Department of Computer Science & Engineering and Information Technology

SOFTWARE ENGINEERING
150502 (DC-9)

L	T	P	C
2	1	2	4

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit - I

Introduction to Software Engineering: Definition, software engineering-layered Technology, Software Characteristics and Components, **Software model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection criteria of model:** Characteristics of Requirements, Status of Development Team, Users participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , **Types of Requirement-** Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural design, Procedural design, data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project domains, Software Measurement, Software Quality Metrics, **Project Management**- Basics-People, Product, Process, Project, **Estimation**- Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic issues, Criteria for completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the various fundamental concepts of software engineering.

CO2. develop the concepts related to software design & analysis.

CO3. compare the techniques for software project management & estimation.

CO4. choose the appropriate model for real life software project.

CO5. design the software using modern tools and technologies.

CO6. test the software through different approaches.

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Department of Computer Science & Engineering and Information Technology

THEORY OF COMPUTATION
150503 (DC-10)

L	T	P	C
2	1	2	4

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
- To analyse and design abstract model of computation & formal languages
- To understand and conduct mathematical proofs for computation and algorithms.

Unit-I

Introduction of Automata Theory: Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and mealy machines, composite machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Meaning of union, intersection, concatenation and closure, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, killing null and unit productions. Chomsky normal form and Greibach normal form.

Unit-IV

Push down Automata: example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Petrinet model.

Unit-V

Turing Machine: Techniques for construction. Universal Turing machine Multitape, multihead and multidimensional Turing machine, N-P complete problems. Decidability and Recursively Enumerable Languages, decidability, decidable languages, undecidable languages, Halting problem of Turing machine & the post correspondence problem.

RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft & Ullman, Narosa Publication.
- Element of the Theory Computation, Lewis & Christors, Pearson.
- Theory of Computation, Chandrasekhar & Mishra, PHI.
- Theory of Computation, Wood, Harper & Row.
- Introduction to Computing Theory, Daniel I-A Cohen, Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the basic concepts of switching and finite automata theory & languages.

CO2. relate practical problems to languages, automata, computability and complexity.

CO3. construct abstract models of computing and check their power to recognize the languages.

CO4. analyse the grammar, its types, simplification and normal form.

CO5. interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.

CO6. develop an overview of how automata theory, languages and computation are applicable in engineering application.

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Department of Computer Science & Engineering and Information Technology

MICROPROCESSOR & INTERFACING
150504 (DC-11)

L	T	P	C
2	1	2	4

COURSE OBJECTIVES

- To understand different processors and basic architecture of 16 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand 8051 microcontroller.

Unit-I

Microprocessors: Introduction to x86 microprocessors, RISC and CISC processors, 8086 Architecture-Functional Diagram, Register Organization, Memory Segmentation, Programming Model, Memory Address, Physical Memory Organization, Minimum and maximum mode signals, Bus Cycle and Timing Diagrams, Instruction Formats, Addressing Modes, Instruction Set, Interrupts of 8086.

Unit-II

Basic Peripherals and Interfacing: 8212, 8155, 8255, 8755, interfacing with LED's, ADC, DAC, stepper motors and I/O & Memory Interfacing.

Unit-III

Special Purpose Programmable Peripheral Devices and Interfacing: 8253, 8254 programmable interval timer, 8259A programmable interrupt controller and 8257 DMA controllers, Keyboard and Display Interfacing.

Unit-IV

Serial and Parallel Data Transfer: Serial and Parallel data transmission, Types of communication system, Baud rate RS-232C, Modem and various bus standards, USART – 8251A.

Unit-V

Introduction to Microcontrollers: 8051 Microprocessor and its Architectures, Pin Description, Input-Output configurations, Interrupts, Addressing Modes, An overview of 8051 Instruction Set.

RECOMMENDED BOOKS

- The Intel Microprocessors, Architecture, Programming and Interfacing, B.B. Brey, PHI.
- Microprocessor 8086: Architecture, Programming and Interfacing, Sunil Mathur, PHI.
- Advanced Microprocessor and Interfacing, D.V. Hall, Mc-Graw Hill.
- Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing, A.K. Ray & K.M. Bhurchandi, Tata McGraw Hill.
- Interfacing Techniques in Digital Design with Emphasis on Microprocessors, R.L. Krutz, John Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. compare the architecture and feature of different 16-bit microprocessor interfacing chips & microcontrollers.

CO2. develop programming skills in assembly language of 8086 microprocessor and 8051 microcontroller.

CO3. demonstrate the concept of interfacing with peripheral devices.

CO4. make use of different interrupts and addressing modes.

CO5. design an interfacing for I/O devices.

CO6. build a system based on 8086 microprocessor and 8051 microcontroller.

Syllabi

of

Departmental Core (DC) Courses

B.Tech VI Semester

(Computer Science & Engineering)

Under Flexible Curriculum

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Department of Computer Science & Engineering and Information Technology

COMPILER DESIGN
150601 (DC-12)

L	T	P	C
2	1	2	4

COURSE OBJECTIVES

- To learn finite state machines and context free grammar.
- To learn, various phases of compiler
- To understand process of compiler implementation.

Unit-I

Overview of Translation Process: Introduction to Compiler, Major Data Structures in Compiler, Other Issues in Compiler Structure, BOOT Strapping and Porting, Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Tool Based Approach to Compiler Construction.

Unit-II

Lexical Analysis: Input Buffering, Symbol Table, Token, Recognition of Tokens, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting and Implementation. Regular Grammar & Language Definition, Transition Diagrams, Design of a Typical Scanner using LEX.

Unit-III

Syntax Analysis: Context Free Grammars (CFGs), Ambiguity, Basic Parsing Techniques: Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing LL(1) Grammar, Bottom-UP Parsing, Operator Precedence Parsing, LR Parsers (SLR, CLR, LALR), Design of a Typical Parser Using YACC.

Unit-IV

Semantic Analysis: Compilation of expression, control, structures, conditional statements, various intermediate code forms, syntax directed translation, Memory allocation and symbol table organizations, static and dynamic array allocation, string allocation, structure allocation etc., error detection indication and recovery, Routines or

printing various lexical, syntax and semantic errors.

Unit-V

Code generation and Code Optimization: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, DAG Representation of Programs, Code Generation from DAGS, Peep-hole Optimization, Code Generator Generators, Specification of Machine. Code Optimization: Source of Optimizations, Optimization of Basic Blocks, Loops, Global Data Flow Analysis, Solution to Iterative Data Flow Equations, Code Improving Transformations, Dealing with Aliases, Data Flow Analysis of Structured Flow Graphs.

RECOMMENDED BOOKS

- Compilers: Principles, Techniques and Tools, V. Aho, R. Sethi and J. D. Ullman, Pearson Education.
- Compiler Construction: Principles and Practice, K.C. Louden, Cengage Learning.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define 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.

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Department of Computer Science & Engineering and Information Technology

COMPUTER NETWORKS
150602 (DC-13)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable Students to deal with various networking problems such as flow control, error control and congestion control.

Unit-I

Introduction: Computer Network, Types- LAN,MAN & WAN, Data transmission modes- Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous transmission, Transmission medium- Guided & Unguided, Cables- Twisted pair, Coaxial cable & Optical fiber, Networking devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode.

Unit-II

Physical Layer: Network topologies- Bus, Ring, Star & Mesh, Line coding- Unipolar, Polar and Bipolar, Switching- Circuit switching, Message switching & Packet switching, Multiplexing: FDM – Frequency division multiplexing, WDM – Wavelength division multiplexing & TDM – Time division multiplexing.

Unit-III

Data Link Layer: Introduction, Design issues, Services, Framing, Error control, Flow control, ARQ Strategies, Error Detection and correction, Parity bits, Cyclic Redundant Code (CRC), Hamming codes, MAC Sub Layer- The channel allocation problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

Unit-IV

Network Layer & Transport Layer: Introduction, Design issues, Services, Routing- Distance vector routing, Hierarchical routing & Link state routing, Shortest path algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

Unit-V

Presentation, Session& Application Layer: Introduction, Design issues, Presentation layer- Translation, Encryption- Substitutions and Transposition ciphers, Compression- lossy and lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote login, File transfer & Electronic mail.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the fundamental concepts of computer network.
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.

Syllabi

of

Mandatory Course(MC)

B.Tech V Semester

(Computer Science & Engineering)

Under Flexible Curriculum

Department of Computer Science & Engineering and Information Technology

Indian Constitution and Traditional Knowledge
100006

100006	Indian Constitution and Traditional Knowledge	Theory	Midterm	Quiz/Assignment	TOTAL	L	T	P	C
		70	20	10	100	3	-	-	-

COURSE OBJECTIVES

- The course aims to provide students with the continuous, comprehensive and cumulative understanding of Indian Knowledge Tradition (Philosophy, Language, Art) and its modern interpretation and analysis.
- It intends to connect the students' modern advanced knowledge system with the roots of Indian Knowledge Tradition for their development and better understanding of the essentials of thought process, intellection and inference.
- To impart the knowledge of the Yogic Science and an insight into Sanskrit Literature which will promote interest among students in discerning the significance of health and wisdom with an Indian perspective.
- The objective of the syllabus is to familiarize students with the essential features and basic principles of the constitution of India.
- It will acquaint them with the concept of government, its organs and various types.
- It will provide students with a comprehensive and clear understanding of the basic fundamental rights and duties.

Unit-I

- Introduction to Basic Structure of Indian Knowledge System
- Homogeneity of modern science and Indian Knowledge Tradition
- Yoga: Promoting positive health and personality
- Case Studies

Unit-II

- Indian Philosophy or Darshanas: Jainism, Buddhism, Yoga, Śaiva and Vedanta
- Indian Linguistic Tradition: Panini's Ashtadhyayi
- Indian Art: Mauryan art, Buddhist art, Gupta art, Muslim Art & Culture Contemporary art

- Case Studies

Unit III:

Introduction to Political Science

- Nature and scope of political science
- Definition, elements and theories of origin of State (Social Contract and Evolutionary)
- Meaning and features of Civil Society
- Indian Political Thought: Raja Ram Mohan Roy, Swami Vivekanand, Gandhi, Ambedkar

Unit IV:

Concept of Government and Its Organs

- Government: Definition and its characteristics
- Types and meaning of Legislature: Composition, Function and Role of the Parliament (Lok Sabha and Rajya Sabha)
- The Powers, Position and Role of the President, Prime Minister and the Cabinet
- The Powers, Position and Role of the Governor and the Chief Minister; Composition and the role of Supreme Court, Judicial Review and Judicial Activism

Unit V:

Salient features of Indian Constitution

- Preamble, Conventions, Sovereignty of the Constitution and the Rule of Law
- Parliamentary Democracy, Federalism, Secularism and Socialism
- Fundamental Rights, Directive Principles of State Policies and Fundamental Duties
- Election Commission and Electoral Reforms

BASIC READINGS:

- O.P. Gauba, Political Theory, Macmillan, (latest edition).
- D.D. Basu, Introduction to the Constitution of India, (Latest Edition).
- N.G. Jayal & Pratap Bhanu Mehta, The Oxford Companion of Politics in India, 2000.
- W.H. Morris-Jones, The Government and Politics of India.
- Swami Jitamanand, Holistic Science and Vedam, Bhartiya Vidyabhawan

- V. Shivramakrishnan (Ed.), Cultural Heritage of India, Bhartiya Vidyabhawan, Mumbai Fifth Edition, 2014.
- Yoga sutra of Patanjali, Ramakrishnan Mission, Kolkata.
- Panini Shiksha, Motilal Banarsidas
- VN Jh, Language, Thought and Reality
- Krishna Chaitanya. Arts of India, Abhinav Publications, 1987.
- SC Chaterjee and DM Datta, An Introduction to Indian Philosophy, university of Calcutta, 1984
- A L Basham, The Wonder That was India

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. know the rich Indian traditions and the Indian constitution.

CO2. Appraise the utility and significance of tradition and its applicability in present times.

CO3. Employ the knowledge of the constitutional norms as laid in the constitution and abide by the practices stated therein.

CO4. Create a better society and living standards for themselves as well as for others.

CO5. Recognize the basic concepts of ethics and morality pertaining to Indian culture and tradition.

CO6. Connect traditional Indian philosophy with their everyday conduct and practices.

Syllabi

of

Mandatory Course (MC)

B.Tech VI Semester

(Computer Science & Engineering)

Under Flexible Curriculum

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Department of Computer Science & Engineering and Information Technology

DISASTER MANAGEMENT
100007

100007	Disaster Management (MC)	Theory	Midterm	Quiz/Assignment	Total	L	T	P	C
		70	20	10	100	3	-	-	03

COURSE OBJECTIVES

- To understand basic concepts in Disaster Management
- To understand Definitions and Terminologies used in Disaster Management
- To understand Types and Categories of Disasters
- To understand the Challenges posed by Disaster
- To understand Impact of Disasters key skills

Unit-I

Introduction to disaster management, concepts and definitions: disaster, vulnerability, risk severity, frequency and details, capacity impact, prevention, mitigation.

Unit-II

Disasters – Disasters classification, demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends, hazard and vulnerability profile of India.

Unit-III

Disaster Impacts – Disaster impact (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues, impact of natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides etc.), impact of manmade disasters (industrial pollution, artificial flooding in urban areas, urban disasters, transportation accidents etc.).

Unit-IV

Disaster Risk Reduction (DRR) - Disaster management cycle- its phases; prevention, mitigation, preparedness, relief and recovery; structural and non- structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response. Roles and responsibilities of government, community,

local institutions, NGOs and other stakeholders: Policies and legislation for disaster management. DRR programmes in India and the activities of National Disaster Management Authority.

Unit-V

Disasters, Environment and Development – Factors affecting vulnerability such as impact of development projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

TEXT BOOKS:

- Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
- Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
- Srivastava H.H. & Gupta G.D., Management of Natural Disasters in developing countries, Daya Publishers Delhi, 2006, 201 pages.

REFERENCE BOOKS:

- http://ndma.gov.in (Home page of National Disaster Management Authority)
- http://www.ndmindia.nic.in / (National Disaster Management in India)
- Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
- National Disaster Management Policy, 2009, GOI.
- Inter Agency Standing Committee (IASC) (Feb. 2007), IASC Guidelines on Mental Health and Psychosocial Support in Emergency Setting. Geneva: IASC

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. Propose disaster prevention and mitigation approaches.
CO2. Classify global and national disasters, their trends and profiles.
CO3. Appreciate the impacts of various disasters.
CO4. Apply Disaster Risk Reduction in management.
CO5. Find the linkage between disasters, environment and development.

ANNEXURE-IV

Syllabi
of
Departmental Electives (DEs) Courses
B.Tech VI Semester
(Computer Science & Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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List of Departmental Elective (DE) Courses

B.Tech (Computer Science & Engineering)

	VI Semester			
Code Category	DE-1		DE-2	
	Subject Code	Subject Name	Subject Code	Subject Name
Track 1	Network Security			
	150603 A	Network & Web Security	150604A	Ethical Hacking
Track 2	Distributed Computing			
	150603 B	Parallel Processing	150604 B	Distributed Systems
Track 3	Image Processing			
	150603 C	Image Processing	150604 C	Pattern Recognition

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Department of Computer Science & Engineering and Information Technology

NETWORK & WEB SECURITY
150603 A (DE-1)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.
- To explore the requirements of real-time communication security and issues related to the security of web services.

Unit-I

Security: Principles and Attacks, **Basic Number theory:** Prime number, congruence's, Modular exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block ciphers and Steam ciphers, Substitution ciphers, Transposition ciphers, Caesar cipher, Play-fair Cipher, Hill Cipher, Cipher modes of operation.

Unit-II

Cryptography: Symmetric key cryptography, Public key Cryptography, Principles of Public key Cryptosystem, Classical Cryptographic algorithms: DES, RC4, Blowfish, RSA, Distribution of public keys and key management, Diffie-hellman key exchange.

Unit-III

Hash Functions: Hash functions, one way hash function, SHA (Secure hash algorithm). **Authentication:** Requirements, Functions, Kerberos, Message authentication codes, Message digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit -IV

IP & Web security overview: SSL (Secure socket layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). **IDS (Intrusion detection system):** Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration testing, Risk management. **Firewalls:** Types, functionality and Polices.

Unit -V

Phishing: Attacks and its types, Buffer overflow attack, Cross Site Scripting, SQL injection Attacks, Session Hijacking. **Denial of Service Attacks:** Smurf attack, SYN flooding, Distributed Denial of Service. **Hacker:** Hacking and types of hackers, Footprinting, Scanning: types: port, network, vulnerability), Sniffing in shared and switched networks, Sniffing detection & prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prosise, Tata McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

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.

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Department of Computer Science & Engineering and Information Technology

PARALLEL PROCESSING
150603 B (DE-1)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To describe different parallel processing architectures based on relationships between processing elements, instruction sequence, memory and interconnected network.
- To identify design and develop algorithms which require parallelization as part of system design or performance enhancement.
- To evaluate the performance of parallel algorithms designed based on shared and distributed memory models as well as against serial based algorithm designs.

Unit-I

Introduction to Parallel Processing: Multiprogramming and Time Sharing, Parallelism in Uniprocessor system, Parallel computer structure, Architectural classification schemes and Parallel processing applications.

Unit-II

Principles of Pipelining: Pipelining principle of linear pipelining, Performance measures, General Pipelines, reservation tables, Instruction and Arithmetic pipelines, Instruction Prefect, Branch handling, Data Buffering, Internal Forwarding and Register tagging, Hazard detection and resolution, Job Sequencing and Collision prevention.

Unit-III

Vector Processing: Vector processing requirements, Characteristics of vector processing multiple vector task dispatching, pipeline vector processing methods, vector super computers, recent vector processors, Architecture of CRAY, Pipeline chaining and vector loops, Architecture of CYBER, Configurability.

Unit-IV

Array Processing: SIMD organization, Interconnection networks, Parallel algorithm for array processor-Matrix Multiplication Parallel sorting on Array Processor, SIMD Fast Fourier transform, Connection issues for SIMD Processing.

Unit-V

Multiprocessor Architecture, Programming & Control: Loosely and Tightly Coupled Architectures. Functional Structures, Types Interconnection networks, Parallel memory organizations.

Process Synchronization mechanism: Semaphores, Critical Section and monitors, System deadlocks and protection schemes, Multiprocessor scheduling strategies, Parallel algorithms.

RECOMMENDED BOOKS

- Computer Architecture and Parallel Processing, K. Hwang and Briggs, Tata McGraw Hill.
- Advanced Computer Architecture, K. Hwang, Tata McGraw Hill.
- Computer Architecture and Organization, J.P. Hayes, Tata McGraw Hill.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define the fundamental concepts of parallelism.

CO2. illustrate the performance of different computing structures.

CO3. develop the ability for improving performance in parallel architecture.

CO4. analyze the parallel algorithms for real world problems solving.

CO5. assess the communication and the computing possibilities of parallel system architecture.

CO6. design contemporary parallel algorithms.

Department of Computer Science & Engineering and Information Technology

IMAGE PROCESSING
150603 C (DE-1)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To understand the fundamentals of Image acquisition, image processing in spatial and frequency domain.
- To understand image transforms and image enhancement techniques use to improve images.
- To know about the image restoration techniques, image registration and segmentation used in digital image processing.

Unit- I

Introduction and Fundamentals: Introduction to Image Processing Systems, Digital Image Fundamentals: Components of Digital Image Processing system, Image model, Imaging geometry, Sampling and quantization of images, Classification of digital images, Zooming and shrinking, Relationship between pixels, basics of convolution.

Unit- II

Image Enhancement in spatial domain: Introduction, Basic gray level function, piecewise linear transformation, Contrast stretching, Histogram specification, Histogram Equalization, Local enhancement using arithmetic and logical operation- Image subtraction, Image averaging Image smoothing: Smoothing Spatial Filters, Smoothing Linear Filters, Image sharpening.

Unit- III

Image Enhancement in Frequency domain: Introduction to Fourier Transform, Filters: low pass and High pass, Gaussian filters, Homomorphic filtering.

Image Restoration- Model of Image Degradation/Restoration process, Noise models, Noise reduction in spatial domain and frequency domain, Inverse filtering, mean filters, Least Mean Square(Wiener) filtering, FIR Wiener Filter.

Unit -IV

Morphological Image Processing: Logic operation involving binary images, Dilation and Erosion, Opening and Closing, Morphological Algorithms: Boundary extraction, Region filling, Extraction of connected components, Convex Hull, Thinning, and Thickening.

Unit -V

Image registration: Introduction, Geometric transformation, Plane to plane transformation, mapping. **Image Segmentation:** Introduction, Region extraction, pixel based approach, Multi level thresholding, Local thresholding, Region based approach, Region growing, Splitting and merging, Edge and Line detection, Corner detection, Detection of discontinuities, Edge linking and boundary detection.

RECOMMENDED BOOKS

- Digital Image Processing, Rafael C Gonzalez, Richard E Woods, Pearson Education.
- Fundamentals of Digital Image Processing, K. Jain, Pearson Education.
- Digital Image Processing, S. Esakkirajan, S. Jayaraman, T. Veerakumar, Tata McGraw-Hill Education.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define different modalities and current techniques in image processing.

CO2. classify spatial and frequency domain techniques used in image processing.

CO3. apply image processing techniques to enhance visual images.

CO4. analyse 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 the mathematical models and principles of digital image processing for real world problems.

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Department of Computer Science & Engineering and Information Technology

ETHICAL HACKING
150604 A (DE-2)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To introduce the basic concepts and principles in ethical hacking.
- This includes the major techniques involved and system vulnerabilities issues for testing.
- To demonstrate vulnerabilities related to computer system to develop an understanding of Programming Survival Skills, Basic Linux Exploits and solution for these issues.

Unit-I

Introduction to Ethical Disclosure: Ethics of Hacking, Ethical Hacking and the legal system, Proper and Ethical Disclosure.

Unit-II

Penetration Testing and Tools: Using Metasploit, Using Back Track Live CD Linux Distribution.

Unit-III

Exploits: Programming Survival Skills, Basic Linux Exploits, Advanced Linux Exploits, Shell code Strategies, Writing Linux Shellcode, Basic windows Exploits.

Unit-IV

Vulnerability Analysis: Passive Analysis, Advanced Static Analysis with IDA Pro, Advanced Reverse Engineering, and Client-side browser exploits, Exploiting Windows Access Control Model for Local Elevation Privilege, Intelligent Fuzzing with Sulley, From Vulnerability to Exploit.

Unit-V

Malware Analysis: Collecting Malware and Initial Analysis, Hacking Malware. **Denial-of Service Attacks:** Types of Attacks (Smurf Attack, Buffer Overflow Attack, Ping of Death Attack, Teardrop Attack, SYN Attack, SYN Flooding), DDoS Attack

(Distributed DoS Attack.), Session Hijacking, Spoofing v Hijacking, TCP/IP hijacking, CAPTCHA Protection.

RECOMMENDED BOOKS

- Gray Hat Hacking: The Ethical Hackers' Handbook, Shon Harris, Allen Harper, Chris Eagle and Jonathan Ness, Tata McGraw Hill.
- Hacking: The Art of Exploitation, Jon Erickson, No Starch Press.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. demonstrate various penetration testing tools like Metasploit, Backtrack etc.

CO2. explain ethics behind hacking and vulnerability disclosure.

CO3. apply the reverse engineering and client-side browser exploits.

CO4. identify the core concepts related to malware, hardware and software vulnerabilities and their causes.

CO5. analyze the vulnerabilities related to computer system and networks using state of the art tools and technologies.

CO6. develop programming survival skills, basic Linux exploits, advanced Linux exploits, shell code strategies.

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Department of Computer Science & Engineering and Information Technology

DISTRIBUTED SYSTEMS
150604 B (DE-2)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To provide students with contemporary knowledge, analyze and design distributed applications.
- To provide master skills to measure the performance of distributed algorithms
- To gain experience in the design and testing of a large software system, and to be able to communicate that design to others.

Unit-I

Introduction to Distributed Systems: Architecture for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages & Disadvantage distributed system, Issues in designing Distributed System.

Unit-II

Distributed Shared Memory: Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Design & Implementations issues In DSM System, Structure of Share Memory Space, Consistency Model, and Thrashing.

Unit-III

Distributed File System: Desirable features of good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File Application & Fault tolerance. Naming - Features, System Oriented Names, Object Locating Mechanism, Human Oriented Name.

Unit-IV

Inter Process Communication and Synchronization: API for Internet Protocol, Data Representation & Marshaling, Group Communication, Client Server Communication, RPC- Implementing RPC Mechanism, Stub Generation, RPC Messages. Synchronization: - Clock Synchronization, Mutual Exclusion, Election Algorithms - Bully & Ring Algorithms.

Unit-V

Distributed Scheduling and Deadlock Distributed Scheduling- Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues. Deadlock- Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms. Case Study of Distributed System: - Amoeba, Mach, Chorus.

RECOMMENDED BOOKS

- Distributed Operating System Concept & Design, Sinha, PHI.
- Distributed System Concepts and Design, Coulouris & Dollimore, Pearson.
- Distributed Operating System, Andrew S. Tanenbaum, Pearson.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define 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 shared memory, file system and, inter process communication.

CO5. compare various distributed system algorithms for solving real world problems.

CO6. discuss large-scale distributed applications.

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Department of Computer Science & Engineering and Information Technology

PATTERN RECOGNITION
150604 C (DE-2)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To understand the fundamentals of Pattern Recognition techniques.
- To understand the principles of Classification approaches to Pattern Recognition.
- To understand the Neural Network approach to Pattern Recognition.

Unit-I

Pattern Classifier: Overview of pattern recognition, Discriminant functions, Supervised learning ,Parametric estimation, Maximum likelihood estimation, Bayesian parameter estimation, Perceptron algorithm, LMSE algorithm, Problems with Bayes approach, Pattern classification by distance functions, Minimum distance pattern classifier.

Unit-II

Unsupervised Classification: Clustering for unsupervised learning and classification, Clustering concept, C-means algorithm, Hierarchical clustering procedures, Graph theoretic approach to pattern clustering, Validity of clustering solutions.

Unit-III

Structural Pattern Recognition: Elements of formal grammars, String generation as pattern description, Recognition of syntactic description, Parsing, Stochastic grammars and applications, Graph based structural representation.

Unit-IV

Feature Extraction And Selection: Entropy minimization, Karhunen Loeve transformation, Feature selection through functions approximation, Binary feature selection.

Unit-V

Recent Advances: Neural network structures for Pattern Recognition, Neural network based Pattern associators, Unsupervised learning in neural Pattern Recognition, Self-organizing networks, Fuzzy logic, Fuzzy pattern classifiers, Pattern classification using

Genetic Algorithms.

RECOMMENDED BOOKS

- Pattern Recognition Statistical, Structural and Neural Approaches, Robert J. Schalkoff, John Wiley & Sons.
- Pattern Recognition Principles, Tou and Gonzales, Wesley Publication Company.
- Pattern Classification and Scene Analysis, R.O. Duda and P. E. Har , Wiley.
- Pattern Recognition Engineering, Morton Nadier and Eric Smith, John Wiley & Sons.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define 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 shared memory, file system and, inter process communication.

CO5. compare various distributed system algorithms for solving real world problems.

CO6. discuss large-scale distributed applications.

Syllabi

of

Open Category (OC) Courses

B.Tech VI Semester

(Computer Science & Engineering)

Under Flexible Curriculum

List of Open Category Courses

VI Semester				
S. NO.	**Code Category**	**Subject Code**	**Subject Name**	**Course Prerequisite**
1.	**OC-1**	150605 A	R Programming	• Basic of programming.
		150605 B	Social Networking	• Basic knowledge of graph theory. • Basic knowledge of various networks and its components.
		150605 C	Soft Computing	• Basic knowledge of set theory, calculus and probability theory.

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Department of Computer Science & Engineering and Information Technology

R PROGRAMMING
150605 A (OC-1)

L	T	P	C
2	1	-	3

COURSE OBJECTIVES

- To understand the critical programming language concepts.
- To perform data analysis using R commands.
- To make use of R loop functions and debugging tools.

Unit-I

Introduction to R: R Commands, Objects, Functions, Simple Manipulations, Matrices and Arrays, Factors, Lists, Data Frames.

Unit-II

Programming Using R: Introduction, Function Creation, Scripts, Logical Operators, Conditional Statements, Loops in R, Switch Statement, Creating List and Data Frames, List and Data Frame Operations, Recursive List.

Unit-III

Object- Oriented Programming in R: Introduction, S3 Classes, S4 Classes, References Classes, Debugging Principle in R, Import and Export Data from CSV, SAS and ODBC.

Unit-IV

Mathematical and Statistical Concepts, Hypothesis Testing, Different Statistical Distribution, Regression, Time Series Analysis.

Unit-V

Graphics in R: Basic Plots, Labelling and Documenting Plots, Adjusting the Axes, Specifying Colour, Fonts and Sizes, Plotting symbols, Customized Plotting, Packages in R for Windows, Linus and Mac.

RECOMMENDED BOOKS

- "R for Beginners", Sandip Rakshit, Tata Mc Graw Hill Education.
- "R programming for Data Science", Roger D. Peng, Learn publishing.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define basic programming constructs used in R.

CO2. explain the various commands used in R.

CO3. apply commands in performing operations over data.

CO4. analyze the data set using constructs of R.

CO5. choose appropriate packages for dealing various tasks.

CO6. predict results from the datasets using R commands.

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Department of Computer Science & Engineering and Information Technology

SOCIAL NETWORKING
150605 B (OC-1)

L	T	P	C
2	1	-	3

COURSE OBJECTIVES

- To know basic notation and terminology used in network science.
- To be able to visualize, summarize and compare networks.
- To develop practical skills of network analysis and be capable of analyzing real work networks.

Unit- I

Introduction: Introduction to Semantic Web, Limitations of current Web, Development of Semantic Web, Emergence of the Social Web, Social Network analysis: Development of Social Network Analysis, Key concepts and measures in network analysis, Electronic sources for network analysis: Electronic discussion networks, Blogs and Online communities, Web-based networks, Applications of Social Network Analysis.

Unit- II

Modeling, Aggregating and Knowledge Representation: Ontology and their role in the Semantic Web: Ontology, based knowledge Representation, Ontology languages for the Semantic Web: Resource Description Framework, Web Ontology Language, Modeling and aggregating social network data: State of the art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships, aggregating and reasoning with social network data, advanced representations.

Unit- III

Extraction and Mining Communities in Web Social Networks: Extracting evolution of Web Community from a Series of Web Archive, Detecting communities in social networks, Definition of community, Evaluating communities, Methods for community detection and mining, Applications of community mining algorithms, Tools for detecting communities social network infrastructures and communities, Decentralized

online social networks, Multi, Relational characterization of dynamic social network communities.

Unit- IV

Predicting Human Behavior and Privacy Issues: Understanding and predicting human behavior for social communities, User data management, Inference and Distribution, Enabling new human experiences, Reality mining, Context, Awareness, Privacy in online social networks, Trust in online environment, Trust models based on subjective logic, Trust network analysis, Trust transitivity analysis, Combining trust and reputation, Trust derivation based on trust comparisons, Attack spectrum and countermeasures.

Unit- V

Visualization and Applications of Social Networks: Graph theory, Centrality, Clustering, Node, Edge Diagrams, Matrix representation, Visualizing online social networks, Visualizing social networks with matrix based representations, Matrix and Node, Link Diagrams, Hybrid representations, Applications, Cover networks, Community welfare, Collaboration networks, Co-Citation networks.

RECOMMENDED BOOKS

- Networks, Crowds, and Markets: Reasoning about a Highly Connected World, David Easley and John Kleinberg, Cambridge University Press.
- Statistical Analysis of Network Data with R (Use R!), Eric Kolaczyk, Gabor Csardi, Springer.
- Social Network Analysis: Methods and Applications, Stanley Wasserman and Katherine Faust, Cambridge University Press.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. classify the alternatives for technologies to carry out social network analysis

CO2. demonstrate an understanding of the theory of social networks.

CO3. apply network analysis software to characterize social network structure in different forms.

CO4. analyze the impact of network structure on patterns through network statistics.

CO5. create social network analysis to understand socially meaningful outcomes in political action and online interaction

CO6. develop any application for designing social network.

Department of Computer Science & Engineering and Information Technology

SOFT COMPUTING
150605 C (OC-1)

L	T	P	C
2	1	-	3

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction and Fundamental Concept of ANN: Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield networks.

Unit-II

Unsupervised Learning: Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization. Counterpropagation Networks, Adaptive Resonance Theory Network.

Unit-III

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations onFuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, **Defuzzification:** Lembda-Cuts for Fuzzy sets(Alpha-Cuts), Lembda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Models, **Other Variants:** Sugeno Fuzzy Models, Tekamoto Fuzzy Models.

Unit-IV

Introduction: Biological Background, Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Classification of Genetic Algorithm, Genetic Programming, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

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Scheme of Examination (B.Tech.)

GROUP A: I Semester & GROUP B: II Semester *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100201	BSC-1	Engineering Physics	70	20	10	30	20	150	4	1	2	6
2.	100202	HSMC-1	Energy, Environment, Ecology & Society	70	20	10	-	-	100	4	1	-	5
3.	100203	ESC-1	Basic Computer Engineering	70	20	10	30	20	150	4	1	2	6
4.	100204	ESC-2	Basic Mechanical Engineering	70	20	10	30	20	150	4	1	2	6
5.	100205	ESC-3	Basic Civil Engineering & Mechanics	70	20	10	30	20	150	4	1	2	6
6.	100206	HSMC-2	Language Lab. & Seminars	-	-	-	30	20	50	-		2	1
Total				350	100	50	150	100	750	20	5	10	30

Induction Programme of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations

GROUP A: (Electrical, Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)
01Theory Period=1 Credit; 02 Practical Periods =1 Credit

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Scheme of Examination (B.Tech.)

GROUP A: II Semester& GROUP B: I Semester *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100101	BSC-2	Engineering Chemistry	70	20	10	30	20	150	4	1	2	6
2.	100102	BSC-3	Engineering Mathematics-I	70	20	10	-	-	100	4	1	-	5
3.	100103	HSMC-3	Technical English	70	20	10	30	20	150	4	1	2	6
4.	100104	ESC-4	Basic Electrical & Electronics Engineering	70	20	10	30	20	150	4	1	2	6
5.	100105	ESC-5	Engineering Graphics	70	20	10	30	20	150	4	1	2	6
6.	100106	ESC-6	Manufacturing Practices	-	-	-	30	20	50	-	-	2	1
Total				**350**	**100**	**50**	**150**	**100**	**750**	**20**	**5**	**10**	**30**
Summer Internship Project –I (Institute Level) (Qualifier): Minimum two-week duration													

GROUP A: (Electrical, Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)
01Theory Period=1 Credit; 02 Practical Periods =1 Credit

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Scheme of Examination (B.Tech.)

III Semester (Computer Science & Engineering) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	100001	BSC-4	Mathematics-II	70	20	10	-	-	100	3	1	-	4
2.	150301	DC-1	Digital Electronics	70	20	10	-	-	100	3	1	-	4
3.	150302	DC-2	Data Structure	70	20	10	30	20	150	3	-	2	4
4.	150303	DC-3	Computer Graphics	70	20	10	30	20	150	3	-	2	4
5.	150304	DC-4	Object Oriented Programming & Methodology	70	20	10	30	20	150	3	-	2	4
6.	150305	DLC-1*	Hardware Lab	-	-	-	30	20	50	-	-	2	1
7.	150306	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	-	25	25	-	-	2	1
8.	150307	DLC-2	Summer Internship Project –I (Institute Level) (Evaluation)	-	-	-	25	~~25~~ MK	25			4	2
Total				350	100	50	145 ~~120~~	~~130~~ 105	750	15	2	14	24
9.	100002 $	MC-1	Biology for Engineers (Audit Course) (MC)	70	20	10	-	-	100	3		-	-
NSS/NCC				Qualifier									

Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation.

$ Course will run for Group A/B in III/IV semester respectively (Passing is optional, however a separate mark sheet will be issued to those who qualify)

*Virtual Lab to be conducted along with the traditional lab

GROUP A: (Electrical, Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

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Scheme of Examination (B.Tech.)

IV Semester (Computer Science & Engineering) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Term work / Lab Work & Sessional		L	T	P	
1.	100003	BSC-5	Mathematics- III	70	20	10	-	-	100	2	2	-	4
2.	150401	DC-5	Design & Analysis of Algorithms	70	20	10	30	20	150	2	1	2	4
3.	150402	DC-6	Database Management System	70	20	10	30	20	150	2	1	2	4
4.	150403	DC-7	Operating System	70	20	10	-	-	100	3	1	-	4
5.	150404	DC-8	Computer System Organization	70	20	10	-	-	100	3	1	-	4
6.	100004	MC-5	Cyber Security[$]	70	20	10	-	-	100	2	1	-	3
7.	150405	DLC-3	Programming Lab (DLC-2)	-	-	-	30	20	50	-	-	4	2
Total				420	120	60	90	60	750	14	7	8	25
NSS/NCC				Qualifier									
Summer Internship Project-II (SoftSkills Based) for two weeks duration: Evaluation in V Semester													

[$] This course will run for Group A/B in IV/III semester respectively.

*Virtual Lab to be conducted along with the traditional lab

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Scheme of Examination (B.Tech.)

V Semester (Computer Science & Engineering) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100005*	HSMC- 4	Ethics, Economics, Entrepreneurship & Management	70	20	10	-	-	100	2	-	-	2
2.	150501	BSC - 6	Discrete Structures	70	20	10	-	-	100	2	1	-	3
3.	150502	DC-09	Software Engineering	70	20	10	30	20	150	2	-	2	3
4.	150503	DC-10	Theory of Computation	70	20	10	30	20	150	2	-	2	3
5.	150504	DC-11	Microprocessor & Interfacing	70	20	10	30	20	150	2	-	2	3
6.	150505	DLC-4	Minor Project-I**	-	-	-	30	20	50	-	-	2	1
7.	150506	DLC-5	Summer Internship Project-II (Evaluation)	-	-	-	25	-	25	-	-	4	2
8.	150507	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	~~25~~ 145	~~-~~ 105	25	-	-	2	1
Total				350	100	50	~~140~~	~~110~~	750	10	1	14	18
9.	100006$	MC - 3	Indian Constitution & Traditional Knowledge (Audit Course)	70	20	10			100	3		-	-
Department level activity/workshop/awareness Programme to be conducted; certificate of compliance to be submitted by HoD to the Exam Controller through Dean Academics													
Additional Courses for obtaining Honours or minor Specialization by desirous students			Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization										

* Group A/B programmes will offer this course in V/VI Semester respectively.

$ Group A/B programmes will offer this course in V/VI Semester respectively. ((Passing is optional, however a separate mark sheet will be issued to those who qualify)

** The minor project-I may be evaluated by an internal committee for awarding sessional marks.

Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation

GROUP A: (Electrical, Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

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Scheme of Examination (B.Tech.)

VI Semester (Computer Science & Engineering) ***for batch admitted in Academic Session 2017-18***

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	150601	DC-12	Compiler Design	70	20	10	30	20	150	2	-	2	3
2.	150602#	DC-13	Computer Networks	70	20	10	-	-	100	2	1	-	3
3.	150603	DE-1*	DE	70	20	10	-	-	100	2	-	-	2
4.	150604	DE-2*	DE	70	20	10	-	-	100	2	-	-	2
5.	150605	OC-1*	OC	70	20	10	-	-	100	2	-	-	2
6.	100007	MC-4	Disaster Management (MC)	70	20	10	-	-	100	2	-	-	2
7.	150606	DLC-6	Minor Project-II	-	-	-	50	50	100	-	-	4	2
Total				420	120	60	80	70	750	12	1	6	16
Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester													
Additional Courses for obtaining Honours or minor Specialization by desirous students			Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization										

Group A/B programmes will offer this course in V/VI Semester respectively.

* At least one of these courses must be run through SWAYAM/NPTEL/ MOOC

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Scheme of Examination (B.Tech.)

VII Semester (Computer Science & Engineering) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name & Title	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem.	Term Work / Lab Work & Sessional		L	T	P	
1.	150701	DE-3	DE	70	20	10	-	-	100	2	-	-	2
2.	150702	DE-4*	DE	70	20	10	-	-	100	2	-	-	2
3.	150703	OC-2	OC	70	20	10	-	-	100	2	1	-	3
4.	150704	OC-3	OC	70	20	10	-	-	100	3	-	-	3
5.	100008	MC-5	Intellectual Property Rights (IPR)	70	20	10	-	-	100	2	-	-	2
6.	150705	DLC-7	Departmental Lab	-	-	-	50	50	100	-	-	4	2
7.	150706	DLC-8	Summer Internship Project-III (04 weeks) (Evaluation)	-	-	-	50	50	100	-	-	4	2
8.	150707	DLC-9	Creative Problem Solving (Evaluation)	-	-	-	25	25	50	-	-	2	1
Total				**350**	**100**	**50**	**125**	**125**	**750**	**11**	**1**	**10**	**17**
Additional Course for Honours or minor Specialization			Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization										

* This course must be run through SWAYAM/NPTEL/ MOOC

12/6/19
DEAN (ACADEMICS)
M.I.T.S
GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

VIII Scheme of Examination (B.Tech.)

~~VII~~ Semester (Computer Science & Engineering) *for batch admitted in Academic Session 2017-18*

S.N.	Subject Code	Category	Subject Name & Title	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem.	Term Work / Lab Work & Sessional		L	T	P	
1.	150801**	DE-5*	DE	70	20	10	-	-	100	2	-	-	2
2.	150802	OC-4*	OC	70	20	10	-	-	100	2	-	-	2
3.	150803	OC-5*	OC	70	20	10	-	-	100	2	-	-	2
4.	150804	DLC-10	Internship/Project	-	-	-	250	150	400	-	-	6	3
5.	150805	DLC-11	Professional Development#	-	-	-	-	50	50	-	-	2	1
Total				210	60	30	250	200	750	6	-	8	10
Additional Courses for obtaining Honours or minor Specialization by desirous students			Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization										

*All of these courses will run through SWAYAM/NPTEL/ MOOC

Evaluation will be based on participation/laurels brought by the students to the institution in national/state level technical and other events during the complete tenure of the UG program (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs and technical events)

12/6/19

DEAN (ACADEMICS)
M.I.T.S.
GWALIOR

for Mr

B. TECH

INFORMATION TECHNOLOGY

(under flexible curriculum)

ANNEXURE-I

Syllabi
of
Departmental Core (DC) Courses
B.Tech V Semester
(Information Technology)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

Department of Computer Science & Engineering and Information Technology

SOFTWARE ENGINEERING
160502 (DC-9)

L	T	P	C
2	1	2	4

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit - I

Introduction to Software Engineering: Definition, software engineering-layered Technology, Software Characteristics and Components, **Software model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection criteria of model:** Characteristics of Requirements, Status of Development Team, Users participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , **Types of Requirement-** Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural design, Procedural design, data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project domains, Software Measurement, Software Quality Metrics, **Project Management-** Basics-People, Product, Process, Project, **Estimation-** Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic issues, Criteria for completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the various fundamental concepts of software engineering.

CO2. develop the concepts related to software design & analysis.

CO3. compare the techniques for software project management & estimation.

CO4. choose the appropriate model for real life software project.

CO5. design the software using modern tools and technologies.

CO6. test the software through different approaches.

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Department of Computer Science & Engineering and Information Technology

THEORY OF COMPUTATION
160503 (DC-10)

L	T	P	C
2	1	2	4

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
- To analyse and design abstract model of computation & formal languages
- To understand and conduct mathematical proofs for computation and algorithms.

Unit-I

Introduction of Automata Theory: Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and mealy machines, composite machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Meaning of union, intersection, concatenation and closure, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, killing null and unit productions. Chomsky normal form and Greibach normal form.

Unit-IV

Push down Automata: example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Petrinet model.

Unit-V

Turing Machine: Techniques for construction. Universal Turing machine Multitape, multihead and multidimensional Turing machine, N-P complete problems. Decidability and Recursively Enumerable Languages, decidability, decidable languages, undecidable languages, Halting problem of Turing machine & the post correspondence problem.

RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft & Ullman, Narosa Publication.
- Element of the Theory Computation, Lewis & Christors, Pearson.
- Theory of Computation, Chandrasekhar & Mishra, PHI.
- Theory of Computation, Wood, Harper & Row.
- Introduction to Computing Theory, Daniel I-A Cohen, Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the basic concepts of switching and finite automata theory & languages.

CO2. relate practical problems to languages, automata, computability and complexity.

CO3. construct abstract models of computing and check their power to recognize the languages.

CO4. analyse the grammar, its types, simplification and normal form.

CO5. interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.

CO6. develop an overview of how automata theory, languages and computation are applicable in engineering application.

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Department of Computer Science & Engineering and Information Technology

MICROPROCESSOR & INTERFACING
160504 (DC-11)

L	T	P	C
2	1	2	4

COURSE OBJECTIVES

- To understand different processors and basic architecture of 16 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand 8051 microcontroller.

Unit-I

Microprocessors: Introduction to x86 microprocessors, RISC and CISC processors, 8086 Architecture-Functional Diagram, Register Organization, Memory Segmentation, Programming Model, Memory Address, Physical Memory Organization, Minimum and maximum mode signals, Bus Cycle and Timing Diagrams, Instruction Formats, Addressing Modes, Instruction Set, Interrupts of 8086.

Unit-II

Basic Peripherals and Interfacing: 8212, 8155, 8255, 8755, interfacing with LED's, ADC, DAC, stepper motors and I/O & Memory Interfacing.

Unit-III

Special Purpose Programmable Peripheral Devices and Interfacing: 8253, 8254 programmable interval timer, 8259A programmable interrupt controller and 8257 DMA controllers, Keyboard and Display Interfacing.

Unit-IV

Serial and Parallel Data Transfer: Serial and Parallel data transmission, Types of communication system, Baud rate RS-232C, Modem and various bus standards, USART – 8251A.

Unit-V

Introduction to Microcontrollers: 8051 Microprocessor and its Architectures, Pin Description, Input-Output configurations, Interrupts, Addressing Modes, An overview of 8051 Instruction Set.

RECOMMENDED BOOKS

- The Intel Microprocessors, Architecture, Programming and Interfacing, B.B. Brey, PHI.
- Microprocessor 8086: Architecture, Programming and Interfacing, Sunil Mathur, PHI.
- Advanced Microprocessor and Interfacing, D.V. Hall, Mc-Graw Hill.
- Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing, A.K. Ray & K.M. Bhurchandi, Tata McGraw Hill.
- Interfacing Techniques in Digital Design with Emphasis on Microprocessors, R.L. Krutz, John Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. compare the architecture and feature of different 16-bit microprocessor interfacing chips & microcontrollers.

CO2. develop programming skills in assembly language of 8086 microprocessor and 8051 microcontroller.

CO3. demonstrate the concept of interfacing with peripheral devices.

CO4. make use of different interrupts and addressing modes.

CO5. design an interfacing for I/O devices.

CO6. build a system based on 8086 microprocessor and 8051 microcontroller.

Syllabi

of

Departmental Core (DC) Courses

B.Tech VI Semester

(Information Technology)

Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Computer Science & Engineering and Information Technology

COMPILER DESIGN
160601 (DC-12)

L	T	P	C
2	1	2	4

COURSE OBJECTIVES

- To learn finite state machines and context free grammar.
- To learn, various phases of compiler
- To understand process of compiler implementation.

Unit-I

Overview of Translation Process: Introduction to Compiler, Major Data Structures in Compiler, Other Issues in Compiler Structure, BOOT Strapping and Porting, Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Tool Based Approach to Compiler Construction.

Unit-II

Lexical Analysis: Input Buffering, Symbol Table, Token, Recognition of Tokens, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting and Implementation. Regular Grammar & Language Definition, Transition Diagrams, Design of a Typical Scanner using LEX.

Unit-III

Syntax Analysis: Context Free Grammars (CFGs), Ambiguity, Basic Parsing Techniques: Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing LL(1) Grammar, Bottom-UP Parsing, Operator Precedence Parsing, LR Parsers (SLR, CLR, LALR), Design of a Typical Parser Using YACC.

Unit-IV

Semantic Analysis: Compilation of expression, control, structures, conditional statements, various intermediate code forms, syntax directed translation, Memory allocation and symbol table organizations, static and dynamic array allocation, string allocation, structure allocation etc., error detection indication and recovery, Routines or

printing various lexical, syntax and semantic errors.

Unit-V

Code generation and Code Optimization: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, DAG Representation of Programs, Code Generation from DAGS, Peep-hole Optimization, Code Generator Generators, Specification of Machine. Code Optimization: Source of Optimizations, Optimization of Basic Blocks, Loops. Global Data Flow Analysis, Solution to Iterative Data Flow Equations, Code Improving Transformations, Dealing with Aliases, Data Flow Analysis of Structured Flow Graphs.

RECOMMENDED BOOKS

- Compilers: Principles, Techniques and Tools, V. Aho, R. Sethi and J. D. Ullman, Pearson Education.
- Compiler Construction: Principles and Practice, K.C. Louden, Cengage Learning.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define 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.

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Computer Science & Engineering and Information Technology

COMPUTER NETWORKS
160602 (DC-13)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable Students to deal with various networking problems such as flow control, error control and congestion control

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Unit-I

Introduction: Computer Network, Types- LAN,MAN & WAN, Data transmission modes- Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous transmission, Transmission medium- Guided & Unguided, Cables- Twisted pair, Coaxial cable & Optical fiber, Networking devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode.

Unit-II

Physical Layer: Network topologies- Bus, Ring, Star & Mesh, Line coding- Unipolar, Polar and Bipolar, Switching- Circuit switching, Message switching & Packet switching, Multiplexing: FDM – Frequency division multiplexing, WDM – Wavelength division multiplexing & TDM – Time division multiplexing.

Unit-III

Data Link Layer: Introduction, Design issues, Services, Framing, Error control, Flow control, ARQ Strategies. Error Detection and correction, Parity bits, Cyclic Redundant Code (CRC), Hamming codes, MAC Sub Layer- The channel allocation problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

Unit-IV

Network Layer & Transport Layer: Introduction, Design issues, Services, Routing- Distance vector routing. Hierarchical routing & Link state routing, Shortest path algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

Unit-V

Presentation, Session& Application Layer: Introduction, Design issues, Presentation layer- Translation, Encryption- Substitutions and Transposition ciphers, Compression- lossy and lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote login, File transfer & Electronic mail.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the fundamental concepts of computer network.

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.

Syllabi
of
Mandatory Course(MC)
B.Tech V Semester
(Information Technology)
Under Flexible Curriculum

Department of Computer Science & Engineering and Information Technology

Department of Computer Science & Engineering and Information Technology

Indian Constitution and Traditional Knowledge
100006

100006	Indian Constitution and Traditional Knowledge	Theory	Midterm	Quiz/Assignment	TOTAL	L	T	P	C
		70	20	10	100	3	-	-	-

COURSE OBJECTIVES

- The course aims to provide students with the continuous, comprehensive and cumulative understanding of Indian Knowledge Tradition (Philosophy, Language, Art) and its modern interpretation and analysis.
- It intends to connect the students' modern advanced knowledge system with the roots of Indian Knowledge Tradition for their development and better understanding of the essentials of thought process, intellection and inference.
- To impart the knowledge of the Yogic Science and an insight into Sanskrit Literature which will promote interest among students in discerning the significance of health and wisdom with an Indian perspective.
- The objective of the syllabus is to familiarize students with the essential features and basic principles of the constitution of India.
- It will acquaint them with the concept of government, its organs and various types.
- It will provide students with a comprehensive and clear understanding of the basic fundamental rights and duties.

Unit-I

- Introduction to Basic Structure of Indian Knowledge System
- Homogeneity of modern science and Indian Knowledge Tradition
- Yoga: Promoting positive health and personality
- Case Studies

Unit-II

- Indian Philosophy or Darshanas: Jainism, Buddhism, Yoga, Śaiva and Vedanta
- Indian Linguistic Tradition: Panini's Ashtadhyayi
- Indian Art: Mauryan art, Buddhist art, Gupta art, Muslim Art & Culture Contemporary art

- Case Studies

Unit III:

Introduction to Political Science

- Nature and scope of political science
- Definition, elements and theories of origin of State (Social Contract and Evolutionary)
- Meaning and features of Civil Society
- Indian Political Thought: Raja Ram Mohan Roy, Swami Vivekanand, Gandhi, Ambedkar

Unit IV:

Concept of Government and Its Organs

- Government: Definition and its characteristics
- Types and meaning of Legislature: Composition, Function and Role of the Parliament (Lok Sabha and Rajya Sabha)
- The Powers, Position and Role of the President, Prime Minister and the Cabinet
- The Powers, Position and Role of the Governor and the Chief Minister; Composition and the role of Supreme Court, Judicial Review and Judicial Activism

Unit V:

Salient features of Indian Constitution

- Preamble, Conventions, Sovereignty of the Constitution and the Rule of Law
- Parliamentary Democracy, Federalism, Secularism and Socialism
- Fundamental Rights, Directive Principles of State Policies and Fundamental Duties
- Election Commission and Electoral Reforms

BASIC READINGS:

- O.P. Gauba, Political Theory, Macmillan, (latest edition).
- D.D. Basu, Introduction to the Constitution of India, (Latest Edition).
- N.G. Jayal & Pratap Bhanu Mehta, The Oxford Companion of Politics in India, 2000.
- W.H. Morris-Jones, The Government and Politics of India.
- Swami Jitamanand, Holistic Science and Vedam, Bhartiya Vidyabhawan

- V. Shivramakrishnan (Ed.), Cultural Heritage of India, Bhartiya Vidyabhawan, Mumbai Fifth Edition, 2014.
- Yoga sutra of Patanjali, Ramakrishnan Mission, Kolkata.
- Panini Shiksha, Motilal Banarsidas
- VN Jh, Language, Thought and Reality
- Krishna Chaitanya. Arts of India, Abhinav Publications, 1987.
- SC Chaterjee and DM Datta, An Introduction to Indian Philosophy, university of Calcutta, 1984
- A L Basham, The Wonder That was India

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. know the rich Indian traditions and the Indian constitution.

CO2. Appraise the utility and significance of tradition and its applicability in present times.

CO3. Employ the knowledge of the constitutional norms as laid in the constitution and abide by the practices stated therein.

CO4. Create a better society and living standards for themselves as well as for others.

CO5. Recognize the basic concepts of ethics and morality pertaining to Indian culture and tradition.

CO6. Connect traditional Indian philosophy with their everyday conduct and practices.

Syllabi

of

Mandatory Course (MC)

B.Tech VI Semester

(Information Technology)

Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Computer Science & Engineering and Information Technology

DISASTER MANAGEMENT
100007

100007	Disaster Management (MC)	Theory	Midterm	Quiz/Assignment	Total	L	T	P	C
		70	20	10	100	3	-	-	03

COURSE OBJECTIVES

- To understand basic concepts in Disaster Management
- To understand Definitions and Terminologies used in Disaster Management
- To understand Types and Categories of Disasters
- To understand the Challenges posed by Disaster
- To understand Impact of Disasters key skills

Unit-I

Introduction to disaster management, concepts and definitions: disaster, vulnerability, risk severity, frequency and details, capacity impact, prevention, mitigation.

Unit-II

Disasters – Disasters classification, demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends, hazard and vulnerability profile of India.

Unit-III

Disaster Impacts – Disaster impact (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues, impact of natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides etc.), impact of manmade disasters (industrial pollution, artificial flooding in urban areas, urban disasters, transportation accidents etc.).

Unit-IV

Disaster Risk Reduction (DRR) - Disaster management cycle- its phases; prevention, mitigation, preparedness, relief and recovery; structural and non- structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response. Roles and responsibilities of government, community,

local institutions, NGOs and other stakeholders: Policies and legislation for disaster management. DRR programmes in India and the activities of National Disaster Management Authority.

Unit-V

Disasters, Environment and Development – Factors affecting vulnerability such as impact of development projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

TEXT BOOKS:

- Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
- Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
- Srivastava H.H. & Gupta G.D., Management of Natural Disasters in developing countries, Daya Publishers Delhi, 2006, 201 pages.

REFERENCE BOOKS:

- http://ndma.gov.in (Home page of National Disaster Management Authority)
- http://www.ndmindia.nic.in / (National Disaster Management in India)
- Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
- National Disaster Management Policy, 2009, GOI.
- Inter Agency Standing Committee (IASC) (Feb. 2007), IASC Guidelines on Mental Health and Psychosocial Support in Emergency Setting. Geneva: IASC

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. Propose disaster prevention and mitigation approaches.

CO2. Classify global and national disasters, their trends and profiles.

CO3. Appreciate the impacts of various disasters.

CO4. Apply Disaster Risk Reduction in management.

CO5. Find the linkage between disasters, environment and development.

ANNEXURE-IV

Syllabi
of
Departmental Electives (DEs) Courses
B.Tech VI Semester
(Information Technology)
Under Flexible Curriculum

List of Departmental Elective (DE) Courses

B.Tech (Information Technology)

	VI Semester			
Code Category	**DE-1**		**DE-2**	
	Subject Code	**Subject Name**	**Subject Code**	**Subject Name**
Track 1	**Network Security**			
	160603 A	Network & Web Security	160604A	Ethical Hacking
Track 2	**Distributed Computing**			
	160603 B	Parallel Processing	160604 B	Distributed Systems
Track 3	**Software Engineering**			
	160603 C	Agile Methodology	160604 C	Software Testing

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Department of Computer Science & Engineering and Information Technology

NETWORK & WEB SECURITY
160603 A (DE-1)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.
- To explore the requirements of real-time communication security and issues related to the security of web services.

Unit-I

Security: Principles and Attacks, **Basic Number theory:** Prime number, congruence's, Modular exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block ciphers and Steam ciphers, Substitution ciphers, Transposition ciphers, Caesar cipher, Play-fair Cipher, Hill Cipher, Cipher modes of operation.

Unit-II

Cryptography: Symmetric key cryptography, Public key Cryptography, Principles of Public key Cryptosystem, Classical Cryptographic algorithms: DES, RC4, Blowfish, RSA, Distribution of public keys and key management, Diffie-hellman key exchange.

Unit-III

Hash Functions: Hash functions, one way hash function, SHA (Secure hash algorithm). **Authentication:** Requirements, Functions, Kerberos, Message authentication codes, Message digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit -IV

IP & Web security overview: SSL (Secure socket layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). **IDS (Intrusion detection system):** Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration testing, Risk management. **Firewalls:** Types, functionality and Polices.

Unit -V

Phishing: Attacks and its types, Buffer overflow attack, Cross Site Scripting, SQL injection Attacks, Session Hijacking. **Denial of Service Attacks:** Smurf attack, SYN flooding, Distributed Denial of Service. **Hacker:** Hacking and types of hackers, Footprinting, Scanning: types: port, network, vulnerability), Sniffing in shared and switched networks, Sniffing detection & prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education India.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prosise, Tata McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

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.

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Computer Science & Engineering and Information Technology

PARALLEL PROCESSING
160603 B (DE-1)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To describe different parallel processing architectures based on relationships between processing elements, instruction sequence, memory and interconnected network.
- To identify design and develop algorithms which require parallelization as part of system design or performance enhancement.
- To evaluate the performance of parallel algorithms designed based on shared and distributed memory models as well as against serial based algorithm designs.

Unit-I

Introduction to Parallel Processing: Multiprogramming and Time Sharing, Parallelism in Uniprocessor system, Parallel computer structure, Architectural classification schemes and Parallel processing applications.

Unit-II

Principles of Pipelining: Pipelining principle of linear pipelining. Performance measures, General Pipelines, reservation tables, Instruction and Arithmetic pipelines, Instruction Prefect, Branch handling, Data Buffering, Internal Forwarding and Register tagging, Hazard detection and resolution, Job Sequencing and Collision prevention.

Unit-III

Vector Processing: Vector processing requirements, Characteristics of vector processing multiple vector task dispatching, pipeline vector processing methods, vector super computers, recent vector processors, Architecture of CRAY, Pipeline chaining and vector loops, Architecture of CYBER, Configurability.

Unit-IV

Array Processing: SIMD organization, Interconnection networks, Parallel algorithm for array processor-Matrix Multiplication Parallel sorting on Array Processor, SIMD Fast Fourier transform, Connection issues for SIMD Processing.

Unit-V

Multiprocessor Architecture, Programming & Control: Loosely and Tightly Coupled Architectures. Functional Structures, Types Interconnection networks, Parallel memory organizations.

Process Synchronization mechanism: Semaphores, Critical Section and monitors, System deadlocks and protection schemes, Multiprocessor scheduling strategies, Parallel algorithms.

RECOMMENDED BOOKS

- Computer Architecture and Parallel Processing, K. Hwang and Briggs, Tata McGraw Hill.
- Advanced Computer Architecture, K. Hwang, Tata McGraw Hill.
- Computer Architecture and Organization, J.P. Hayes, Tata McGraw Hill.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define the fundamental concepts of parallelism.
CO2. illustrate the performance of different computing structures.
CO3. develop the ability for improving performance in parallel architecture.
CO4. analyze the parallel algorithms for real world problems solving.
CO5. assess the communication and the computing possibilities of parallel system architecture.
CO6. design contemporary parallel algorithms.

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Computer Science & Engineering and Information Technology

AGILE METHODOLOGY
160603 C (DE-1)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To understand the background and driving forces for taking an Agile approach to software development.
- To understand the business value of adopting Agile approaches.
- To understand the Agile development practices.

Unit -I

Fundamentals of Agile: The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software, Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools.

Unit- II

Agile Scrum Framework: Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management.

Unit- III

Agile Testing: The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester.

Unit- IV

Agile Software Design and Development: Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.

Unit -V

Industry Trends: Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies.

RECOMMENDED BOOKS

- Agile Software Development with Scrum, Ken Schawber, Mike Beedle, Pearson.
- Agile Testing: A Practical Guide for Testers and Agile Teams, Lisa Crispin, Janet Gregory, Addison Wesley.
- Agile Software Development, Principles, Patterns and Practices, Robert C. Martin, Prentice Hall.
- Agile Software Development: The Cooperative Game, Alistair Cockburn, Addison Wesley.
- User Stories Applied: For Agile Software, Mike Cohn, Addison Wesley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. demonstrate Scrum Release Planning, and Scrum Sprint Planning.
CO2. apply user stories into tasks and ideal day estimates.
CO3. classify a Sprint with Sprint Reviews and Sprint Retrospectives.
CO4. examine the Scrum with multiple team or distributed project teams.
CO5. design test driven and agile principal based software.
CO6. develop any application using agile methodology.

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Department of Computer Science & Engineering and Information Technology

ETHICAL HACKING
160604 A (DE-2)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To introduce the basic concepts and principles in ethical hacking.
- This includes the major techniques involved and system vulnerabilities issues for testing.
- To demonstrate vulnerabilities related to computer system to develop an understanding of Programming Survival Skills, Basic Linux Exploits and solution for these issues.

Unit-I

Introduction to Ethical Disclosure: Ethics of Hacking, Ethical Hacking and the legal system, Proper and Ethical Disclosure.

Unit-II

Penetration Testing and Tools: Using Metasploit, Using Back Track Live CD Linux Distribution.

Unit-III

Exploits: Programming Survival Skills, Basic Linux Exploits, Advanced Linux Exploits, Shell code Strategies, Writing Linux Shellcode, Basic windows Exploits.

Unit-IV

Vulnerability Analysis: Passive Analysis, Advanced Static Analysis with IDA Pro, Advanced Reverse Engineering, and Client-side browser exploits, Exploiting Windows Access Control Model for Local Elevation Privilege, Intelligent Fuzzing with Sulley, From Vulnerability to Exploit.

Unit-V

Malware Analysis: Collecting Malware and Initial Analysis, Hacking Malware. **Denial-of Service Attacks:** Types of Attacks (Smurf Attack, Buffer Overflow Attack, Ping of Death Attack, Teardrop Attack, SYN Attack, SYN Flooding), DDoS Attack

(Distributed DoS Attack.), Session Hijacking, Spoofing v Hijacking, TCP/IP hijacking, CAPTCHA Protection.

RECOMMENDED BOOKS

- Gray Hat Hacking: The Ethical Hackers' Handbook, Shon Harris, Allen Harper, Chris Eagle and Jonathan Ness, Tata McGraw Hill.
- Hacking: The Art of Exploitation, Jon Erickson, No Starch Press.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. demonstrate various penetration testing tools like Metasploit, Backtrack etc.

CO2. explain ethics behind hacking and vulnerability disclosure.

CO3. apply the reverse engineering and client-side browser exploits.

CO4. identify the core concepts related to malware, hardware and software vulnerabilities and their causes.

CO5. analyze the vulnerabilities related to computer system and networks using state of the art tools and technologies.

CO6. develop programming survival skills, basic Linux exploits, advanced Linux exploits, shell code strategies.

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Department of Computer Science & Engineering and Information Technology

DISTRIBUTED SYSTEMS
160604 B (DE-2)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To provide students with contemporary knowledge, analyze and design distributed applications.
- To provide master skills to measure the performance of distributed algorithms
- To gain experience in the design and testing of a large software system, and to be able to communicate that design to others.

Unit-I

Introduction to Distributed Systems: Architecture for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages & Disadvantage distributed system, Issues in designing Distributed System.

Unit-II

Distributed Shared Memory: Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Design & Implementations issues In DSM System, Structure of Share Memory Space, Consistency Model, and Thrashing.

Unit-III

Distributed File System: Desirable features of good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File Application & Fault tolerance. Naming - Features, System Oriented Names, Object Locating Mechanism, Human Oriented Name.

Unit-IV

Inter Process Communication and Synchronization: API for Internet Protocol, Data Representation & Marshaling, Group Communication, Client Server Communication, RPC- Implementing RPC Mechanism, Stub Generation, RPC Messages.

Synchronization: - Clock Synchronization, Mutual Exclusion, Election Algorithms - Bully & Ring Algorithms.

Unit-V

Distributed Scheduling and Deadlock Distributed Scheduling- Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues. Deadlock- Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms. Case Study of Distributed System: - Amoeba, Mach, Chorus.

RECOMMENDED BOOKS

- Distributed Operating System Concept & Design, Sinha, PHI.
- Distributed System Concepts and Design, Coulouris & Dollimore, Pearson.
- Distributed Operating System, Andrew S. Tanenbaum, Pearson.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define 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 shared memory, file system and, inter process communication.
CO5. compare various distributed system algorithms for solving real world problems.
CO6. discuss large-scale distributed applications.

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Department of Computer Science & Engineering and Information Technology

SOFTWARE TESTING
160604 C (DE-2)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To understand defects and various levels of testing.
- To study about testing plan, management and its types.
- To understand the testing automation and its challenges.

Unit-I

Introduction: Overview, Objectives, Software Structure and Software Testing, Purpose of Testing, Testing vs. Debugging, Model for Testing, Taxonomy of Bugs, Mistakes, Bugs and Failures, Consequences of Bugs.

Unit –II

Testing Tactics: Software Testing Fundamentals, Basic Path Testing, Control Structure Testing, Black-Box Testing: Graph Based testing methods, Equivalence Partitioning, Boundary Value Analysis, Orthogonal Testing, White Box Testing, Test Coverage – Traceability matrix.

Unit -III

Testing & Levels: Overview, Objectives, Testing Levels, Unit Testing, Component Testing, Integration Testing, System Testing, Interoperability Testing, Performance Testing, Regression Testing, Acceptance Testing.

Unit -IV

Special Tests: Introduction, Complexity Testing, Graphical User Interface Testing, Security Testing, Performance Testing, Volume and Stress Testing, Recovery Testing, Installation Testing, Requirement Testing.

Unit -V

Test Planning: Introduction, Test Policy, Test Strategy, Test Planning, Quality Plan and Test Plan, Guidelines for developing the Test Plan, Test Estimation, Test Standards, Building Test Data and Test Cases, Essential Activities in testing, Test

Management Software, Test Log Document, Effective Test Cases, Test File, Building test Data, Rules and Responsibilities in Testing Life Cycle, Test Progress Monitoring.

RECOMMENDED BOOKS

- Software Testing, Techniques and Applications, Arun Khannur, Pearson Education.
- Software Engineering, Roger S Pressman, Tata McGraw Hill.
- Software Testing Principles, Techniques and Tools, M G Limaye, Tata McGraw Hill.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define different types of defects and testing models.

CO2. demonstrate methods of test generation from requirements.

CO3. explain different types of testing.

CO4. apply software testing techniques in commercial environments.

CO5. examine various test plans and continuous quality improvement.

CO6. choose the various test tools for automation.

Syllabi

of

Open Category (OC) Courses

B.Tech VI Semester

(Information Technology)

Under Flexible Curriculum

List of Open Category Courses

VI Semester				
S. NO.	**Code Category**	**Subject Code**	**Subject Name**	**Course Prerequisite**
1.	OC-1	160605 A	R Programming	• Basic of programming.
		160605 B	Social Networking	• Basic knowledge of graph theory. • Basic knowledge of various networks and its components.
		160605 C	Soft Computing	• Basic knowledge of set theory, calculus and probability theory.

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Department of Computer Science & Engineering and Information Technology

R PROGRAMMING
160605 A (OC-1)

L	T	P	C
2	1	-	3

COURSE OBJECTIVES

- To understand the critical programming language concepts.
- To perform data analysis using R commands.
- To make use of R loop functions and debugging tools.

Unit-I

Introduction to R: R Commands, Objects, Functions, Simple Manipulations, Matrices and Arrays, Factors, Lists, Data Frames.

Unit-II

Programming Using R: Introduction, Function Creation, Scripts, Logical Operators, Conditional Statements, Loops in R, Switch Statement, Creating List and Data Frames, List and Data Frame Operations, Recursive List.

Unit-III

Object- Oriented Programming in R: Introduction, S3 Classes, S4 Classes, References Classes, Debugging Principle in R, Import and Export Data from CSV, SAS and ODBC.

Unit-IV

Mathematical and Statistical Concepts, Hypothesis Testing, Different Statistical Distribution, Regression, Time Series Analysis.

Unit-V

Graphics in R: Basic Plots, Labelling and Documenting Plots, Adjusting the Axes, Specifying Colour, Fonts and Sizes, Plotting symbols, Customized Plotting, Packages in R for Windows, Linus and Mac.

RECOMMENDED BOOKS

- "R for Beginners", Sandip Rakshit, Tata Mc Graw Hill Education.
- "R programming for Data Science", Roger D. Peng, Learn publishing.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define basic programming constructs used in R.

CO2. explain the various commands used in R.

CO3. apply commands in performing operations over data.

CO4. analyze the data set using constructs of R.

CO5. choose appropriate packages for dealing various tasks.

CO6. predict results from the datasets using R commands.

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Department of Computer Science & Engineering and Information Technology

SOCIAL NETWORKING
160605 B (OC-1)

L	T	P	C
2	1	-	3

COURSE OBJECTIVES

- To know basic notation and terminology used in network science.
- To be able to visualize, summarize and compare networks.
- To develop practical skills of network analysis and be capable of analyzing real work networks.

Unit- I

Introduction: Introduction to Semantic Web, Limitations of current Web, Development of Semantic Web, Emergence of the Social Web, Social Network analysis: Development of Social Network Analysis, Key concepts and measures in network analysis, Electronic sources for network analysis: Electronic discussion networks, Blogs and Online communities, Web-based networks, Applications of Social Network Analysis.

Unit- II

Modeling, Aggregating and Knowledge Representation: Ontology and their role in the Semantic Web: Ontology, based knowledge Representation, Ontology languages for the Semantic Web: Resource Description Framework, Web Ontology Language, Modeling and aggregating social network data: State of the art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships, aggregating and reasoning with social network data, advanced representations.

Unit- III

Extraction and Mining Communities in Web Social Networks: Extracting evolution of Web Community from a Series of Web Archive, Detecting communities in social networks, Definition of community, Evaluating communities, Methods for community detection and mining, Applications of community mining algorithms, Tools for detecting communities social network infrastructures and communities, Decentralized

online social networks, Multi, Relational characterization of dynamic social network communities.

Unit- IV

Predicting Human Behavior and Privacy Issues: Understanding and predicting human behavior for social communities, User data management, Inference and Distribution, Enabling new human experiences, Reality mining, Context, Awareness, Privacy in online social networks, Trust in online environment, Trust models based on subjective logic, Trust network analysis, Trust transitivity analysis, Combining trust and reputation, Trust derivation based on trust comparisons, Attack spectrum and countermeasures.

Unit- V

Visualization and Applications of Social Networks: Graph theory, Centrality, Clustering, Node, Edge Diagrams, Matrix representation, Visualizing online social networks, Visualizing social networks with matrix based representations, Matrix and Node, Link Diagrams, Hybrid representations, Applications, Cover networks, Community welfare, Collaboration networks, Co-Citation networks.

RECOMMENDED BOOKS

- Networks, Crowds, and Markets: Reasoning about a Highly Connected World, David Easley and John Kleinberg, Cambridge University Press.
- Statistical Analysis of Network Data with R (Use R!), Eric Kolaczyk, Gabor Csardi, Springer.
- Social Network Analysis: Methods and Applications, Stanley Wasserman and Katherine Faust, Cambridge University Press.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. classify the alternatives for technologies to carry out social network analysis

CO2. demonstrate an understanding of the theory of social networks.

CO3. apply network analysis software to characterize social network structure in different forms.

CO4. analyze the impact of network structure on patterns through network statistics.

CO5. create social network analysis to understand socially meaningful outcomes in political action and online interaction

CO6. develop any application for designing social network.

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Department of Computer Science & Engineering and Information Technology

SOFT COMPUTING
160605 C (OC-1)

L	T	P	C
2	1	-	3

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction and Fundamental Concept of ANN: Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield networks.

Unit-II

Unsupervised Learning: Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization. Counterpropagation Networks, Adaptive Resonance Theory Network.

Unit-III

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations onFuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, **Defuzzification:** Lembda-Cuts for Fuzzy sets(Alpha-Cuts), Lembda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Models, **Other Variants:** Sugeno Fuzzy Models, Tekamoto Fuzzy Models.

Unit-IV

Introduction: Biological Background, Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Classification of Genetic Algorithm, Genetic Programming, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques.

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley
- Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications-S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI.
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
- Neural Networks and Learning Machines-Simon Haykin PHI.
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define basic concepts of neural network and fuzzy systems.

CO2. compare solutions by applying various soft computing approaches on a given problem.

CO3. develop and train different supervised and unsupervised networks.

CO4. classify various nature inspired algorithms according to their application aspect.

CO5. compare the efficiency of various hybrid systems.

CO6. design a soft computing model for solving real world problems.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination (B.Tech.)

GROUP A: I Semester & GROUP B: II Semester *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100201	BSC-1	Engineering Physics	70	20	10	30	20	150	4	1	2	6
2.	100202	HSMC-1	Energy, Environment, Ecology & Society	70	20	10	-	-	100	4	1	-	5
3.	100203	ESC-1	Basic Computer Engineering	70	20	10	30	20	150	4	1	2	6
4.	100204	ESC-2	Basic Mechanical Engineering	70	20	10	30	20	150	4	1	2	6
5.	100205	ESC-3	Basic Civil Engineering & Mechanics	70	20	10	30	20	150	4	1	2	6
6.	100206	HSMC-2	Language Lab. & Seminars	-	-	-	30	20	50	-		2	1
Total				350	100	50	150	100	750	20	5	10	30
Induction Programme of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations													

GROUP A: (Electrical, Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

01Theory Period=1 Credit; 02 Practical Periods =1 Credit

DEAN (ACADEMICS)
MITS
GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination (B.Tech.)

GROUP A: II Semester& GROUP B: I Semester *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100101	BSC-2	Engineering Chemistry	70	20	10	30	20	150	4	1	2	6
2.	100102	BSC-3	Engineering Mathematics-I	70	20	10	-	-	100	4	1	-	5
3.	100103	HSMC-3	Technical English	70	20	10	30	20	150	4	1	2	6
4.	100104	ESC-4	Basic Electrical & Electronics Engineering	70	20	10	30	20	150	4	1	2	6
5.	100105	ESC-5	Engineering Graphics	70	20	10	30	20	150	4	1	2	6
6.	100106	ESC-6	Manufacturing Practices	-	-	-	30	20	50	-	-	2	1
Total				350	100	50	150	100	750	20	5	10	30
Summer Internship Project –I (Institute Level) (Qualifier): Minimum two-week duration													

GROUP A: (Electrical, Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)
01Theory Period=1 Credit; 02 Practical Periods =1 Credit

12/6/13
DEAN (ACADEMICS)
MITS
GWALIOR

for Mr

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination (B.Tech.)

III Semester (Information Technology) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	100001	BSC-4	Mathematics-II	70	20	10	-	-	100	3	1	-	4
2.	160301	DC-1	Digital Electronics	70	20	10	-	-	100	3	1	-	4
3.	160302	DC-2	Data Structure	70	20	10	30	20	150	3	-	2	4
4.	160303	DC-3	Computer Graphics & Multimedia	70	20	10	30	20	150	3	-	2	4
5.	160304	DC-4	Object Oriented Programming & Methodology	70	20	10	30	20	150	3	-	2	4
6.	160305	DLC-1*	Hardware Lab	-	-	-	30	20	50	-	-	2	1
7.	160306	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	-	25	25	-	-	2	1
8.	160307	DLC-2	Summer Internship Project –I (Institute Level) (Evaluation)	-	-	-	25	~~25~~ MK	25			4	2
Total				350	100	50	~~120~~ 145	~~130~~ 105	750	15	2	14	24
9.	100002 $	MC-1	Biology for Engineers (Audit Course) (MC)	70	20	10	-	-	100	3	-	-	-
NSS/NCC				Qualifier									

Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation.

$ Course will run for Group A/B in III/IV semester respectively (Passing is optional, however a separate mark sheet will be issued to those who qualify)

*Virtual Lab to be conducted along with the traditional lab

GROUP A: (Electrical, Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

MK 12/6/15
DEAN (ACADEMICS)
M.I.T.S.
GWALIOR

for MK

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination (B.Tech.)

IV Semester (Information Technology) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Term work / Lab Work & Sessional		L	T	P	
1.	100003	BSC-5	Mathematics- III	70	20	10	-	-	100	2	2	-	4
2.	160401	DC-5	Design & Analysis of Algorithms	70	20	10	30	20	150	2	1	2	4
3.	160402	DC-6	Database Management System	70	20	10	30	20	150	2	1	2	4
4.	160403	DC-7	Operating System	70	20	10	-	-	100	3	1	-	4
5.	160404	DC-8	Computer System Organization	70	20	10	-	-	100	3	1	-	4
6.	100004	MC-7	Cyber Security[$]	70	20	10	-	-	100	2	1	-	3
7.	160405	DLC-3*	Programming Lab	-	-	-	30	20	50	-	-	4	2
Total				420	120	60	90	60	750	14	7	8	25
NSS/NCC				Qualifier									
Summer Internship Project-II (Soft skills Based) for two weeks duration: Evaluation in V Semester													

[$] This course will run for Group A/B in IV/III semester respectively.

*Virtual Lab to be conducted along with the traditional lab

12/6/18
DEAN (ACADEMICS)
MITS
GWALIOR

for Dr.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination (B.Tech.)

V Semester (Information Technology) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100005*	HSMC-4	Ethics, Economics, Entrepreneurship & Management	70	20	10	-	-	100	2	-	-	2
2.	160501	BSC - 6	Discrete Structures	70	20	10	-	-	100	2	1	-	3
3.	160502	DC-09	Software Engineering	70	20	10	30	20	150	2	-	2	3
4.	160503	DC-10	Theory of Computation	70	20	10	30	20	150	2	-	2	3
5.	160504	DC-11	Microprocessor & Interfacing	70	20	10	30	20	150	2	-	2	3
6.	160505	DLC-4	Minor Project-I** DLC-3	-	-	-	30	20	50	-	-	2	1
7.	160506	DLC-5	Summer Internship Project-II (Evaluation) DLC-4	-	-	-	25	-	25	-	-	4	2
8.	160507	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	~~15~~ 25	25	25	-	-	2	1
Total				350	100	50	~~160~~ ~~140~~ 145	~~50~~ ~~110~~ 105	750	10	1	14	18
9.	100006$	MC-3	Indian Constitution & Traditional Knowledge (Audit Course)	70	20	10	-	-	100	3	-	-	-
Department level activity/workshop/awareness Programme to be conducted; certificate of compliance to be submitted by HoD to the Exam Controller through Dean Academics													
Additional Courses for obtaining Honours or minor Specialization by desirous students			Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization										

* Group A/B programmes will offer this course in V/VI Semester respectively.

$ Group A/B programmes will offer this course in V/VI Semester respectively. ((Passing is optional, however a separate mark sheet will be issued to those who qualify)

** The minor project-I may be evaluated by an internal committee for awarding sessional marks.

Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation

GROUP A: (Electrical, Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

12/6/19

DEAN (ACADEMICS)

GWALIOR

for Mr

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination (B.Tech.)

VI Semester (Information Technology) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	160601	DC-12	Compiler Design	70	20	10	30	20	150	2	-	2	3
2.	160602#	DC-13	Computer Networks	70	20	10	-	-	100	2	1	-	3
3.	160603	DE-1*	DE	70	20	10	-	-	100	2	-	-	2
4.	160604	DE-2*	DE	70	20	10	-	-	100	2	-	-	2
5.	160605	OC-1*	OC	70	20	10	-	-	100	2	-	-	2
6.	100007	MC-4	Disaster Management (MC)	70	20	10	-	-	100	2	-	-	2
7.	160606	DLC-6	Minor Project-II DLC-5	-	-	-	50	50	100	-	-	4	2
Total				420	120	60	80	70	750	12	1	6	16
Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester													
Additional Courses for obtaining Honours or minor Specialization by desirous students			Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization										

Group A/B programmes will offer this course in V/VI Semester respectively.

* At least one of these courses must be run through SWAYAM/NPTEL/ MOOC

12/6/19

DEAN (ACADEMICS)
MITS
GWALIOR

for Mr

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination (B.Tech.)

VII Semester (Information Technology) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name & Title	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem.	Term Work Lab Work & Sessional		L	T	P	
1.	160701	DE-3	DE – 3	70	20	10	-	-	100	2	-	-	2
2.	160702	DE-4*	DE	70	20	10	-	-	100	2	-	-	2
3.	160703	OC-2	OC	70	20	10	-	-	100	2	1	-	3
4.	160704	OC-3	OC	70	20	10	-	-	100	3	-	-	3
5.	100008	MC-5	Intellectual Property Rights (IPR)	70	20	10	-	-	100	2	-	-	2
6.	160705	DLC-7	Departmental Lab DLC-6	-	-	-	50	50	100	-	-	4	2
7.	160706	DLC-8	Summer Internship Project-III DLC-7 (04 weeks) (Evaluation)	-	-	-	50	50	100	-	-	4	2
8.	160707	DLC-9	Creative Problem Solving (Evaluation) DLC-8	-	-	-	25	25	50	-	-	2	1
Total				350	100	50	125	125	750	11	1	10	17
Additional Course for Honours or minor Specialization			Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization										

* This course must be run through SWAYAM/NPTEL/ MOOC

12/6/19

DEAN (ACADEMICS)
M.I.T.S
GWALIOR

for Dir

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

VIII Scheme of Examination (B.Tech.)

~~VII~~ Semester (Information Technology) *for batch admitted in Academic Session 2017-18*

S.N.	Subject Code	Category	Subject Name & Title	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem.	Term Work / Lab Work & Sessional		L	T	P	
1.	160801	DE-5*	DE – 5*	70	20	10	-	-	100	2	-	-	2
2.	160802	OC-4*	OC	70	20	10	-	-	100	2	-	-	2
3.	160803	OC-5*	OC	70	20	10	-	-	100	2	-	-	2
4.	160804	DLC-10	Internship/Project DLC-9	-	-	-	250	150	400	-	-	6	3
5.	160805	~~DLC-11~~	Professional Development#	-	-	-	-	50	50	-	-	2	1
Total				210	60	30	250	200	750	6	-	8	10
Additional Courses for obtaining Honours or minor Specialization by desirous students			Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization										

*All of these courses will run through SWAYAM/NPTEL/ MOOC

Evaluation will be based on participation/laurels brought by the students to the institution in national/state level technical and other events during the complete tenure of the UG program (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs and technical events)

12/6/19
DEAN (ACADEMICS)
M.I.T.S.
GWALIOR

for Dir

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. GROUP A: I Semester & GROUP B: II Semester *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100201	BSC	Engineering Physics (BSC-1)	70	20	10	30	20	150	4	1	2	6
2.	100202	HSMC	Energy, Environment, Ecology & Society (HSMC-1)	70	20	10	-	-	100	4	1	-	5
3.	100203	ESC	Basic Computer Engineering (ESC-1)	70	20	10	30	20	150	4	1	2	6
4.	100204	ESC	Basic Mechanical Engineering (ESC-2)	70	20	10	30	20	150	4	1	2	6
5.	100205	ESC	Basic Civil Engineering & Mechanics (ESC-3)	70	20	10	30	20	150	4	1	2	6
6.	100206	HSMC	Language Lab. & Seminars (HSMC-2)	-	-	-	30	20	50	-		2	1
Total				**350**	**100**	**50**	**150**	**100**	**750**	**20**	**5**	**10**	**30**

Induction Programme of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations

GROUP A: (Electrical, Electronics, **Computer Science & Engineering,** Information Technology, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)
01Theory Period=1 Credit; 02 Practical Periods =1 Credit

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. GROUP A: II Semester & GROUP B: I Semester *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100101	BSC	Engineering Chemistry (BSC-2)	70	20	10	30	20	150	4	1	2	6
2.	100102	BSC	Engineering Mathematics-I (BSC-3)	70	20	10	-	-	100	4	1	-	5
3.	100103	HSMC	Technical English (HSMC-3)	70	20	10	30	20	150	4	1	2	6
4.	100104	ESC	Basic Electrical & Electronics Engineering (ESC-4)	70	20	10	30	20	150	4	1	2	6
5.	100105	ESC	Engineering Graphics (ESC-5)	70	20	10	30	20	150	4	1	2	6
6.	100106	ESC	Manufacturing Practices (ESC-6)	-	-	-	30	20	50	-	-	2	1
Total				**350**	**100**	**50**	**150**	**100**	**750**	**20**	**5**	**10**	**30**
Summer Internship Project –I (Institute Level) (Qualifier): Minimum two-week duration													

GROUP A: (Electrical, Electronics, **Computer Science & Engineering**, Information Technology, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)
01Theory Period=1 Credit; 02 Practical Periods =1 Credit

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. III Semester (Computer Science & Engineering) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	100001	BSC	Mathematics-II (BSC-4)	70	20	10	-	-	100	3	1	-	4
2.	150301	DC	Digital Electronics (DC-1)	70	20	10	-	-	100	3	1	-	4
3.	150302	DC	Data Structures (DC-2)	70	20	10	30	20	150	3	-	2	4
4.	150303	DC	Computer Graphics (DC-3)	70	20	10	30	20	150	3	-	2	4
5.	150304	DC	Object Oriented Programming & Methodology (DC-4)	70	20	10	30	20	150	3	-	2	4
6.	150305	DLC	Hardware Lab* (DLC-1)	-	-	-	30	20	50	-	-	2	1
7.	150306	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	-	25	25	-	-	2	1
8.	150307	DLC	Summer Internship Project –I (Institute Level) (Evaluation)	-	-	-	25	-	25	-	-	4	2
Total				**350**	**100**	**50**	**145**	**105**	**750**	**15**	**2**	**14**	**24**
9.	100002 $	MC	Biology for Engineers (Audit Course) (MC)	70	20	10	-	-	100	3	-	-	-
NSS/NCC				Qualifier									

Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation.

$ Course will run for Group A/B in III/IV semester respectively (Passing is optional, however a separate mark sheet will be issued to those who qualify)

*Virtual Lab to be conducted along with the traditional lab

GROUP A: (Electrical, Electronics, **Computer Science & Engineering**, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. IV Semester (Computer Science & Engineering) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot			L	T	P	
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Term work / Lab Work & Sessional					
1.	100003	BSC	Mathematics- III (BSC-5)	70	20	10	-	-	100	2	2	-	4
2.	150401	DC	Design & Analysis of Algorithms (DC-5)	70	20	10	30	20	150	2	1	2	4
3.	150402	DC	Database Management System (DC-6)	70	20	10	30	20	150	2	1	2	4
4.	150403	DC	Operating System (DC-7)	70	20	10	-	-	100	3	1	-	4
5.	150404	DC	Computer System Organization (DC-8)	70	20	10	-	-	100	3	1	-	4
6.	100004	MC	Cyber Security (MC)	70	20	10	-	-	100	2	1	-	3
7.	150405	DLC	Programming Lab* (DLC-2)	-	-	-	30	20	50	-	-	4	2
Total				420	120	60	90	60	750	14	7	8	25
NSS/NCC				Qualifier									
Summer Internship Project-II (SoftSkills Based) for two weeks duration: Evaluation in V Semester													

*Virtual Lab to be conducted along with the traditional lab

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. V Semester (Computer Science & Engineering) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot			L	T	P	
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional					
1.	100005*	HSMC	Ethics, Economics, Entrepreneurship & Management (HSMC- 4)	70	20	10	-	-	100	2	-	-	2
2.	150501	BSC	Discrete Structures (BSC – 6)	70	20	10	-	-	100	2	1	-	3
3.	150502	DC	Software Engineering (DC-09)	70	20	10	30	20	150	2	-	2	3
4.	150503	DC	Theory of Computation (DC-10)	70	20	10	30	20	150	2	-	2	3
5.	150504	DC	Microprocessor & Interfacing (DC-11)	70	20	10	30	20	150	2	-	2	3
6.	150505	DLC	Minor Project-I** (DLC-3)	-	-	-	30	20	50	-	-	2	1
7.	150506	DLC	Summer Internship Project-II (Evaluation) (DLC-4)	-	-	-	25	-	25	-	-	4	2
8.	150507	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	-	25	25	-	-	2	1
Total				**350**	**100**	**50**	**145**	**105**	**750**	**10**	**1**	**14**	**18**
9.	100006$	MC	Indian Constitution & Traditional Knowledge (Audit Course) (MC)	70	20	10	-	-	100	3	-	-	-
Department level activity/workshop/awareness Programme to be conducted; certificate of compliance to be submitted by HoD to the Exam Controller through Dean Academics													
Additional Courses for obtaining Honours or minor Specialization by desirous students			**Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization**										

* Group A/B programmes will offer this course in V/VI Semester respectively.

$ Group A/B programmes will offer this course in V/VI Semester respectively. (Passing is optional, however a separate mark sheet will be issued to those who qualify)

** The minor project-I may be evaluated by an internal committee for awarding sessional marks.

Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation

GROUP A: (Electrical, Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. VI Semester (Computer Science & Engineering) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	150601	DC	Compiler Design (DC-12)	70	20	10	30	20	150	2	-	2	3
2.	150602	DC	Computer Networks (DC-13)	70	20	10	-	-	100	2	1	-	3
3.	DE	DE	Departmental Elective (DE-1)	70	20	10	-	-	100	2	-	-	2
4.	DE	DE	Departmental Elective* (DE-2)	70	20	10	-	-	100	2	-	-	2
5.	OC	OC	Open Category (OC-1)	70	20	10	-	-	100	2	-	-	2
6.	100007	MC	Disaster Management (MC)	70	20	10	-	-	100	2	-	-	2
7.	150606	DLC	Minor Project-II (DLC-5)	-	-	-	50	50	100	-	-	4	2
Total				420	120	60	80	70	750	12	1	6	16
Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester													
Additional Courses for obtaining Honours or minor Specialization by desirous students			Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization										

DE -1 (Through Traditional Mode)		
S. No.	Subject Code	Subject Name
1.	150611	Network & Web Security
2.	150612	Image Processing
3.	150613	Mobile Computing

DE -2*		
S. No.	Subject Code	Subject Name
1.	150651	Data Analytics with Python
2.	150652	Introduction to Machine Learning
3.	150653	Cloud Computing

OC-1		
S. No.	Subject Code	Subject Name
1.	900106	Data Structures
2.	900107	Python Programming
3.	900108	Software Engineering

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

15/1/2020

DEAN (ACADEMICS)
MITS
GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Information Technology

[For batch admitted in Academic Session 2017-18

Semester-Wise Scheme & Guidelines for Flexible Curriculum

Abbreviations used

L	**Lecture**
T	**Tutorial**
P	**Practical**
HSMC	**Humanities and Social Sciences including Management Courses**
BSC	**Basic Science Courses**
ESC	**Engineering Science Courses**
DC	**Departmental Core**
DE	**Departmental Elective**
OC	**Open Category**
DLC	**Departmental Laboratory Courses**
MC	**Mandatory Course**
MOOC	**Massive Open Online Courses**

Definition of Credit:

1 Hr. Lecture (L) per week	**1 credit**
1 Hr. Tutorial (T) per week	**1 credit**
2 Hours Practical(Lab)/week	**1 credit**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. GROUP A: I Semester & GROUP B: II Semester *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100201	BSC	Engineering Physics (BSC-1)	70	20	10	30	20	150	4	1	2	6
2.	100202	HSMC	Energy, Environment, Ecology & Society (HSMC-1)	70	20	10	-	-	100	4	1	-	5
3.	100203	ESC	Basic Computer Engineering (ESC-1)	70	20	10	30	20	150	4	1	2	6
4.	100204	ESC	Basic Mechanical Engineering (ESC-2)	70	20	10	30	20	150	4	1	2	6
5.	100205	ESC	Basic Civil Engineering & Mechanics (ESC-3)	70	20	10	30	20	150	4	1	2	6
6.	100206	HSMC	Language Lab. & Seminars (HSMC-2)	-	-	-	30	20	50	-		2	1
Total				**350**	**100**	**50**	**150**	**100**	**750**	**20**	**5**	**10**	**30**
Induction Programme of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations													

GROUP A: (Electrical, Electronics, Computer Science & Engineering, **Information Technology**, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)
01Theory Period=1 Credit; 02 Practical Periods =1 Credit

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. GROUP A: II Semester & GROUP B: I Semester *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100101	BSC	Engineering Chemistry (BSC-2)	70	20	10	30	20	150	4	1	2	6
2.	100102	BSC	Engineering Mathematics-I (BSC-3)	70	20	10	-	-	100	4	1	-	5
3.	100103	HSMC	Technical English (HSMC-3)	70	20	10	30	20	150	4	1	2	6
4.	100104	ESC	Basic Electrical & Electronics Engineering (ESC-4)	70	20	10	30	20	150	4	1	2	6
5.	100105	ESC	Engineering Graphics (ESC-5)	70	20	10	30	20	150	4	1	2	6
6.	100106	ESC	Manufacturing Practices (ESC-6)	-	-	-	30	20	50	-	-	2	1
Total				**350**	**100**	**50**	**150**	**100**	**750**	**20**	**5**	**10**	**30**
Summer Internship Project –I (Institute Level) (Qualifier): Minimum two-week duration													

GROUP A: (Electrical, Electronics, Computer Science & Engineering, **Information Technology**, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)
01Theory Period=1 Credit; 02 Practical Periods =1 Credit

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. III Semester (Information Technology) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	100001	BSC	Mathematics-II (BSC-4)	70	20	10	-	-	100	3	1	-	4
2.	160301	DC	Digital Electronics (DC-1)	70	20	10	-	-	100	3	1	-	4
3.	160302	DC	Data Structures (DC-2)	70	20	10	30	20	150	3	-	2	4
4.	160303	DC	Computer Graphics & Multimedia (DC-3)	70	20	10	30	20	150	3	-	2	4
5.	160304	DC	Object Oriented Programming & Methodology (DC-4)	70	20	10	30	20	150	3	-	2	4
6.	160305	DLC	Hardware Lab* (DLC-1)	-	-	-	30	20	50	-	-	2	1
7.	160306	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	-	25	25	-	-	2	1
8.	160307	DLC	Summer Internship Project –I (Institute Level) (Evaluation)	-	-	-	25	-	25			4	2
Total				**350**	**100**	**50**	**145**	**105**	**750**	**15**	**2**	**14**	**24**
9.	100002 $	MC	Biology for Engineers (Audit Course) (MC)	70	20	10	-	-	100	3		-	-
NSS/NCC				Qualifier									

Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation.

$ Course will run for Group A/B in III/IV semester respectively (Passing is optional, however a separate mark sheet will be issued to those who qualify)

*Virtual Lab to be conducted along with the traditional lab

GROUP A: (Electrical, Electronics, Computer Science & Engineering, **Information Technology**, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. IV Semester (Information Technology)

for batch admitted in Academic Session 2017-18

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Term work / Lab Work & Sessional		L	T	P	
1.	100003	BSC	Mathematics- III (BSC-5)	70	20	10	-	-	100	2	2	-	4
2.	160401	DC	Design & Analysis of Algorithms (DC-5)	70	20	10	30	20	150	2	1	2	4
3.	160402	DC	Database Management System (DC-6)	70	20	10	30	20	150	2	1	2	4
4.	160403	DC	Operating System (DC-7)	70	20	10	-	-	100	3	1	-	4
5.	160404	DC	Computer System Organization (DC-8)	70	20	10	-	-	100	3	1	-	4
6.	100004	MC	Cyber Security (MC)	70	20	10	-	-	100	2	1	-	3
7.	160405	DLC	Programming Lab* (DLC-2)	-	-	-	30	20	50	-	-	4	2
Total				**420**	**120**	**60**	**90**	**60**	**750**	**14**	**7**	**8**	**25**
NSS/NCC				**Qualifier**									
Summer Internship Project-II (SoftSkills Based) for two weeks duration: Evaluation in V Semester													

*Virtual Lab to be conducted along with the traditional lab

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. V Semester (Information Technology) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100005*	HSMC	Ethics, Economics, Entrepreneurship & Management (HSMC- 4)	70	20	10	-	-	100	2	-	-	2
2.	160501	BSC	Discrete Structures (BSC – 6)	70	20	10	-	-	100	2	1	-	3
3.	160502	DC	Software Engineering (DC-09)	70	20	10	30	20	150	2	-	2	3
4.	160503	DC	Theory of Computation (DC-10)	70	20	10	30	20	150	2	-	2	3
5.	160504	DC	Microprocessor & Interfacing (DC-11)	70	20	10	30	20	150	2	-	2	3
6.	160505	DLC	Minor Project-I** (DLC-3)	-	-	-	30	20	50	-	-	2	1
7.	160506	DLC	Summer Internship Project-II (Evaluation) (DLC-4)	-	-	-	25	-	25	-	-	4	2
8.	160507	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-		25	25	-	-	2	1
Total				**350**	**100**	**50**	**145**	**105**	**750**	**10**	**1**	**14**	**18**
9.	100006$	MC	Indian Constitution & Traditional Knowledge (Audit Course) (MC)	70	20	10	-	-	100	3		-	-
Department level activity/workshop/awareness Programme to be conducted; certificate of compliance to be submitted by HoD to the Exam Controller through Dean Academics													
Additional Courses for obtaining Honours or minor Specialization by desirous students			**Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization**										

* **Group A/B programmes will offer this course in V/VI Semester respectively.**

$ **Group A/B programmes will offer this course in V/VI Semester respectively. (Passing is optional, however a separate mark sheet will be issued to those who qualify)**

** **The minor project-I may be evaluated by an internal committee for awarding sessional marks.**

Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation

GROUP A: (Electrical, Electronics, Computer Science & Engineering, **Information Technology**, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. VI Semester (Information Technology) *for batch admitted in Academic Session 2017-18*

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	160601	DC	Compiler Design (DC-12)	70	20	10	30	20	150	2	-	2	3
2.	160602	DC	Computer Networks (DC-13)	70	20	10	-	-	100	2	1	-	3
3.	DE	DE	Departmental Elective (DE-1)	70	20	10	-	-	100	2	-	-	2
4.	DE	DE	Departmental Elective * (DE-2)	70	20	10	-	-	100	2	-	-	2
5.	OC	OC	Open Category (OC-1)	70	20	10	-	-	100	2	-	-	2
6.	100007	MC	Disaster Management (MC)	70	20	10	-	-	100	2	-	-	2
7.	160606	DLC	Minor Project-II (DLC-5)	-	-	-	50	50	100	-	-	4	2
Total				**420**	**120**	**60**	**80**	**70**	**750**	**12**	**1**	**6**	**16**
Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester													
Additional Courses for obtaining Honours or minor Specialization by desirous students			**Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization**										

DE -1 (Through Traditional Mode)		
S. No.	Subject Code	Subject Name
1.	160611	Network & Web Security
2.	160612	Image Processing
3.	160613	Agile Methodology

DE -2*		
S. No.	Subject Code	Subject Name
1.	160651	Data Analytics with Python
2.	160652	Introduction to Machine Learning
3.	160653	Cloud Computing

OC-1		
S. No.	Subject Code	Subject Name
1.	900106	Data Structures
2.	900107	Python Programming
3.	900108	Software Engineering

* Course run through SWAYAM/NPTEL/MOOC Learning Based Platform

15/1/2020

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Computer Science & Engineering

[For batch admitted in Academic Session 2018-19

Semester-Wise Scheme & Guidelines for Flexible Curriculum

Abbreviations used

L	**Lecture**
T	**Tutorial**
P	**Practical**
HSMC	**Humanities and Social Sciences including Management Courses**
BSC	**Basic Science Courses**
ESC	**Engineering Science Courses**
DC	**Departmental Core**
DE	**Departmental Elective**
OC	**Open Category**
DLC	**Departmental Laboratory Courses**
MC	**Mandatory Course**
MOOC	**Massive Open Online Courses**

Definition of Credit:

1 Hr. Lecture (L) per week	**1 credit**
1 Hr. Tutorial (T) per week	**1 credit**
2 Hours Practical(Lab)/week	**1 credit**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. GROUP A: I Semester & GROUP B: II Semester *For batches admitted in Academic Session 2018-19*

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100201	BSC	Engineering Physics (BSC-1)	70	20	10	30	20	150	2	1	2	4
2.	100202	HSMC	Energy, Environment, Ecology & Society (HSMC-1)	70	20	10	-	-	100	3	-	-	3
3.	100203	ESC	Basic Computer Engineering (ESC-1)	70	20	10	30	20	150	3	-	2	4
4.	100204	ESC	Basic Mechanical Engineering (ESC-2)	70	20	10	30	20	150	3	-	2	4
5.	100205	ESC	Basic Civil Engineering & Mechanics (ESC-3)	70	20	10	30	20	150	3	-	2	4
6.	100206	HSMC	Language Lab. & Seminars (HSMC-2)	-	-	-	30	20	50	-	-	4	2
Total				350	100	50	150	100	750	14	1	12	21
NSS/NCC				Qualifier									
Induction programme of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations													

GROUP A: (Electrical, Electronics, **Computer Science & Engineering**, Information Technology, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)
01Theory Period=1 Credit; 02 Practical Periods =1 Credit

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. GROUP A: II Semester & GROUP B: I Semester *for batches admitted in Academic Session 2018-19*

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100101	BSC	Engineering Chemistry (BSC-2)	70	20	10	30	20	150	3	-	2	4
2.	100102	BSC	Engineering Mathematics-I (BSC-3)	70	20	10	-	-	100	3	1	-	4
3.	100103	HSMC	Technical English (HSMC-3)	70	20	10	30	20	150	3	-	2	4
4.	100104	ESC	Basic Electrical & Electronics Engineering (ESC-4)	70	20	10	30	20	150	3	-	2	4
5.	100105	ESC	Engineering Graphics (ESC-5)	70	20	10	30	20	150	2	-	2	3
6.	100106	ESC	Manufacturing Practices (ESC-6)	-	-	-	30	20	50	-	-	2	1
Total				**350**	**100**	**50**	**150**	**100**	**750**	**14**	**1**	**10**	**20**
NSS/NCC				**Qualifier**									
Summer Internship Project –I (Institute Level) (Qualifier): Minimum two-week duration													

GROUP A: (Electrical, Electronics, **Computer Science & Engineering**, Information Technology, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. III Semester (Computer Science & Engineering) *for batches admitted in Academic Session 2018-19*

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot			L	T	P	
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional					
1.	100001	BSC	Mathematics-II (BSC-4)	70	20	10	-	-	100	3	1	-	4
2.	150301	DC	Digital Electronics (DC-1)	70	20	10	-	-	100	3	1	-	4
3.	150302	DC	Data Structures (DC-2)	70	20	10	30	20	150	3	-	2	4
4.	150303	DC	Computer Graphics (DC-3)	70	20	10	30	20	150	3	-	2	4
5.	150304	DC	Object Oriented Programming & Methodology (DC-4)	70	20	10	30	20	150	3	-	2	4
6.	150305	DLC	Hardware Lab* (DLC-1)	-	-	-	30	20	50	-	-	2	1
7.	150306	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	-	25	25	-	-	2	1
8.	150307	DLC	Summer Internship Project –I (Institute Level) (Evaluation)	-	-	-	25	-	25			4	2
Total				350	100	50	145	105	750	15	2	14	24
9.	100002$	MC	Biology for Engineers(Audit Course) (MC)	70	20	10	-	-	100	3		-	-
NSS/NCC				Qualifier									

#Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation.

$ Course will run for Group A/B in III/IV semester respectively (This is a non-credit course and it is optional to appear & pass in the end semester examination. However, a separate mark sheet will be issued to those who will qualify)

*Virtual Lab to be conducted along with the traditional lab

GROUP A: (Electrical, Electronics, **Computer Science & Engineering**, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. IV Semester (Computer Science & Engineering) *for batches admitted in Academic Session 2018-19*

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Term work / Lab Work & Sessional		L	T	P	
1.	100003	BSC	Mathematics- III (BSC-5)	70	20	10	-	-	100	2	2	-	4
2.	150401	DC	Design & Analysis of Algorithms (DC-5)	70	20	10	30	20	150	2	1	2	4
3.	150402	DC	Database Management System (DC-6)	70	20	10	30	20	150	2	1	2	4
4.	150403	DC	Operating System (DC-7)	70	20	10	-	-	100	3	1	-	4
5.	150404	DC	Computer System Organization (DC-8)	70	20	10	-	-	100	3	1	-	4
6.	100004	MC	Cyber Security (MC)	70	20	10	-	-	100	2	1	-	3
7.	150405	DLC	Programming Lab* (DLC-2)	-	-	-	30	20	50	-	-	6	3
Total				420	120	60	90	60	750	14	7	10	26
NSS/NCC				Qualifier									
Summer Internship Project-II (Softskills Based) for two weeks duration: Evaluation in V Semester													

*Virtual Lab to be conducted along with the traditional lab

15/1/2020

DEAN (ACADEMICS)
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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Information Technology

[For batch admitted in Academic Session 2018-19

Semester-Wise Scheme & Guidelines for Flexible Curriculum

Abbreviations used

L	Lecture
T	Tutorial
P	Practical
HSMC	Humanities and Social Sciences including Management Courses
BSC	Basic Science Courses
ESC	Engineering Science Courses
DC	Departmental Core
DE	Departmental Elective
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DLC	Departmental Laboratory Courses
MC	Mandatory Course
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2 Hours Practical(Lab)/week	1 credit

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. GROUP A: I Semester & GROUP B: II Semester *for batches admitted in Academic Session 2018-19*

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100201	BSC	Engineering Physics (BSC-1)	70	20	10	30	20	150	2	1	2	4
2.	100202	HSMC	Energy, Environment, Ecology & Society (HSMC-1)	70	20	10	-	-	100	3	-	-	3
3.	100203	ESC	Basic Computer Engineering (ESC-1)	70	20	10	30	20	150	3	-	2	4
4.	100204	ESC	Basic Mechanical Engineering (ESC-2)	70	20	10	30	20	150	3	-	2	4
5.	100205	ESC	Basic Civil Engineering & Mechanics (ESC-3)	70	20	10	30	20	150	3	-	2	4
6.	100206	HSMC	Language Lab. & Seminars (HSMC-2)	-	-	-	30	20	50	-	-	4	2
Total				**350**	**100**	**50**	**150**	**100**	**750**	**14**	**1**	**12**	**21**
NSS/NCC				**Qualifier**									
Induction programme of first three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations													

GROUP A: (Electrical, Electronics, Computer Science& Engineering, **Information Technology**, Electronics & Telecommunication)
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01Theory Period=1 Credit; 02 Practical Periods =1 Credit

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. GROUP A: II Semester & GROUP B: I Semester *for batches admitted in Academic Session 2018-19*

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100101	BSC	Engineering Chemistry (BSC-2)	70	20	10	30	20	150	3	-	2	4
2.	100102	BSC	Engineering Mathematics-I (BSC-3)	70	20	10	-	-	100	3	1	-	4
3.	100103	HSMC	Technical English (HSMC-3)	70	20	10	30	20	150	3	-	2	4
4.	100104	ESC	Basic Electrical & Electronics Engineering (ESC-4)	70	20	10	30	20	150	3	-	2	4
5.	100105	ESC	Engineering Graphics (ESC-5)	70	20	10	30	20	150	2	-	2	3
6.	100106	ESC	Manufacturing Practices (ESC-6)	-	-	-	30	20	50	-	-	2	1
Total				**350**	**100**	**50**	**150**	**100**	**750**	**14**	**1**	**10**	**20**
NSS/NCC				**Qualifier**									
Summer Internship Project –I (Institute Level) (Qualifier): Minimum two-week duration													

GROUP A: (Electrical, Electronics, Computer Science & Engineering, **Information Technology**, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

B.Tech. III Semester (Information Technology) *for batches admitted in Academic Session 2018-19*

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	100001	BSC	Mathematics-II (BSC-4)	70	20	10	-	-	100	3	1	-	4
2.	160301	DC	Digital Electronics (DC-1)	70	20	10	-	-	100	3	1	-	4
3.	160302	DC	Data Structures (DC-2)	70	20	10	30	20	150	3	-	2	4
4.	160303	DC	Computer Graphics & Multimedia (DC-3)	70	20	10	30	20	150	3	-	2	4
5.	160304	DC	Object Oriented Programming & Methodology (DC-4)	70	20	10	30	20	150	3	-	2	4
6.	160305	DLC	Hardware Lab* (DLC-1)	-	-	-	30	20	50	-	-	2	1
7.	160306	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	-	25	25	-	-	2	1
8.	160307	DLC	Summer Internship Project –I (Institute Level) (Evaluation)	-	-	-	25	-	25			4	2
Total				**350**	**100**	**50**	**145**	**105**	**750**	**15**	**2**	**14**	**24**
9.	100002$	MC	Biology for Engineers(Audit Course)(MC)	70	20	10	-	-	100	3		-	-
NSS/NCC				Qualifier									

Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation.

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*Virtual Lab to be conducted along with the traditional lab

GROUP A: (Electrical, Electronics, Computer Science & Engineering, **Information Technology**, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

15/1/2020

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. IV Semester (Information Technology) *for batches admitted in Academic Session 2018-19*

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Term work Lab Work & Sessional		L	T	P	
1.	100003	BSC	Mathematics- III (BSC-5)	70	20	10	-	-	100	2	2	-	4
2.	160401	DC	Design & Analysis of Algorithms (DC-5)	70	20	10	30	20	150	2	1	2	4
3.	160402	DC	Database Management System (DC-6)	70	20	10	30	20	150	2	1	2	4
4.	160403	DC	Operating System (DC-7)	70	20	10	-	-	100	3	1	-	4
5.	160404	DC	Computer System Organization (DC-8)	70	20	10	-	-	100	3	1	-	4
6.	100004	MC	Cyber Security (MC)	70	20	10	-	-	100	2	1	-	3
7.	160405	DLC	Programming Lab* (DLC-2)	-	-	-	30	20	50	-	-	6	3
Total				**420**	**120**	**60**	**90**	**60**	**750**	**14**	**7**	**10**	**26**
NSS/NCC				**Qualifier**									
Summer Internship Project-II (Softskills Based) for two weeks duration: Evaluation in V Semester													

*Virtual Lab to be conducted along with the traditional lab

15/1/2020

DEAN (ACADEMICS)
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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR.
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)
Department of Computer Science & Engineering and Information Technology

BASIC COMPUTER ENGINEERING
100203

COURSE OBJECTIVES

- To develop comprehensive knowledge about the fundamental principles and concepts of basic computer engineering.
- To develop competencies for the design, coding and debugging of computer programs.
- To understand fundamentals of operating system concept.
- To acquire the basic knowledge of computer networks and its application & internet technology.

Unit-I

Basics of Computer: Introduction, Generation of Computers, Classification of Computers, Hardware, Software: Types of Software, Memory Representation, RAM, ROM and Hard Disk.

Number System & Conversion: Decimal, Binary, Octal and Hexadecimal.

Unit-II

Basics of Programming: Introduction, History, Generations of Programming Languages, Types of Programming Languages, Flow Charts.

Fundamentals of C++ programming: Data Types, Operators, Writing and Executing C++ Programs, Standard I/O Functions, Goto Statement, Break and Continue Statement, Conditional Statements and Loops.

Unit-III

Functions: Introduction, Function Prototypes, Passing Values to Functions, Recursive Functions.

Arrays: Declaration and Initialization, Manipulating Array Elements, Multidimensional Arrays, String.

Pointer and Structure: Introduction, Declarations, Double Pointer, Pointer to Function, Function Returning Pointer, Pointer to Array, Array of Pointers, Dynamic Memory Allocation using Malloc and Calloc functions, Structures, Arrays of Structures, Pointers to Structures, Union.

Unit-IV

Operating System: Introduction, Functions of Operating System, Types of Operating System, Popular Operating Systems.

Database Management System: Introduction to DBMS, Data Models, Applications of DBMS, Architecture of Database Management System, DBA, Keys, Data Definition Language, Data Manipulation Language.

Unit-V

Computer Networks & Internet Technology: Introduction, Types of Network, Internetworking Devices, Network Topologies, E-commerce, WWW and Web Browser.

HTML: Introduction, Working with Text, Lists, Table, Frames, Hyperlinks, Images, Multimedia, Forms and Controls.

RECOMMENDED BOOKS

- Fundamentals of Computer Engineering, E. Balagurusamy, Tata McGraw Hill Education.
- Let Us C++, Yashavant P. Kanetkar, BPB Publications.
- Operating System Concepts, Galvin, Wiley.
- Computer Fundamentals and C Programming, Sumitabha Das, McGraw Hill Education

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COURSE OUTCOMES

After completion of the course students would be able to:

CO1. tell the fundamental concepts and techniques used in computer engineering.

CO2. explain the working and features of the basic components of computer system.

CO3. apply the concept and attributes to design programs for problem solving.

CO4. compare various operating systems and also analyze the different approaches of maintaining data.

CO5. determine the importance of various components of computer networking and web designing.

CO6. develop a skill of programming using the constructs of C++.

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Department of Computer Science & Engineering and Information Technology

Syllabi of Subjects
B.Tech. III Semester
(Computer Science & Engineering and Information Technology)
Under Flexible Scheme Structure

III SEMESTER

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR.
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DIGITAL ELECTRONICS
150301/160301 (DC-1)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
- To learn various number systems, boolean algebra and logic gates.
- To understand the concept of counters, latches and flip-flops.

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and Simplifications.

Unit-III

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-Triggered D Flip-Flop, Edge-Triggered JK Flip-Flop, JK Master-Slave Flip-Flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the computer architecture for defining basic component and functional unit.

CO2. recall different number system and solve the basic arithmetic operations.

CO3. develop the understanding of combinational circuits.

CO4. analyze the basic concept of sequential circuits.

CO5. compare various memories.

CO6. solve the Boolean functions using logic gates.

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DATA STRUCTURES
150302/160302 (DC-2)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
- To understand various techniques of searching and sorting.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

Unit-I

Introduction to Data Structures: Algorithms & their Characteristics, Asymptotic Notations. Arrays and its Representations, Index to Address Translation. **Link List:** Introduction, Implementation of Linked List, Operations, Circular Link List, Doubly Linked List, Polynomial Manipulation Using Linked List.

Unit-II

Stacks: Concepts and Implementation of Stacks, Operations on Stack, Conversion of Infix to Postfix Notation, Evaluation of Postfix Expression, Recursion.

Queues: Concepts and Implementation, Operations on Queues, Dequeue, Priority Queues, Circular Queues and Application.

Unit-III

Trees: Types, Terminology, Binary Tree -Representations, Traversal, Conversion of General Tree to Binary Tree, Binary Search Tree, Threaded Binary Tree and Height Balanced Tree.

Unit-IV

Searching & Sorting: Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Radix Sort and Heap Sort, Comparison between Sorting Techniques, Hashing and Collision Resolution Techniques.

Unit-V

Graphs: Background, Graph Theory Terminologies, Representation of Graphs- Sequential & Linked Representation, Path Matrix, Graph Traversals- BFS, DFS, Spanning Trees, Applications of Graph.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

After completion of this course, the students would be able to:

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.

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COMPUTER GRAPHICS
150303 (DC-3)

COURSE OBJECTIVES

- To provide an introduction to the theory and practice of computer graphics.
- To give a good exposure related to Computer Graphics algorithms and to design various graphics primitives.
- To enhance the proficiency in programming skills related to animation and graphics object design.

Unit-I

Introduction to Computer Graphics: Interactive Computer Graphics, Application of Computer Graphics, Random and Raster Scan Displays, Storage Tube Graphics Display, Calligraphic Refresh Graphics Display, Flat Panel Display, Refreshing, Flickering, Interlacing, Resolution, Bit Depth, Aspect Ratio etc.

Unit-II

Scan Conversion Technique: Image Representation, Line Drawing: DDA, Bresenham's Algorithm. **Circle Drawing:** General Method, Mid-Point, DDA, Bresenham's Circle Generation Algorithm, Ellipse Generation Algorithm, **Curves:** Parametric Function, Bezier Method, B-Spline Method.

Unit-III

2D & 3D Transformations: Translation, Rotation, Scaling, Reflection, Shearing, Inverse Transformation, Composite Transformation, World Coordinate System, Viewing Transformation, Representation of 3D Object on Screen, Parallel and Perspective Projections.

Unit-IV

Clipping: Point Clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Cohen Sutherland Line Clipping Algorithm Etc, Polygon Clipping, Convex and Concave

Polygon, Sutherland Hodgeman Polygon Clipping Algorithm etc, Area Filling, Hidden Surface Elimination: Z- Buffer Algorithm and Painter's Algorithm.

Unit-V

Basic Illumination Models: Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, Color Models like RGB, YIQ, CMY, HSV etc., Introduction to Digital Image Processing (DIP), Fundamental Steps and Components of DIP.

RECOMMENDED BOOKS

- Computer Graphics, Donald Hearn and M.P. Becker, PHI Publication.
- Computer Graphics Principle and Practice, FoleyVandam, Feiner, Hughes.
- Principles of Computers Graphics, Rogers, TMH.
- Computer Graphics, Sinha and Udai, TMH.
- Digital Image Processing, Gonzalez.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1. explain interactive computer graphics, various display devices and explore applications of computer graphics.

CO2. illustrate various line generations, circle generation, curve generation and shape generation algorithms.

CO3. apply various 2-dimensional, 3-dimensional transformations and projections on images.

CO4. classify methods of image clipping and various algorithms for line and polygon clipping.

CO5. choose appropriate filling algorithms, hidden surface elimination algorithm and apply on various images.

CO6. discuss various color models, shading methods, animation and digital image processing.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR.
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Department of Computer Science & Engineering and Information Technology

COMPUTER GRAPHICS & MULTIMEDIA
160303 (DC-3)

COURSE OBJECTIVES

- To provide an introduction to the theory and practice of computer graphics.
- To give a good exposure related to Computer Graphics algorithms and to design various graphics primitives.
- To enhance the proficiency in programming skills related to animation and graphics object design.

Unit-I

Introduction to Computer Graphics: Interactive Computer Graphics, Application of Computer Graphics, Random and Raster Scan Displays, Storage Tube Graphics Display, Calligraphic Refresh Graphics Display, Flat Panel Display, Refreshing, Flickering, Interlacing, Resolution, Bit Depth, Aspect Ratio etc.

Unit-II

Scan Conversion Technique: Image Representation, Line Drawing: DDA, Bresenham's Algorithm. Circle Drawing: General Method, Mid-Point, DDA, Bresenham's Circle Generation Algorithm, Ellipse Generation Algorithm, Curves: Parametric Function, Bezier Method, B-Spline Method.

Unit-III

2D & 3D Transformations: Translation, Rotation, Scaling, Reflection, Shearing, Inverse Transformation, Composite Transformation, World Coordinate System, Viewing Transformation, Representation of 3D Object on Screen, Parallel and Perspective Projections. **Clipping:** Point Clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Cohen Sutherland Line Clipping Algorithm etc, Polygon Clipping, Convex and Concave Polygon, Sutherland Hodgeman Polygon Clipping Algorithm etc, Area Filling, Hidden **Surface Elimination:** Z- Buffer Algorithm and Painter's Algorithm.

Unit-IV

Basic Illumination Models: Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, Color Models like RGB, YIQ, CMY, HSV etc.

Unit-V

Multimedia System: Introduction, Multimedia Hardware, Multimedia System Architecture. Data & File Format Standards. i.e RTF, TIFF, MIDI, JPEG, DIB, MPEG, **Audio:** Digital Audio, MIDI, Processing Sound, Sampling, Compression.
Video: Avi, 3GP, MOV, MPEG, Compression Standards, Compression through Spatial and Temporal Redundancy. Multimedia Authoring.

RECOMMENDED BOOKS

- Donald Hearn and M.P. Becker: Computer Graphics, PHI Publication.
- FoleyVandam, Feiner, Hughes: Computer Graphics Principle and Practice.
- Rogers:Principles of Computers Graphics, TMH.
- Sinha and Udai: Computer Graphics, TMH.
- Digital Image Processing by Gonzalez.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1. explain interactive computer graphics, various display devices and explore applications of computer graphics.

CO2. illustrate various line generations, circle generation, curve generation, shape generation algorithms and storage technique.

CO3. apply various 2-dimensional, 3-dimensional transformations and projections on images.

CO4. classify methods of image clipping and various algorithms for line and polygon clipping and different multimedia storage extensions.

CO5. choose appropriate filling algorithms, hidden surface elimination algorithm and apply on various images.

CO6. discuss various color models, shading methods, animation and digital image processing.

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Department of Computer Science & Engineering and Information Technology

OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
150304/160304 (DC-4)

COURSE OBJECTIVES

- To study about the concept of object oriented programming.
- To create C++ programs that leverage the object oriented features of the C++ Language.
- To apply object oriented or non-object oriented techniques to solve bigger computing problems.

Unit-I

Introduction to C++ and Object Oriented Concepts: Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its Type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

Programming Techniques: Unstructured & Structured Programming, Object Oriented Paradigm, Features of OOPs, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

Unit-II

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

Constructors and Destructors: Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

Unit-III

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary

Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

Unit-IV

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

Unit-V

Pointer & File Concept: Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

RECOMMENDED BOOKS

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusam.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. tell the concepts of classes & objects and their significance in real world.

CO2. explain the benefits of object oriented design.

CO3. build C++ classes using appropriate encapsulation and design principles.

CO4. analyze the utilization of inheritance and polymorphism in the solution of problems.

CO5. choose appropriate object orient programming concepts for solving real world problems.

CO6. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.

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HARDWARE LAB
150305/160305 (DLC-1)

COURSE OBJECTIVES

- To understand various number systems, boolean algebra, logic gates.
- To acquire the knowledge of a computer system, motherboard and its processing unit.
- To be aware of different memories, I/O devices, windows installation and SMPS.

Unit -I

Number System, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and Simplifications.

Unit-II

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit -III

Sequential Circuits, Latches, Flip-Flops: Edge-Triggered D Flip-Flop, Edge-Triggered JK Flip-Flop, JK Master-Slave Flip-flop, Registers. Integrated Circuits.

Unit-IV

Introduction of Motherboard, Types of Motherboard, Integrated Motherboards, Non-Integrated Motherboards, Desktop Motherboards, Server Motherboards, Laptop Motherboards, Factors of Motherboard, Components of a Motherboard, Manufacturers of Motherboards, Bus Architecture.

Unit -V

Introduction to Memory, Types of Memory, Installation and Partition of Hard Disk, Working of Hard Disk. Basics of I/O Devices, Introduction to Ports, Identify the Different Ports, Ports Troubleshooting, Windows Installation, SMPS (Switch Mode Power Supply).

III SEMESTER

RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.
- The Indispensable PC Hardware Book, Hans-Peter Messmer, Third Edition.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. illustrate the concept of number system and boolean algebra.

CO2. demonstrate installation of windows and connections through ports at basic level.

CO3. build various circuits and inspect their working.

CO4. examine the ICs specifications and their functioning.

CO5. explain the concept of memory, motherboard, bus, and SMPS.

CO6. choose appropriate logic gates to design combinational & sequential circuits.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR.
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Department of Computer Science & Engineering and Information Technology

Syllabi of Subjects
B.Tech. IV Semester
(Computer Science & Engineering and Information Technology)
Under Flexible Scheme Structure

IV SEMESTER

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR.
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)
Department of Computer Science & Engineering and Information Technology

DESIGN & ANALYSIS OF ALGORITHMS
150401/160401 (DC-5)

COURSE OBJECTIVES

- To introduce the topic of algorithms as a precise mathematical concept.
- To study the techniques like recursion, divide and conquer, dynamic programming, greedy approach, backtracking and branch and bound.
- To practice their skills on many well-known algorithms and data structures designed to solve real-life problems.

Unit-I

Introduction to Computational Model: RAM, Turing Machine, Circuit model, PRAM, Bulk Synchronous Parallel (BSP) Model, Algorithms and its Importance, Recurrences and Asymptotic Notations, Mathematical Analysis of Non Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, **Basic Tree and Graph Concepts:** Binary Search Trees, Height Balanced Trees, B-Trees and Traversal Techniques.

Unit-II

Divide and Conquer Method: Introduction and its examples such as finding the Maximum and Minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication.

Unit-III

Greedy Method: Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees :** Prims's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's Single Source Shortest Path Algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, Principle of Optimality, Examples of Dynamic Programming Methods such as – 0/1 Knapsack, Traveling Salesman Problem, Floyd's All Pairs Shortest Path, Longest Common Subsequence and Reliability Design.

Unit-V

Backtracking: Concept and its examples like 4-Queen's Problem, Knapsack Problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch & Bound:** Introduction and its examples like - Traveling Salesperson Problem etc. **NP-Completeness:** Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP-Complete Problems.

RECOMMENDED BOOKS

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities Press.
- Introduction to Algorithms, Coremen Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullmann, Pearson.
- Algorithm Design, Michael T Goodrich, Robarto Tamassia, Wiley India.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. tell the basic features of an algorithm.

CO2. demonstrate a familiarity with major algorithms and data structures.

CO3. apply important algorithmic design paradigms and methods of analysis.

CO4. analyze the asymptotic performance of algorithms.

CO5. compare different design techniques to develop algorithms for computational problems.

CO6. design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch n bound approach.

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DATABASE MANAGEMENT SYSTEM
150402/160402 (DC-6)

COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modeling, relational, hierarchical and network models.
- To understand and use data manipulation language to query, update and manage a database.

Unit-I

DBMS: Concepts & Architecture, Introduction of File Organization Techniques, Database Approach v/s Traditional File Approach, Advantages of Database System, Schemas, Instances, Data Independence, Functions of DBA, Entities & Attributes, Entity Types, Value Sets, Key Attributes, Relationships, E-R Diagram.

Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, Comparison between Models.

Unit-II

Relational Data Models: Domains, Tuples, Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints.

Query Languages: Relational Algebra & Relational Calculus, Relational Algebra Operations like Select, Project, Division, Intersection, Union, Division, Rename, Join etc.

Unit-III

SQL: Data Definition, Data Manipulation in SQL, Update Statements & Views in SQL Query & Subquery, Query by example Data Storage Definition, Data Retrieval Queries, Set Operations, Aggregate functions, Nested Sub-Queries, Data Manipulation Statements etc . Overview of Tuple Oriented & Domain Oriented Relational Calculus & Operations.

Unit-IV

Database Design: Introduction to Normalization, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Functional Dependency, Attribute Closure, Decomposition, Dependency Preservation, Loss Less & Lossy Join, Problems with Null Valued & Dangling Tuple, Multivalued Dependencies.

Unit-V

Transaction Processing Concepts: Introduction, State Diagram, Properties of Transaction, Types of Transaction, Serializability: Conflict and View Serializability, Concurrency Control: Concepts, Techniques, Concurrent Operation of Databases, Recovery: Introduction, Types of Recovery.

Overview of Distributed Databases: Protection, Security & Integrity Constraints. Relational Database Management Systems: Oracle & Microsoft Access Tools. Basic Concepts of Object Oriented Database System & Design.

RECOMMENDED BOOKS

- Database System Concepts, Abraham Silberschatz Henry F. Korth S. Sudarshan, McGraw-Hill 6th Edition.
- Database Management System, Raghu Ramakrishnan Johannes Gehrke, McGraw Hill 3rd Edition.
- Fundamentals of Database System, Elmasri & Navathe, Addison-Wesley Publishing, 5th Edition.
- An Introduction to Database Systems, Date C. J, Addison-Wesley Publishing, 8th Edition.

COURSE OUTCOMES

After successful completion of the course students will be able to:

CO1. tell the terminology, features, classifications, and characteristics embodied in database systems.

CO2. explain different issues involved in the design and implementation of database system.

CO3. apply transaction processing concepts and recovery methods over real time data.

CO4. analyze database schema for a given problem domain.

CO5. justify principles for logical design of databases, including the E-R method and normalization approach.

CO6. formulate, using relational algebra and SQL, solutions to a broad range of query problems.

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Department of Computer Science & Engineering and Information Technology

OPERATING SYSTEM
150403/160403 (DC-7)

COURSE OBJECTIVES

- To provide basic knowledge of computer operating system structures and functioning.
- To compare several different approaches to memory management, file management and process management.
- To understand various problems related to concurrent operations and their solutions.

Unit I

Basics of Operating System: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Unit II

Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit III

Process Synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

Unit IV

Memory Management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit V

Storage Management: Mass-Storage Structure, Overview, Disk Structure, Disk Attachment, Disk Scheduling.

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free-Space Management.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Willey Publication.
- Operating Systems, internals and Design Principles, Stallings, Seventh Edition, Pearson Publication.
- Modern Operating Systems, Tanenbaum, Fourth Edition. Pearson Publication.

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

CO1. tell the basic concept of operating systems.

CO2. explain the working of operating system.

CO3. develop the solution of various operating system problems/issues.

CO4. analyze the various operating system problems/issues.

CO5. measure the performance of various scheduling/allocation approaches.

CO6. test the working of various scheduling/allocation approaches.

COMPUTER SYSTEM ORGANIZATION
150404/160404 (DC-8)

COURSE OBJECTIVE

- To provide the fundamental knowledge of a computer system and its processing units.
- To provide the details of input & output operations, memory management and performance measurement of the computer system.
- To understand how computer represents and manipulate data.

Unit -I

Introduction: Von Newman Model, Various Subsystems, CPU, Memory, I/O, System Bus, CPU and Memory Registers, Program Counter, Accumulator, Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Tree-State Bus Buffers, Bus and Memory Transfers, Arithmetic Micro-Operation, Logic Micro-Operation, Shift Micro-Operation Register Transfer Micro Operations, Arithmetic Micro-Operations, Logic Micro-Operations and Shift Micro-Operations.

Unit- II

Computer Arithmetic: Addition and Subtraction with Signed-Magnitude, Multiplication Algorithm, Division Algorithm, Division Algorithms, Floating-Point Arithmetic Operations.

Central Processing Unit (CPU): General Purpose Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC). Hardwired and Microprogrammed Control.

Unit -III

Microprocessors: Introduction of 8085 Microprocessor: Architecture, Instruction Set, Addressing Modes, Interrupts and Basic Assembly Language Programming.

Unit -IV

Input-Output Organization: Peripheral Devices, I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA (DMA Controller, DMA

Transfer), Input-Output Processor (IOP), Data Transfer- Serial/Parallel, Simplex/ Half Duplex/ Full Duplex.

Unit-V

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory- Organization and Mappings, Memory Management Hardware, Introduction to Pipelining & Multiprocessors.

RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
- Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar, Penram International Publishing (India) Pvt. Ltd.
- Computer Organization, Carl Hamacher, THM.
- Computer Architecture and Organization, J P Hayes, Mc-Graw Hills, New Delhi.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. recall the basic building blocks of computer architecture.

CO2. compare different memories.

CO3. apply the concept of memory mapping, multiprocessor and pipelining in solving real world problems.

CO4. analyze various modes of Input-Output data transfer.

CO5. evaluate the arithmetic related to the number system.

CO6. develop the skill of writing low level programming.

Department of Computer Science & Engineering and Information Technology

CYBER SECURITY
100004 (MC-2)

COURSE OBJECTIVES

- To provide an understanding of cyber security fundamentals.
- To analyze various cyber attacks and their countermeasures.
- To provide basics of Internet and networking.
- To identify various cyber security threats and vulnerabilities.
- To apply forensic science to investigate a cyber crime.

Unit-I

Introduction- Overview of Cyber Security, Cyber Crime, Cyber Warfare, Cyber Terrorism, Cyber Espionage, Cyber Vandalism (Hacking), Cyber Stalking, Internet Frauds and Software Piracy.

Unit-II

Basics of Internet & Networking- Wired and Wireless Networks, Internetworking Devices, Topologies, Web Browser, Web Server, OSI Model, IP Addressing, Firewall, E-Commerce, DNS, NAT, VPN, HTTP & HTTPS.

Unit-III

Cryptography and Network Security- Security Principles, Attacks, Cryptography, Steganography, Cryptanalysis, Symmetric key and Public key cryptography, Digital Signature, Intrusion Detection System, Secure Socket Layer(SSL) & Secure Electronic Transaction(SET).

Unit-IV

Cyber Security Threats and Vulnerabilities- Hacker, Types of Hacker- White, Gray and black, **Malicious Software's-** Virus, Worm, Trojan Horse, Backdoors and Spywares. Sniffers, Denial of Service Attack and Phishing.

Unit-V

Cyber Crime Investigation and Legal Issues: Intellectual property, privacy issues, IT Act 2000, Basics of Cyber Crime Investigation- Cyber Forensics, Electronic Evidences and its Types.

RECOMMENDED BOOKS

- Cryptography and Network Security, 4/E, William Stallings, 4th edition, Pearson publication.
- Computer Security: Principles and Practice, Stallings William, Pearson publication.
- Investigating Network Intrusions and Cybercrime, EC-Council Press.
- Network Forensics, Tracking Hackers through Cyberspace, Sherri Davidoff, Jonathan Ham, Prentice Hall.
- Cryptography and Network Security, 3e, Atul Kahate, McGraw Hill publication.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. Tell the basic terminologies of Cyber Security.

CO2. Explain the basic concept of networking and Internet.

CO3. Apply various methods used to protect data in the internet environment in real world situations.

CO4. Discover the concept 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.

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Department of Computer Science & Engineering and Information Technology

PROGRAMMING LAB
(JAVA PROGRAMMING)
150405/160405 (DLC-3)

COURSE OBJECTIVES

- To understand fundamentals of object-oriented programming in java, including defining classes, invoking methods, using class libraries, etc.
- To acquire the ability to write a computer program to solve specified problems.
- To be able to use java SDK environment to create, debug and run simple java programs.

Unit-I

Introduction to Java programming: Overview and Characteristics of Java, Java Virtual Machine, Installing Java, Java Program Development, Java Source File Structure, Compilation, Executions. Packages, Package Access, Variables and Data Types, Conditional and Looping Constructs, Arrays.

Unit-II

Object-Oriented Programming with Java Classes and Objects: Fields and Methods, Constructors, Overloading Methods, Nested Classes, Overriding Methods, Polymorphism, Making Methods and Classes Final, Wrapper Classes.

Unit-III

Extending Classes and Inheritance: Types of Inheritance in Java, Abstract Classes and Methods, Interfaces, Use of 'Super', Polymorphism in Inheritance. Garbage Collection in Java.

Exception handling: Try- Catch, Throw, Throws, Finally constructs, Exception class.

Unit-IV

String Package and Multithreading: Operation on String, Mutable & Immutable String, Tokenizing a String, Creating Strings using String Buffer Class.

Understanding Threads: Needs of Multi-Threaded Programming, Thread Life-Cycle, Thread Priorities and Synchronizing Threads.

Unit-V

The I/O Package: Input Stream and Output Stream classes, Reader and Writer classes, Basics of AWT, Swing and Applets: Layout Managers, Event Handling, Classes for Various Controls such as Label, Choice, List, Checkbox, etc., Dialogs and Frames using Menus.

Basic Concepts of Networking: Working with URLs, Concepts of URLs and Sockets. Basics of Database Connectivity with JDBC.

RECOMMENDED BOOKS

- Programming with JAVA: A Primer, E. Balagurusamy, Tata McGraw Hill.
- JAVA: The Complete Reference, Herbert Schildt, McGraw Hill Education.
- JAVA-2: The Complete Reference, Patrick Naughton, Herbert Schidt.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. tell the available features in Java programming language.

CO2. illustrate Java programming constructs in solving problems.

CO3. make use of Java programming language for creating databases.

CO4. test for bugs in a software application written in Java programming language.

CO5. determine different ways for handling exception, memory management, file handling, I/O management and internet based application development.

CO6. build a project for application development using Java programming language.

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Syllabi of Subjects
B.Tech V Semester
(Computer Science & Engineering and Information Technology)
Under Flexible Curriculum

V SEMESTER

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR.
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SOFTWARE ENGINEERING
150502/160502 (DC-9)

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit - I

Introduction to Software Engineering: Definition, Software Engineering-Layered Technology, Software Characteristics and Components, **Software Model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection Criteria of Model**: Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , **Types of Requirement-** Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural Design, Procedural Design, Data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project Domains, Software Measurement, Software Quality Metrics, **Project Management-** Basics-People, Product, Process, Project, **Estimation-** Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) Based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic Issues, Criteria for Completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the various fundamental concepts of software engineering.

CO2. develop the concepts related to software design & analysis.

CO3. compare the techniques for software project management & estimation.

CO4. choose the appropriate model for real life software project.

CO5. design the software using modern tools and technologies.

CO6. test the software through different approaches.

THEORY OF COMPUTATION
150503/160503 (DC-10)

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
- To analyse and design abstract model of computation & formal languages.
- To understand and conduct mathematical proofs for computation and algorithms.

Unit-I

Introduction of Automata Theory: Examples of Automata Machines, Finite Automata as a Language Acceptor and Translator, Moore Machines and Mealy Machines, Composite Machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic Finite Automata Machines, Conversion of NDFA to DFA, Minimization of Automata Machines, Regular Expression, Arden's Theorem. Meaning of Union, Intersection, Concatenation and Closure, 2 Way DFA.

Unit-III

Grammars: Types of Grammar, Context Sensitive Grammar, Context Free Grammar, Regular Grammar. Derivation Trees, Ambiguity in Grammar, Simplification of Context Free Grammar, Conversion of Grammar to Automata Machine and Vice Versa, Chomsky Hicrarchy of Grammar, Killing Null aqnd Unit Productions. Chomsky Normal Form and Greibach Normal Form.

Unit-IV

Push DOWN Automata: Example of PDA, Deterministic And Non-Deterministic PDA, Conversion of PDA into Context Free Grammar And vice versa, CFG Equivalent to PDA, Petrinet Model.

Unit-V

Turing Machine: Techniques for Construction. Universal Turing Machine Multitape, Multihead and Multidimensional Turing Machine, N-P Complete Problems. Decidability and Recursively Enumerable Languages, Decidability, Decidable

Languages, Undecidable Languages, Halting Problem of Turing Machine & The Post Correspondence Problem.

RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft & Ullman, Narosa Publication.
- Element of the Theory Computation, Lewis & Christors, Pearson.
- Theory of Computation, Chandrasekhar & Mishra, PHI.
- Theory of Computation, Wood, Harper & Row.
- Introduction to Computing Theory, Daniel I-A Cohen, Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the basic concepts of switching and finite automata theory & languages.

CO2. relate practical problems to languages, automata, computability and complexity.

CO3. construct abstract models of computing and check their power to recognize the languages.

CO4. analyse the grammar, its types, simplification and normal form.

CO5. interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.

CO6. develop an overview of how automata theory, languages and computation are applicable in engineering application.

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MICROPROCESSOR & INTERFACING
150504/160504 (DC-11)

COURSE OBJECTIVES

- To understand different processors and basic architecture of 16 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand 8051 microcontroller.

Unit-I

Microprocessors: Introduction to x86 Microprocessors, RISC and CISC Processors, 8086 Architecture-Functional Diagram, Register Organization, Memory Segmentation, Programming Model, Memory Address, Physical Memory Organization, Minimum and Maximum Mode Signals, Bus Cycle and Timing Diagrams, Instruction Formats, Addressing Modes, Instruction Set, Interrupts of 8086.

Unit-II

Basic Peripherals and Interfacing: 8212, 8155, 8255, 8755, Interfacing with LED's, ADC, DAC, Stepper Motors and I/O & Memory Interfacing.

Unit-III

Special Purpose Programmable Peripheral Devices and Interfacing: 8253, 8254 Programmable Interval Timer, 8259A Programmable Interrupt Controller and 8257 DMA Controllers, Keyboard and Display Interfacing.

Unit-IV

Serial and Parallel Data Transfer: Serial and Parallel Data Transmission, Types of Communication System, Baud Rate RS-232C, Modem and various Bus Standards, USART – 8251A.

Unit-V

Introduction to Microcontrollers: 8051 Microprocessor and its Architectures, Pin Description, Input-Output Configurations, Interrupts, Addressing Modes, Overview of 8051 Instruction Set.

RECOMMENDED BOOKS

- The Intel Microprocessors, Architecture, Programming and Interfacing, B.B. Brey, PHI.
- Microprocessor 8086: Architecture, Programming and Interfacing, Sunil Mathur, PHI.
- Advanced Microprocessor and Interfacing, D.V. Hall, Mc-Graw Hill.
- Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing, A.K. Ray & K.M. Bhurchandi, Tata McGraw Hill.
- Interfacing Techniques in Digital Design with Emphasis on Microprocessors, R.L. Krutz, John Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. compare the architecture and feature of different 16-bit microprocessor interfacing chips & microcontrollers.

CO2. develop programming skills in assembly language of 8086 microprocessor and 8051 microcontroller.

CO3. demonstrate the concept of interfacing with peripheral devices.

CO4. make use of different interrupts and addressing modes.

CO5. design an interfacing for I/O devices.

CO6. build a system based on 8086 microprocessor and 8051 microcontroller.

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B.Tech VI Semester
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Under Flexible Curriculum

VI SEMESTER

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COMPILER DESIGN
150601/160601 (DC-12)

COURSE OBJECTIVES

- To learn finite state machines and context free grammar.
- To learn, various phases of compiler
- To understand process of compiler implementation.

Unit-I

Overview of Translation Process: Introduction to Compiler, Major Data Structures in Compiler, Other Issues in Compiler Structure, BOOT Strapping and Porting, Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Tool Based Approach to Compiler Construction.

Unit-II

Lexical Analysis: Input Buffering, Symbol Table, Token, Recognition of Tokens, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting and Implementation. Regular Grammar & Language Definition, Transition Diagrams, Design of a Typical Scanner using LEX.

Unit-III

Syntax Analysis: Context Free Grammars (CFGs), Ambiguity, Basic Parsing Techniques: Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing LL(1) Grammar, Bottom-UP Parsing, Operator Precedence Parsing, LR Parsers (SLR, CLR, LALR), Design of a Typical Parser Using YACC.

Unit-IV

Semantic Analysis: Compilation of Expression, Control, Structures, Conditional Statements, Various Intermediate Code Forms, Syntax Directed Translation, Memory Allocation and Symbol Table Organizations, Static and Dynamic Array Allocation,

String Allocation, Structure Allocation etc., Error Detection Indication and Recovery, Routines or Printing Various Lexical, Syntax and Semantic Errors.

Unit-V

Code Generation and Code Optimization: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, DAG Representation of Programs, Code Generation from DAGS, Peep-hole Optimization, Code Generator Generators, Specification of Machine. Code Optimization: Source of Optimizations, Optimization of Basic Blocks, Loops, Global Data Flow Analysis, Solution to Iterative Data Flow Equations, Code Improving Transformations, Dealing with Aliases, Data Flow Analysis of Structured Flow Graphs.

RECOMMENDED BOOKS

- Compilers: Principles, Techniques and Tools, V. Aho, R. Sethi and J. D. Ullman, Pearson Education.
- Compiler Construction: Principles and Practice, K.C. Louden, Cengage Learning.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define 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.

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COMPUTER NETWORKS
150602/160602 (DC-13)

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable students to deal with various networking problems such as flow control, error control and congestion control.

Unit-I

Introduction: Computer Network, Types- LAN,MAN & WAN, Data Transmission Modes- Serial & Parallel, Simplex, Half Duplex & Full Duplex, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Cables- Twisted Pair, Coaxial Cable & Optical Fiber, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode.

Unit-II

Physical Layer: Network topologies- Bus, Ring, Star & Mesh, Line Coding- Unipolar, Polar and Bipolar, Switching- Circuit Switching, Message Switching & Packet Switching, Multiplexing: FDM – Frequency Division Multiplexing, WDM – Wavelength Division Multiplexing & TDM – Time Division Multiplexing.

Unit-III

Data Link Layer: Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- Channel Allocation Problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

Unit-IV

Network Layer & Transport Layer: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token Bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

Unit-V

Presentation, Session& Application Layer: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote Login, File Transfer & Electronic Mail.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the fundamental concepts of computer network.

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.

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Department of Computer Science & Engineering and Information Technology

Departmental Elective (DE-1) Courses

DEPARTMENTAL ELECTIVE (DE-1) OFFERED IN VI SEMESTER

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Department of Computer Science & Engineering and Information Technology

List of Departmental Elective (DE-1) Courses

B.Tech (Computer Science & Engineering / Information Technology)

DE-1 (Offline Mode)	
Subject Code	**Subject Name**
150611 / 160611	Network & Web Security
150612 / 160612	Image Processing
150613	Mobile Computing
160613	Agile Methodology

DEPARTMENTAL ELECTIVE (DE-1) OFFERED IN VI SEMESTER

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR.
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NETWORK & WEB SECURITY
150611/ 160611 (DE-1)

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.
- To explore the requirements of real-time communication security and issues related to the security of web services.

Unit-I

Security: Principles and Attacks, Basic Number Theory: Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Steam Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit-III

Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). Authentication: Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit -IV

IP & Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). IDS (Intrusion detection system):

Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management. Firewalls: Types, Functionality and Polices.

Unit -V

Phishing: Attacks and its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. Denial of Service Attacks: Smurf Attack, SYN Flooding, Distributed Denial of Service. Hacker: Hacking and Types of Hackers, Foot Printing, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared And Switched Networks, Sniffing Detection & Prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prosise, Tata McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

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.

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IMAGE PROCESSING
150612/ 160612(DE-1)

COURSE OBJECTIVES

- To understand the fundamentals of image acquisition, image processing in various domains.
- To understand image transformation, enhancement and restoration techniques used in image processing.
- To know image registration and segmentation used in image processing.

Unit- I

Introduction and Fundamentals: Introduction to Image Processing Systems, Digital Image Fundamentals: Components of Digital Image Processing System, Image Model, Imaging Geometry, Sampling and Quantization of Images, Classification of Digital Images, Zooming and Shrinking, Relationship Between Pixels.

Unit- II

Image Enhancement in Spatial Domain: Introduction, Basic Gray Level Function, Piecewise Linear Transformation, Contrast Stretching, Histogram Specification, Histogram Equalization, Local Enhancement using Arithmetic and Logical Operation- Image Subtraction, Image Averaging Image Smoothing: Smoothing Spatial Filters, Smoothing Linear Filters, Image Sharpening.

Unit- III

Image Enhancement in Frequency Domain: Introduction to Fourier Transform, Filters: Low Pass and High Pass, Gaussian Filters, Homomorphic Filtering.

Image Restoration- Model of Image Degradation/Restoration Process, Noise Models, Noise Reduction in Spatial Domain and Frequency Domain, Inverse Filtering, Mean Filters, Least Mean Square(Wiener) Filtering, Fir Wiener Filter.

Unit -IV

Morphological Image Processing: Logic Operation Involving Binary Images, Dilation And Erosion, Opening and Closing, Morphological Algorithms: Boundary

Extraction, Region Filling, Extraction Of Connected Components, Convex Hull, Thinning, and Thickening.

Unit -V

Image Registration: Introduction, Geometric Transformation, Plane to Plane Transformation, Mapping.

Image Segmentation: Introduction, Region Extraction, Pixel Based Approach, Multilevel Thresholding, Local Thresholding, Region Based Approach, Region Growing, Splitting and Merging, Edge and Line Detection, Corner Detection, Detection of Discontinuities, Edge Linking and Boundary Detection.

RECOMMENDED BOOKS

- Digital Image Processing, Rafael C Gonzalez, Richard E Woods, Pearson Education.
- Fundamentals of Digital Image Processing, K. Jain, Pearson Education.
- Digital Image Processing, S. Esakkirajan, S. Jayaraman, T. Veerakumar, Tata McGraw-Hill Education.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define different modalities and current techniques in image processing.
CO2. classify spatial and frequency domain techniques used in image processing.
CO3. apply image processing techniques to enhance visual images.
CO4. analyse 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 the mathematical models and principles of digital image processing for real world problems.

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MOBILE COMPUTING
150613 (DE-1)

COURSE OBJECTIVES

- To introduce the basic concepts and principles in mobile computing.
- To provide a computer systems perspective on the converging areas of wireless networking, mobile devices, and network protocols.
- To introduce wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices.

Unit-I

Review of Personal Communication Services (PCS): Basic Concepts of Cellular Systems, Global System for Mobile Communication (GSM), Protocols, Handover, Data Services, and Multiple Division Techniques.

Unit-II

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 Standard. Mobile IP.

Unit-III

Wireless Application Protocol (WAP): Mobile Internet Standard. WAP Gateway and Protocols, Wireless Markup Languages (WML).

Unit-IV

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of Services in 3G.

Unit-V

Wireless Local Loop (WLL): Introduction to WLL Architecture, WLL Technologies. Global Mobile Satellite Systems: Case Studies of IRIDIUM and GLOBALSTAR Systems. Bluetooth Technology, Wi-Fi and Wi-Max.

DEPARTMENTAL ELECTIVE (DE-1) OFFERED IN VI SEMESTER

RECOMMENDED BOOKS

- Mobile communications, J. Schiller, Pearson Education.
- Wireless and Mobile Networks Architecture, by Yi —Bing Lin, John Wiley & Sons.
- Mobile & Personnel Communication Systems and Services, Raj Pandya, Prentice Hall India.
- Wireless Communication- Principles and Practices, Theodore S. Rappaport, Pearson Education.
- The Wireless Application Protocol, Singhal & Bridgman, Pearson Education.

COURSE OUTCOMES

After completion of the course students would be able to:

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.

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AGILE METHODOLOGY
160613 (DE-1)

COURSE OBJECTIVES

- To understand the background and driving forces for taking an agile approach to software development.
- To understand the business value of adopting agile approaches.
- To understand the agile development practices.

Unit -I

Fundamentals of Agile: The Genesis of Agile, Introduction and Background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven Development, Lean Software, Development, Agile Project Management, Design and Development Practices in Agile Projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools.

Unit- II

Agile Scrum Framework: Introduction to Scrum, Project Phases, Agile Estimation, Planning Game, Product Backlog, Sprint Backlog, Iteration Planning, User Story Definition, Characteristics and Content of User Stories, Acceptance Tests and Verifying Stories, Project Velocity, Burn Down Chart, Sprint Planning and Retrospective, Daily Scrum, Scrum Roles – Product Owner, Scrum Master, Scrum Team, Scrum Case Study, Tools for Agile Project Management.

Unit- III

Agile Testing: Agile Lifecycle and its Impact on Testing, Test-Driven Development (TDD), Xunit Framework and Tools for TDD, Testing User Stories - Acceptance Tests and Scenarios, Planning and Managing Testing Cycle, Exploratory Testing, Risk Based Testing, Regression Tests, Test Automation, Tools to Support Agile Tester.

Unit- IV

Agile Software Design and Development: Agile Design Practices, Role of Design Principles Including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and Significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated Build Tools, Version Control.

Unit -V

Industry Trends: Market scenario and Adoption of Agile, Agile ALM, Roles in Agile Project, Agile applicability, Agile in Distributed Teams, Business Benefits, Challenges in Agile, Risks and Mitigation, Agile Projects on Cloud, Balancing Agility with Discipline, Agile Rapid Development Technologies.

RECOMMENDED BOOKS

- Agile Software Development with Scrum, Ken Schawber, Mike Beedle, Pearson.
- Agile Testing: A Practical Guide for Testers and Agile Teams, Lisa Crispin, Janet Gregory, Addison Wesley.
- Agile Software Development, Principles, Patterns and Practices, Robert C. Martin, Prentice Hall.
- Agile Software Development: The Cooperative Game, Alistair Cockburn, Addison Wesley.
- User Stories Applied: For Agile Software, Mike Cohn, Addison Wesley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. demonstrate scrum release planning, and scrum sprint planning.
CO2. apply user stories into tasks and ideal day estimates.
CO3. classify a sprint with sprint reviews and sprint retrospectives.
CO4. examine the scrum with multiple team or distributed project teams.
CO5. design test driven and agile principal based software.
CO6. develop any application using agile methodology.

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Department of Computer Science & Engineering and Information Technology

Departmental Elective (DE-2) Courses offered through SWAYAM/NPTEL/MOOC Platform Under Flexible Curriculum

DEPARTMENTAL ELECTIVE (DE-2) OFFERED IN VI SEMESTER

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Department of Computer Science & Engineering and Information Technology

List of Departmental Elective (DE) Courses

B.Tech (Computer Science & Engineering)

DE-2 (Online Mode) (through SWAYAM/NPTEL/MOOC based learning platform)	
Subject Code	**Subject Name**
150651	Data Analytics with Python
150652	Introduction to Machine Learning
150653	Cloud Computing

List of Departmental Elective (DE) Courses

B.Tech (Information Technology)

DE-2 (Online Mode) (through SWAYAM/NPTEL/MOOC based learning platform)	
Subject Code	**Subject Name**
160651	Data Analytics with Python
160652	Introduction to Machine Learning
160653	Cloud Computing

DEPARTMENTAL ELECTIVE (DE-2) OFFERED IN VI SEMESTER

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR.
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)
Department of Computer Science & Engineering and Information Technology

Open Category (OC) Courses (offered by Department of CSE & IT) Under Flexible Curriculum

OPEN CATEGORY (OC-1) OFFERED IN VI SEMESTER

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Department of Computer Science & Engineering and Information Technology

List of Open Category (OC-1) Courses

OC-1 (To be opted by other department students)	
Subject Code	**Subject Name**
900106	Data Structures
900107	Python Programming
900108	Software Engineering

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DATA STRUCTURES
900106 (OC-1)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
- To understand various techniques of searching and sorting.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

Unit-I

Introduction to Data Structures: Algorithms & their Characteristics, Asymptotic Notations. Arrays and its Representations, Index to Address Translation. **Linked List:** Introduction, Implementation of Linked List, Operations, Circular Linked List, Doubly Linked List, Polynomial Manipulation using Linked List.

Unit-II

Stacks: Concepts and Implementation of Stacks, Operations on Stack, Conversion of Infix to Postfix Notation, Evaluation of Postfix Expression, Recursion.

Queues: Concepts and Implementation, Operations on Queues, Dequeue, Priority Queues, Circular Queues and Application.

Unit-III

Trees: Types, Terminology, Binary Tree -Representations, Traversal, Conversion of General Tree to Binary Tree, Binary Search Tree, Threaded Binary Tree and Height Balanced Tree.

Unit-IV

Searching & Sorting: Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Radix Sort and Heap Sort, Comparison between Sorting Techniques, Hashing and Collision Resolution Techniques.

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Unit-V

Graphs: Background, Graph Theory Terminologies, Representation of Graphs- Sequential & Linked Representation, Path Matrix, Graph Traversals- BFS, DFS, Spanning Trees, Applications of Graph.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. outline the basics of algorithms and their performance criteria.

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.

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PYTHON PROGRAMMING
900107 (OC-1)

COURSE OBJECTIVES

- To understand the structure and components of a python program.
- To learn the basic construct of python programming for implementing interdisciplinary research-based problems.
- To plot data using appropriate python visualization libraries for analysis.

Unit I

Introduction to Python: Setting Up Programming Environment, Running Python Programs from a Terminal, Variables and Simple Data Types: Variables, Strings, Numbers and Maths, Comments, Conditional Statements, Introducing Loops, Working of Input Function.

Unit II

Tuples and Lists: Tuples, Lists, List Operations, Using If Statements with Lists, Organizing a List, Working with Lists: Looping through Entire List, Making Numeric Lists, Working with Part of List. Dictionaries and Sets: Simple Dictionary, Looping Through a Dictionary, Nesting, Example with a Dictionary, Fibonacci and Dictionaries, Global Variables, Defining a Set, Set Operations.

Unit III

Functions: Defining a Function, Passing Arguments, Return Values, Passing a List, Passing an Arbitrary Number of Arguments, Storing Functions in Module, In- Built Functions, Lambda Functions. **Classes and Inheritance:** Object Oriented Programming, Creating and using a Class, Working with Class Instances, Methods, Inheritance, Importing Classes, Python Standard Library.

Unit IV

Files and Exceptions: Reading from a File, Writing to a File, File Operations, Assertions, Exceptions, Exception example. **Debugging:** Programming Challenges, Classes of Tests, Bugs, and Debugging, Debugging examples.

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Unit V

Data Visualization: Installing Matplotlib, Plotting a Simple Line Graph, Random Walks, Making Histogram. **Graphical User Interfaces:** Event-Driven Programming Paradigm; Tkinter Module, Creating Simple GUI; Buttons, Labels, Entry Fields, Dialogs; Widget Attributes - Sizes, Fonts, Colors, Layouts, Nested Frames.

RECOMMENDED BOOKS

- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes.
- Learn Python the Hard Way: 3rd Edition.
- T.R. Padmanabhan, Programming with Python, Springer, 1st Ed., 2016.
- Kenneth Lambert, Fundamentals of Python: First Programs, Cengage Learning, 1st Ed., 2012.

COURSE OUTCOMES

After completion of this course, the students would be able to:

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.

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SOFTWARE ENGINEERING
900108 (OC-1)

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, scrum and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit - I

Introduction to Software Engineering: Definition, Software Engineering-Layered Technology, Software Characteristics and Components, Software Model: Software Development of Life Cycle Model (SDLC), Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. Selection Criteria of Model: Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , Types of Requirement- Functional and Non-Functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural Design, Procedural Design, Data Directed Design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project Domains, Software Measurement, Software Quality Metrics, Project Management- Basics-People, Product, Process, Project, Estimation- Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) Based Estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic Issues, Criteria for Completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the various fundamental concepts of software engineering.

CO2. develop the concepts related to software design & analysis.

CO3. compare the techniques for software project management & cost estimation.

CO4. choose the appropriate model for real life software project.

CO5. design the software using modern tools and technologies.

CO6. test the software through different approaches.

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