Madhav Institute of Technology & Science, Gwalior- 474 005

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Computer Science Engineering	Year 2018-2022

Semester		Course Outcome
Semester 1		**100203: Basic Computer Engineering**
	CO1	Define the fundamentals of computer system.
	CO2	Outline the various components of computer system.
	CO3	Design, implement, test and debug the computer programs using programming language.
	CO4	Analyze the usage of various system & application softwares to manage computer system and data.
	CO5	Develop the ability to design computer programs to solve real world problems.
	CO6	Elaborate the working of Internet.
		100202:Energy, Environment, Ecology & Society
	CO1	List and describe various energy resources, their conversion to electrical power and role in technological & economic development
	CO2	Update themselves with national/international power status and renewable power development targets & missions
	CO3	Understand the impact of pollution on the ecosystem and control policies adopted atnational/international levels
	CO4	Illustrate the concepts of ecosystems and their conservation
	CO5	Solve practical problems of society in a sustainable and ethical manner
	CO6	Fulfill their professional duties keeping in mind the environmental safety, health, and welfare of public.
		1100001:Engineering Mathematics-II
	CO1	Retrieve the engineering application problems to related course content
	CO2	Describe the basic concept of Complex Variable , Linear Programming Problem and Numerical Methods
	CO3	Classify Complex Variable , Linear Programming Problem and Numerical Methods so as to apply the knowledge in solving routine problems
	CO4	Inculcate analytical and computational skill to interpret the topics for engineering problems
	CO5	Analyze the Complex Variable, Linear Programming Problem and Numerical Methods to examine the real world problem
	CO6	Evaluate and Implement suitable techniques relevant for industries and contribute to the society
Semester 3		**150301:Digital Electronics**
	CO1	Illustrate various number systems, Binay codes and its application in digital design.
	CO2	Identify the logic functions, circuits, truth tables and also apply the laws of Boolean algebra to simplify circuits and expressions.
	CO3	Develop the formal procedures for the analysis and design of combinational circuits.
	CO4	Analyse sequential circuit's components and their usability in digital circuits.
	CO5	Compare the concept of memories, programmable devices and digital ICs.
	C06	Design and analyze circuits for digital arithmetic.
		150302: Data Structures
	CO1	Outline the basics of algorithms and their performance criteria.
	CO2	Explain the working of linear and non-linear data structures.
	CO3	Identify the appropriate data structure to solve the specific problems.
	CO4	Analyse the performance of various data structures and their applications.
	CO5	Evaluate the time and space complexities of various data structures and their applications.
	CO6	Design the optimal algorithmic solutions for various problems
		150303:Computer Graphics
	CO1	Illustrate the fundamental concepts of Computer Graphics, hardware & software components and its applications.
	CO2	Explain various graphical image genration & manipulation methods and algorithms.
	CO3	Apply various methods of generation & manipulation of images for creating graphical images and color models.
	CO4	Explain various rendering, illumination and color models of realistic image or pictures using image processing techniques.
	CO5	Discuss various methods to create natural seen & realistic images in 2D &3D space.
	CO6	Design & analysis of various graphical image processing techniques and animation.
		150304: Object Oriented Programming & Methodology
	CO1	Relate the concepts and significance of OOPs in real world.
	CO2	Demonstrate adeptness of object oriented programming to solve problems using Object oriented concepts
	CO3	Apply object oriented programming to develop solutions of problems using standard language constructs.
	CO4	Analyze data flow diagrams and flow charts for small/ moderate problems
	CO5	Determine how to simulate the problem in field of Operating system, Computer networks and real world problems.
	CO6	Develop software using concepts of objects, associations and integrity constraint.
		150305: Hardware LAB
	CO1	Explain basics of different computer peripherals and interfaces.
	CO2	Demonstrate architecture of various computer hardware devices and their functioning.
	CO3	Demonstrate the details of system buses, memory system, and I/O interfaces.
	CO4	Identify the existing configuration of the computers peripherals and creating wireless network through the access point.
	CO5	Analyze progress in contemporary peripherals and bus systems.
	CO6	construct a networking based on IPv4 address scheme.
		100004:Cyber Security
	CO1	Tell the basic terminologies of cyber security
	CO2	Explain the basic concepts of Networking and Internet
	CO3	Apply various methods used to protect data in the internet environment in real world situations
	CO4	Discover the Concepts of IP security and Architecture
	CO5	Compare various types of Cyber Security Threats/ Vulnerabilities
	CO6	Develop the understanding of Cyber Crime Investigation and IT Act 2000
		150401:Design & Analysis of Algorithms
	CO1	Define the basic properties of algorithm.
	CO2	Analyze the complexity of an algorithm.
	CO3	Apply mathematical preliminaries to analyse and design stages of different types of algorithms.

CO4	Examine algorithms for a number of important computational problems.	
CO5	Compare different design techniques to develop algorithms for various computational problems.	
CO6	Build the general principles and good algorithm design techniques to develop efficient computer algorithms.	

150402:Database Management System

CO1	Demonstrate the concepts of different type of database system.
CO2	Apply Relational algebra concepts to design database system.
CO3	Make use of queries to design and access database system.
CO4	Analyze the evaluation of transaction processing and concurrency control.
CO5	Determine the optimize database for real world applications.
CO6	Design a database system for a real world application.

150403:Operating System

CO1	Outline the basic concept of operating systems
CO2	Analyze the working of operating system
CO3	Examine the working of various scheduling/allocation approaches
CO4	Measure the performance of various scheduling/allocation approaches
CO5	Compare the various operating system problems/issues
CO6	Develop the Solution of various operating system problems/issues

150404:Computer System Organization

CO1	Demonstrate the computer architecture for defining basic component and functional unit.
CO2	Recall different number system and solve the basic arithmetic operations of signed and unsigned numbers.
CO3	Develop the fundamental concept to understand the working of microprocessor.
CO4	Explain the basic concept of input output organization.
CO5	Compare various memory and mapping techniques.
CO6	Develop the skill of writing assembly language programming.

150405:Programming Lab

CO1	Demonstrate the fundamentals of computer programming
CO2	Read, understand and trace the execution of program
CO3	Develop Conditional and Iterative Statements
CO4	Design the program using functions
CO5	Implement the programs using Derived and User defined data types
CO6	Design program for a given problem using computer programming

100005:Project Management & Financing

CO1	Know the attributes of project and its different phases.
CO2	Develop the project network based on work breakdown structure and esimation of activity durations
CO3	Analyze the project network and make decide the various alternates.
CO4	Evaluate the optimum cost of project for assigned deadlines.
CO5	Understand the different options to arrange the finances to complete it within stipulated time

1000006:Disaster Management

CO1	understand the basic concepts of set theory, propositional logic, graph theory, discrete numeric function and algebraic structure.
CO2	Illustrate the knowledge of course content and distinguish between them in terms of their applications.
CO3	Implement the course content to solve the problems.
CO4	Apply the concept of studied topics with suitable technique faced in engineering problems.
CO5	Analyze the basic concepts of set theory, propositional logic, graph theory, discrete numeric function and algebraic structure to examine the real world problems
CO6	Design the analytical skill and interpret applications of engineering beneficial in real time troubleshooting.

150511:Data Science

CO1	List various software models with respect to their accuracy and needs of the customer requirement.
CO2	Explain the real world problems using software engineering concepts.
CO3	Develop the technique and results with customer expectations.
CO4	Identify and how to use various cost estimation techniques used in software engineering.
CO5	Compare design of a system, component, or process to meet desired needs within realistic constraints
CO6	Develop the techniques, skills and software engineering tools necessary for engineering domain.

150512:Networking with TCP/IP

CO1	Explain the basic concepts of switching and finite automata theory and languages.
CO2	Relate practical problems to languages, automata, computability, and complexity.
CO3	Construct abstract models of computing and analyse their power to recognize the languages.
CO4	Construct and analyze the grammar.
CO5	Apply mathematical models and descriptors in various computing theories
CO6	Solve problems in computer science using mathematical and formal techniques.

150513:Information Security

CO1	Classify the concepts of different advanced microprocessors and microcontroller.
CO2	Illustrate the various peripheral interfaces, controllers and bus standards.
CO3	Build a system using peripheral devices and controllers for 8086 microprocessor.
CO4	Distinguish the interface with various devices to the microprocessor.
CO5	Design an interface for various devices on 8086/8051 based systems.
CO6	Develops skills in assembly language programming for 8051 & 8086 applications.

150514: Compiler Design

CO1	Recall the concepts of finite automata and context free grammar
CO2	Build the concept of working of compiler
CO3	Examine various parsing techniques and their comparison
CO4	Compare various code generation and code optimization techniques.
CO5	Analyze different tools and techniques for designing a compiler
CO6	Design various phases of compiler

150515:Artificial Intelligence

Semester-4

Semester 5

	CO1	Design solutions to real world problems
	CO2	Express the technical ideas, strategies and methodologies
	CO3	Utilize new tools, algorithms, techniques to obtain solution of the project
	CO4	Evaluate the performance of the prototype/ results
	CO5	Able to locate and use technical information from multiple sources.
	CO6	Demonstrate the ability to communicate effectively in speech and writing
		100007:Disaster Management
	CO1	CO1: Identify disaster prevention and mitigation approaches
	CO2	CO2: Classify global and national disasters, their trends and profiles
	CO3	CO3: Determine the impacts of various disasters
	CO4	CO4: Apply Disaster Risk Reduction in management
	CO5	CO5: Infer the linkage between disasters, environment and development
		150601: Compiler Design
	CO1	Recall the concepts of finite automata and context free grammar
	CO2	Build the concept of working of compiler
	CO3	Examine various parsing techniques and their comparison
	CO4	Compare various code generation and code optimization techniques.
	CO5	Analyze different tools and techniques for designing a compiler
	CO6	Design various phases of compiler
		150602: Computer Networks
	CO1	Explain the fundamental concepts of Computer Networks.
	CO2	Illustrate the basic taxonomy & terminologies of computer network protocols.
	CO3	Develop a concept for understanding advance computer network.
	CO4	Build the skill of IP addressing and routing mechanism
	CO5	Predict the performance of computer network in congestion and Internet.
	CO6	Construct the network environment for implementation of computer networking concept.
		150603:Minor Project - II
	CO1	Able to formulate a real problem
	CO2	Express the technical ideas, strategies and methodologies
	CO3	Utilize the new tools, algorithms, techniques to obtain solution of the project
	CO4	Test and validate the develop the prototype/results
	CO5	Write a project report
	CO6	Present the oral demonstration
		(DE-1)150611:Network & Web Security
	CO1	Explain cryptographic algorithms, hash algorithms and authentication mechanisms.
Semester 6	**CO2**	Illustrate fundamentals of number theory, attacks and security principles.
	CO3	Apply number theory and various algorithms to achieve principles of security.
	CO4	Analyze the cause for various existing network attacks and describe the working of available security controls
	CO5	Examine the vulnerabilities in IT infrastructure.
	CO6	Predict the attacks and controls associated with IP, transport-level, web and e-mail security.
		(DE-1)150612: Image Processing
	CO1	Explain different modalities and current techniques in image acquisition.
	CO2	Classify spatial and fequency domain techniques in image processing.
	CO3	Apply image processing techniques to enhance visual images.
	CO4	Analyze the constraints in image processing when dealing with real problems
	CO5	Evaluate various enhancement, restoration and retrieval techniques of image processing
	CO6	Design a system using mathematical models and principle of digital image processing for real world problems
		(DE-1)150613:Mobile Computing
	CO1	explain the basic concepts of mobile telecommunications system.
	CO2	demonstrate the infrastructure to develop mobile communications system
	CO3	classify the different generations and technology for mobile communications.
	CO4	examine the working of different protocols of wireless mobile communication technology.
	CO5	determine the importance of each technology suitable for different situation of mobile and wireless communications.
	CO6	develop protocols for Adhoc and infrastructure based wireless networks.
		(OC-1) 900106: Data Structures
	CO1	Outline the basics of algorithms and their performance criteria's
	CO2	Explain the working of linear / Non linear data structures
	CO3	Identify the appropriate data structure to solve specific problems
	CO4	Analyze the performance of various data structures & their applications
	CO5	Evaluate the time/ space complexities of various data structures & their applications
	CO6	Design the optimal algorithmic solutions for various problems
		(OC-1) 900107:Python Programming
	CO1	explain the numbers, Math, functions, Strings, List, Tuples and Dictionaries in Python
	CO2	apply different Decision-Making statements and Functions
	CO3	identify the Object-oriented programming in Python
	CO4	analyze the different File handling operations
	CO5	design GUI Applications in Python and evaluate different database operations
	CO6	develop Client-Server network applications using Python
		100008:Intellectual Property Rights
	CO1	Imbibe the knowledge of Intellectual Property and its protection through various laws
	CO2	apply the knowledge of IPR for professional development
	CO3	Identify the appopriate data structures to solve specific problems
	CO4	develop a platform for protection and complianceof Intellectual Property Rights & knowledge

	CO5	create awareness amidst academia and industry of IPR and Copyright compliance
	CO6	deliver the purpose and function of IPR and patenting

		170703: Creative Problem Solving
	CO1	Define a Structured Problem Solving Process
	CO2	Understand Cause-Effect- Symptom-Problem Relationships in Problem Definition
	CO3	Apply Cause-Effect Tools and Techniques and Develop Root- Cause Analysis
	CO4	Apply Idea Generation Tools and Techniques in Formulating Creative Solutions
	CO5	Apply Evaluative Tools and Techniques for Decision Making Process
	CO6	Identify Strategic Considerations in Evaluating Risks and Implementing Solutions

(DE-3) 150711: Networking with TCP/IP

	CO1	define the concept of computer network and various layered architecture.
	CO2	compare the classless and class full addressing of IPV4 .
	CO3	identify the different types of networking devices and their functions within a network.
	CO4	analyze various protocols of computer networks for assisting network design and implementation.
	CO5	design client server applications and communication model and protocols for communication.
	CO6	elaborate various TCP/IP protocol for achieving multimedia and security services.

(DE-3) 150712: Data Mining & Warehousing

	CO1	Illustrate various tools of Data Mining and their techniques to solve the real time problems
	CO2	Apply data preprocessing and data quality for construction of data warehouse
	CO3	Identify various data bases and modeling of data warehouse and comparing various methods for storing & retrieving data from different data
	CO4	Develop various classification algorithms for data using data mining.
	CO5	Make use of data mining methods for identification of association for transactional databases.
	CO6	Analyse data mining for knowledge discovery & prediction

(DE-3) 150713: Distributed Systems

	CO1	tell the basic elements and concepts related to distributed system technologies
	CO2	demonstrate knowledge of the core architectural aspects of distributed systems.
	CO3	identify how the resources in a distributed system are managed by algorithm.
	CO4	examine the concept of distributed file system and distributed shared memory.
	CO5	compare various distributed system algorithms for solving real world problems.
	CO6	develop application for achieving various services of distributed system

(DE-4) 150754: Cloud Computing

	CO1	List various strengths and limitations of cloud computing.
	CO2	Explain the architecture, infrastructure and delivery models of cloud computing
	CO3	Apply suitable virtualization concepts.
	CO4	Analyse various programming models and approaches for cloud computing.
	CO5	Elaborate various security mechanisms for cloud computing environment.
	CO6	Predict various practical applications of cloud computing.

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(OC-2) 900209: Network Security

	CO1	define the concept of computer network and various layered architecture.
	CO2	compare the classless and class full addressing of IPV4 .
	CO3	identify the different types of networking devices and their functions within a network.
	CO4	analyze various protocols of computer networks for assisting network design and implementation.
	CO5	design client server applications and communication model and protocols for communication.
	CO6	elaborate various TCP/IP protocol for achieving multimedia and security services.

(OC-2) 900210: Data Mining & Warehousing

	CO1	Illustrate various tools of Data Mining and their techniques to solve the real time problems
	CO2	Apply data preprocessing and data quality for construction of data warehouse
	CO3	Identify various data bases and modeling of data warehouse and comparing various methods for storing & retrieving data from different data
	CO4	Develop various classification algorithms for data using data mining.
	CO5	Make use of data mining methods for identification of association for transactional databases.
	CO6	Analyse data mining for knowledge discovery & prediction

(OC-3) 900221 Artificial Intelligence

	CO1	Tell the fundamental concepts of Artificial Intelligence and its real-world applications.
	CO2	Illustrate the various seraching algorithms used to solve AI problems.
	CO3	Utilize the several techniques of Knowledge Representation to deal with AI problems.
	CO4	Analyze the performance of various algorithm used in AI.
	CO5	Evaluate programming methods and algorithmic principles in puzzle solving techniques.
	CO6	Formulate an strategy to solve the real-world problems by various applications of AI.

(OC-3) 900222 Computer Networks

	CO1	Explain cryptographic algorithms, hash algorithms and authentication mechanisms.
	CO2	Illustrate fundamentals of number theory, attacks and security principles.
	CO3	Apply number theory and various algorithms to achieve principles of security.
	CO4	Analyze the cause for various existing network attacks and describe the working of available security controls
	CO5	Examine the vulnerabilities in IT infrastructure.
	CO6	Predict the attacks and controls associated with IP, transport-level, web and e-mail security.

150851: Social Network

	CO1	Design solutions to real world problems
	CO2	Express the technical ideas, strategies and methodologies
	CO3	Utilize new tools, algorithms, techniques to obtain solution of the project
	CO4	Evaluate the performance of the prototype/ results
	CO5	Able to locate and use technical information from multiple sources.
	CO6	Demonstrate the ability to communicate effectively in speech and writing

150801: Internship/Project

(left margin, Semester 8)

CO1	Design solutions to real world problems	
CO2	Express the technical ideas, strategies and methodologies	
CO3	Utilize new tools, algorithms, techniques to obtain solution of the project	
CO4	Evaluate the performance of the prototype/ results	
CO5	Able to locate and use technical information from multiple sources.	
CO6	Demonstrate the ability to communicate effectively in speech and writing	
	900619: Introduction to Internet of Things	
CO1	Explain internet of things, evolution of IoT, applications of IoT	
CO2	classify IoT architecture, IoT service life cycle and application of device/cloud collaboration	
CO3	Apply the concept of IoT in real world scenario	
CO4	Analyse security and privacy in the IoT	
CO5	choose appropriate framework for distributed data analysis for IoT and anomaly detection	
CO6	develop small low cost embedded systems	