid background in the design and analysis of the major classes of algorithms. At the end of the course students will be able to develop their own versions for a given computational task and to compare and contrast their performance.

COURSE OUTCOMES:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

COURSE NAME: MCS–204 Cloud Computing
CLASS - M.ScComputer Science SEMESTER – II

Objectives of the Course:

The objectives of the course are to:

- Clarify what cloud computing is and what are the various advantages and limitations of using cloud computing,
- Explain the various open challenges and issues of cloud computing,
- Enlighten the different services of cloud computing,
- Highlight the specific privacy and information security risks that can exists using cloud computing services
- Introduce the advance concepts such as Big Data Analytics, Federated Cloud Computing.

COURSE OUTCOMES:

- Analyze the Cloud computing setup with it's vulnerabilities and applications using different architectures.
- Design different workflows according to requirements and apply map reduce programming model.
- Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.
- Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds.
- Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application.
- Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

COURSE NAME: MCS–205 Distributed Database Systems
CLASS - M.ScComputer Science SEMESTER – II

Objectives: To make the students understand

- What a distributed database management system (DDBMS) is and what its components are.
- How database implementation is affected by different levels of data and process distribution.
- How transactions are managed in a distributed database environment.

How database design is affected by the distributed database environment.

COURSE OUTCOMES:

- Develop system architecture based on distributed databases.
- Develop a system to support distributed transactions in such databases
- Create queries to retrieve data from a distributed database which will have optimum performance.
- Provide for competitive access to data in systems using distributed databases.
- Propose solutions for increasing reliability and security of distributed database system
- Recommend mechanisms to control data fragmentation in distributed databases
- Compare different systems for managing distributed databases (DDBMS).
- Apply technical knowledge and skills to solve problems of database distribution to several fragments.

COURSE NAME: MCS–301 Advanced Software Engineering
CLASS - M.ScComputer Science SEMESTER – III

Objective of the Course:

- Knowledge of basic Software Engineering methods and practices, and their appropriate application.
- A general understanding of software process models such as the waterfall and evolutionary models.
- Acquire the knowledge of software re-engineering.
- Understanding of the role of project management including planning, scheduling, risk management, etc.
- Understanding of different measurements of object oriented and
- Knowledge of UML for object oriented design.

Course Outcomes:

a) Knowledge and Understanding: Students will understand

- System development lifecycle.
- Software process methodologies.
- The principles of object-oriented software construction.
- The software-development process, including requirements analysis, design, programming, testing and maintenance.

b) Intellectual Cognitive/Analytical Skills: Students will be able to

- Model object-oriented software systems.
- Design and plan software solutions to problems using an object-oriented strategy.
- Transform an existing system to new system using Re-engineering methods.
- Apply various metrics to evaluate the performance of software.
- Evaluate systems in terms of general quality attributes.
- Use and evaluate appropriate tools and techniques.
- Compare and Contrast various Software Reuse Tools.

c) Practical skills - Students will learn to:

- Specify, design and construct CASE tools and application software.
- Develop and apply various strategies for software applications.
- Identify some of the main risks of software development and use.
- Analyze the system requirements and the production of system specifications.
- Use appropriate computer-based design support tools.

d) Transferable skills - Students will be able to

- Effectively participate in team-based activities.

- Manage learning and self-development, including time management and the development of organizational skills.
- Display personal responsibility by working to multiple deadlines in complex activities.

COURSE NAME: MCS–302 System Software
CLASS - M.ScComputer Science SEMESTER – III

Objectives of Course:

- To understand the difference between system software and application software.
- To understand the various types of system software.
- To understand the concept behind working of each system software.
- To understand different phases and passes of compiler and assembler.
- To learn the fundamentals of Operating Systems

COURSE OUTCOMES

At the end of this course the student shall be able to:

- Explain the working of OS in detail
- identify and understand different phases and passes of compiler and their functioning.
- understand the concept of syntax analysis and solve the problems of predictive parsing.
- differentiate between top down and bottom up parsing and understand syntax directed translation techniques.
- Apply code optimization and code generation techniques.
- Generate flowchart and algorithms for passes of Assembler
- Differentiate between different types of loader

COURSE NAME: MCS–303 Data Mining and Warehousing
CLASS - M.ScComputer Science SEMESTER – III

Objectives of Course:

- Identify the scope and necessity of Data Mining & Warehousing for the society.
- Describe the designing of Data Warehousing so that it can be able to solve the root problems.
- To understand various tools of Data Mining and their techniques to solve the real time problems.

- To develop ability to design various algorithms based on data mining tools.
- To develop further interest in research and design of new Data Mining techniques.

Learning outcome

Knowledge:

The candidate will get knowledge of:

- Data preprocessing and data quality.
- Modeling and design of data warehouses.
- Algorithms for data mining.

Skills:

- Be able to design data warehouses.
- Ability to apply acquired knowledge for understanding data and select suitable methods for data analysis.

COURSE NAME: MCS–304 Concept of Core and Advanced Java
CLASS - M.ScComputer Science SEMESTER – III

Objective of the course:

To successfully complete this course, student able to understand the concept of:

- Objects Oriented Basis, Java Virtual Machine.
- Classes, objects, inheritance, packages, Enumeration,Input/Output operations, and various keywords.
- Exception and Error. How to handle the exception in Java
- Applet basics, Applet Architecture
- Event Handling and Abstract Window Toolkit.
- Multithreading: Java Thread model, How to set Thread Priorities

Course Outcomes:

- Able to understand concept of Object Oriented Programming & Java Programming.
- And basic concepts of Java such as operators, classes, objects, inheritance, packages, Enumeration and various keywords.
- Able to understand the concept of exception handling and Input/Output operations.
- Able to design the applications of Java & Java applet.
- Able to Analyze & Design the concept of Event Handling and Abstract Window Toolkit.
- Able to implement multithreading in java and how to set the priorities level of threads.

COURSE NAME: MCS–305 Network Programming
CLASS - M.ScComputer Science SEMESTER – III

Objectives

- Demonstrate advanced knowledge of networking.
- Comprehend the key protocols which support the Internet.
- Be known with several common programming interfaces for network communication.
- Demonstrate advanced knowledge of programming for network communications.
- Have a detailed knowledge of the TCP/UDP Sockets.

Learning Outcomes

- create applications using techniques such as multiplexing, forking, multithreading
- make use of different types of I/O such as non-blocking I/O and event driven I/O
- make use of various solutions to perform inter-process communications
- apply knowledge of Unix/Linux operating systems to build robust client and server software for this environment;
- learn advanced programming techniques such as IPv6 Socket Programming, Broadcasting, Multicasting
- describe major technologies and protocols used in network communications

COURSE NAME: MCS-401 Advanced Web Technologies
CLASS - M.Sc Computer Science SEMESTER – IV

Course Objectives:

The goal of this ASP.NET training course is to teach students how to create a simple Active Server Page ASP.NET application that delivers dynamic content to the Web. The ASP.NET course covers Web Forms and handling events, Web Controls and input validation, using the new web application architecture and Web Services, and debugging in the new integrated development environment.

Learning Outcomes:

- Successful students will able to design web applications using ASP.NET
- Successful students will be able to use ASP.NET controls in web applications.
- Successful students will be able to debug and deploy ASP.NET web applications
- Successful students will be able to create database driven ASP.NET web applications and web services

COURSE NAME: MCS–402 Microprocessor and Its Applications
CLASS - M.Sc Computer Science SEMESTER – IV

Course Objective:

- To introduce students with the architecture and operation of typical microprocessors and microcontrollers.
- To familiarize the students with the programming and interfacing of microprocessors and microcontrollers.
- To provide strong foundation for designing real world applications using microprocessors and microcontrollers.

Course Outcomes:

- Evaluate and solve basic binary math operations using the microprocessor and describe the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance.
- Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.
- Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements.
- Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.
- Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
- Evaluate assembly language programs and download the machine code that will provide solutions real- world control problems.

COURSE NAME: MCS–403 Object Oriented Modeling, Analysis and Design
CLASS - M.Sc Computer Science SEMESTER – IV

Objectives of the Course :

This course is aimed at acquainting students with the new way of thinking about development of software using OMT. The course aims to equip students with the importance, usage and implementation of all the constructs encountered while developing a good object oriented software

Program Learning Outcomes:

Students will learn how to :

- Analyze a problem statement.
- Construct models for the problem in hand.
- Prepare a System Design

- Prepare Object Design
- Write clean code in Programming Language
- Effectively develop a high quality Software