

Course Outcome of M.Sc (Computer Science)

M.Sc Computer Science is a Postgraduate course which is affiliated to the Rashtrasant Tukdoji Maharaj Nagpur University. The course comprises four semesters, each semester has four subjects and two practicals. The final semester includes project work instead of a practical exam where the students get a chance to showcase the knowledge they have gathered in their course tenure.

M.Sc Computer Science Semester I

Paper - I (Code : 1T1) Discrete Mathematical Structure	
CO 1	Understand the basic concepts of set theory, logic, functions, relations and graph theory.
CO 2	Use mathematical proofs to demonstrate the correctness of algorithms and other mathematical statements.
CO 3	Design and implement algorithms to solve problems in discrete mathematics.
CO 4	Understand the basic concepts of semigroups and groups.

Paper - II (Code : 1T2) Programming in Java	
CO 1	Understand the basic concepts of object-oriented programming
CO 2	Implement Java programs using the basic syntax and constructs
CO 3	Understand the concepts of JDBC, networking, and RMI.
CO 4	Understand the concepts of servlets, JSP, and JavaBeans.

Paper - III (Code : 1T3) Digital Electronics and Microprocessor

CO 1	Understand the basic concepts of number systems and data representation.
CO 2	Be able to use Boolean algebra to simplify logic expressions.
CO 3	Be able to design and analyze shift registers.
CO 4	Understand the architecture of the 8086 microprocessor.

Paper - IV (Code : 1T4) Advanced DBMS and Administration

CO 1	Understand the basic concepts of relational database design, including functional dependencies, normalization, and query processing.
CO 2	Be able to design and implement transaction processing systems.
CO 3	Understand the basic concepts of Oracle database architecture and administration, including data dictionary views, standard packages, and managing rollback segments.
CO 4	Be able to tune Oracle databases for performance.

Practical - I (Code : 1P1)

CO 1	Implement Java programs using the basic syntax and constructs
CO 2	Apply Java to solve real-world problems

Practical - II (Code : 1P2)

CO 1	Program a microprocessor using simulators
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Semester II

Paper - I (Code : 2T1) Windows Programming using VC++	
CO 1	Understand the basic concepts of Windows programming, such as the Windows API, GDI, and MFC.
CO 2	Be able to develop graphical user interfaces using GDI and MFC.
CO 3	Be able to think logically and solve problems using Windows programming.
CO 4	Be able to apply Windows programming skills to real-world problems.

Paper - II (Code : 2T2) Theory of Computation and Compiler Construction	
CO 1	Understand the basic concepts of compiler construction, including lexical analysis, parsing, code generation, and optimization.
CO 2	Be able to design and implement finite-state machines.
CO 3	Be able to think critically about the design and implementation of compilers.
CO 4	Be able to apply the theory of computation and compiler construction to solve real-world problems.

Paper - III (Code : 2T3) Computer Architecture and Organization	
CO 1	Understand the basic concepts of computer organization, such as the processor, memory, and I/O devices.
CO 2	Understand the design of the control unit, including the data path and control path.
CO 3	Understand the different storage technologies used in computer systems.
CO 4	Understand the concept of performance evaluation in computer systems.

Paper - IV (Code : 2T4) Computer Graphics

CO 1	Understand the basic concepts of computer graphics, such as 2D and 3D graphics, geometric transformations, and rasterization.
CO 2	Understand the different line drawing algorithms, such as DDA and Bresenham's.
CO 3	Understand the basic transformation operations, such as translation, rotation, and scaling.
CO 4	Understand the different color models, such as XYZ, RGB, YIQ, CMY, and HSV.

Practical - I (Code : 2P1)

CO 1	Understand the basic concepts of Visual C++, such as variables, data types, operators, and control flow statements.
CO 2	Understand the basic concepts of object-oriented programming, such as classes, objects, and inheritance.
CO 3	Be able to write simple Visual C++ programs and be able to use the Visual Studio IDE.

Practical - II (Code : 2P2)

CO 1	Be able to use C++ graphics libraries to create and manipulate graphics images.
CO 2	Be able to apply computer graphics concepts to real-world problems.

Semester III

Paper - I (Code : 3T1) Data Communication and Networks	
CO 1	Understand the basic concepts of data communication and networking, such as network structure, architectures, and services.
CO 2	Understand the different types of layers, protocols and how they are used.
CO 3	Understand the basic concepts of network security, such as security vulnerabilities and threats, and classification of security services.
CO 4	Understand the design principles of firewalls and how they are used to filter packets and control access to computer networks.

Paper - II (Code : 3T2) Software Engineering	
CO 1	Understand the basic concepts of software engineering, such as the software development life cycle, software quality, and software testing.
CO 2	Be able to apply the software development life cycle to a software project.
CO 3	Be able to work collaboratively on software engineering projects.
CO 4	Be able to use software testing techniques to find defects in software.

Paper - III (Core Elective 1) (Code : 3T3) CE1-1 Neural Network	
CO 1	Understand the basic concepts of neural networks, such as artificial neurons, layers, and activation functions.
CO 2	Understand the different learning algorithms used in neural networks, such as backpropagation and stochastic gradient descent.
CO 3	Be able to implement neural networks in a programming language, such as Python or Java.
CO 4	Be able to apply neural network concepts to real-world problems.

Paper - III (Core Elective 1) (Code : 3T3) CE1-2 Multimedia Technologies

CO 1	Understand the basic concepts of multimedia, such as images, audio, and video.
CO 2	Understand the basics of ActionScript, including object-oriented programming concepts, data types, and classes.
CO 3	Understand the principles of multimedia data compression, including lossless and lossy compression algorithms.
CO 4	Understand the basic concepts of audio compression, including quantization and wavelet-based coding.

Paper - III (Core Elective 1) (Code : 3T3) CE1-3 ASP.NET

CO 1	Understand the basics of ASP.NET, including the event-driven programming model, the HTTP protocol, and the structure of ASP.NET pages.
CO 2	Understand the different types of server controls in ASP.NET, including HTML controls, web controls, and validation controls.
CO 3	Understand how to connect to data sources in ASP.NET.
CO 4	Understand how to manage state in ASP.NET, including application state, session state, and view state.

Paper - IV (Foundation Course 1) (Code : 3T4) FC1 Operating System Concepts

CO 1	Understand the different operating system services, such as process management, memory management, and file management.
CO 2	Understand the different operating system scheduling algorithms, such as round robin, priority scheduling, and shortest job first scheduling.
CO 3	Be able to design and implement operating system features.
CO 4	Be able to communicate effectively about operating system concepts.

Paper - IV (Core(Discipline Centric)1) (Code : 3T4) CDC1 Mobile Computing

CO 1	Understand the basic concepts of mobile computing, such as mobile devices, mobile networks, and mobile applications.
CO 2	Understand the different types of mobile networks, such as GSM, GPRS, EDGE, 3G, and 4G.
CO 3	Be able to communicate effectively about mobile computing concepts.
CO 4	Understand the challenges of mobile computing, such as limited resources, intermittent connectivity, and security.

Practical - I (Code : 3P1)

CO 1	Be able to write C++ code to create and use sockets.
CO 2	Be able to implement different networking protocols in C++.

Practical - II (Code : 3P2)

CO 1	Understand the ASP.NET component model and the ASP.NET provider model.
CO 2	Understand the anatomy of an ASP.NET page, including the Page class and the Page lifecycle.
CO 3	Understand the different types of server controls in ASP.NET, including HTML controls, web controls, and validation controls.

Semester IV

Paper - I (Code : 4T1) Data Mining	
CO 1	Understand the different types of data mining tasks, such as classification, clustering, association rule mining, and sequential pattern mining.
CO 2	Understand the different types of data mining algorithms, such as decision trees, support vector machines, and k-means clustering.
CO 3	Be able to evaluate the performance of data mining algorithms.
CO 4	Be able to think critically about data mining problems and come up with innovative solutions.

Paper - II (Code : 4T2) Artificial Intelligence & Expert System	
CO 1	Understand the different types of artificial intelligence systems, such as rule-based systems, case-based reasoning systems, and neural networks.
CO 2	Understand the different applications of artificial intelligence, such as natural language processing, computer vision, and robotics.
CO 3	Be able to design and implement artificial intelligence systems.
CO 4	Be able to think critically about artificial intelligence problems.

Paper - III (Core Elective 2) (Code : 4T3) CE2-1 Design and Analysis of Algorithm	
CO 1	Understand the different types of algorithms, such as greedy algorithms, divide-and-conquer algorithms, and dynamic programming algorithms.
CO 2	Understand the different types of problem-solving techniques, such as backtracking and branch-and-bound.
CO 3	Be able to solve problems using different problem-solving techniques.
CO 4	Be able to think critically about algorithm design problems.

Paper - III (Core Elective 2) (Code : 4T3) CE2-2 Embedded System

CO 1	Understand the basic concepts of embedded systems, such as hardware, software, and firmware.
CO 2	Understand the different types of embedded systems, such as real-time systems, embedded controllers, and intelligent devices.
CO 3	Be able to design and implement embedded systems.
CO 4	Be able to think critically about embedded systems problems.

Paper - III (Core Elective 2) (Code : 4T3) CE2-3 Pattern Recognition

CO 1	Understand the different types of pattern recognition algorithms, such as decision trees, neural networks, and support vector machines.
CO 2	Be able to apply pattern recognition techniques to solve problems.
CO 3	Understand the different types of clustering algorithms and how they are used to group patterns.
CO 4	Be able to evaluate the performance of pattern recognition systems and identify areas for improvement.

Paper - IV (Foundation Course 2) (Code : 4T4) FC2 Advances in Information Technology

CO 1	Understand the different types of software and their purposes.
CO 2	Understand the different types of programming languages and their strengths and weaknesses.
CO 3	Understand the different types of networks and network topologies and their advantages and disadvantages.
CO 4	Understand the concept of e-commerce and the internet and how they are used in business.

Paper - IV (Core(Discipline Centric)2) (Code : 4T4) CDC2 Parallel Computing

CO 1	Understand the basic concepts of parallel computing, such as parallelism, scalability, and performance.
CO 2	Understand the principles of parallel algorithm design, such as decomposition techniques, mapping techniques, and communication operations.
CO 3	Understand the analytical modeling of parallel programs, such as performance metrics and scalability metrics.
CO 4	Be able to use analytical models to guide the design of parallel algorithms.

Practical - I (Code : 4P1)

CO 1	Understand the different types of algorithms and their asymptotic behavior.
CO 2	Understand the different types of data structures and their performance characteristics.

Project (Code : Project)

CO 1	Demonstrate knowledge of the subject content.
CO 2	Apply skills and knowledge to solve problems.
CO 3	Work independently and as part of a team.

Seminar (Code : Seminar 1, Seminar 2, Seminar 3, Seminar 4)

CO 1	Demonstrate critical thinking and analysis skills.
CO 2	Communicate effectively in oral and written form.
CO 3	Engage in self-directed learning.