Subject Code	Topics	Theory/ Practical	Max. Mark	Min. Mark
MCST-201	Theory of Computation and Compiler Design.	Theory	100	40
MCST-202	Software Engineering.	Theory	100	40
MCST-203	Artificial Intelligence and Expert System.	Theory	100	40
MCST-204	Embedded System Programming.	Theory	100	40
MCST-205	Soft Computing Techniques.	Theory	100	40
MCST-206	Advanced Trends and Technology in Computer Science.	Theory	100	40
MCSP-207	MATLAB	Practical	200	80
MCSP-208	Major Project	Project	600	240
	Total Marks		1400	
GRAND TOTAL	(End Years Marks)		2800	

MCST- 201
THEORY OF COMPUTATION AND COMPILER DESIGN

UNIT- I
AUTOMATA, REGULAR EXPRESSIONS AND LANGUAGES
Principles of mathematical induction, Finite Automata (FA), Deterministic Finite Automata (DFA), Non-deterministic Finite Automata (NFA), Regular Expression, FA and Regular Expressions, Proving languages not to be regular, Closure properties of regular languages, Equivalence and minimization of Automata

UNIT-II
CONTEXT-FREE GRAMMARS AND LANGUAGES
Context-Free Grammar (CFG), Parse Tree, Ambiguity in grammars and languages Definition of the pushdown automata, Languages of a Pushdown Automata, Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata.

UNIT-III
PROPERTIES OF CONTEXT-FREE LANGUAGES, UNDECIDABALITY
Normal forms for CFG, Pumping Lemma for CFL, Closure Properties of CFL, Turing Machines, A language that is not Recursively Enumerable (RE), An un-decidable problem that is RE, Un-decidable problems about Turing Machine, Post's Correspondence Problem.

UNIT- IV
INTRODUCTION TO COMPILING & SYNTAX ANALYSIS
Compilers − Analysis of the source program, Phases of a compiler, Compiler construction tools Lexical analysis , Role of lexical analyzer ,Role of the parser, Writing grammars, Context-free grammars ,Top down parsing, Bottom-up parsing, Shift reduce parsing, Operator precedence parsing, LR parsers **,** SLR parser.

UNIT-V
CODE GENERATION & OPTIMIZATION, RUN TIME ENVIRONMENTS
Issues in the design of code generation, Basic blocks and flow graphs, a simple code generator−DAG representation of basic blocks, Peephole optimization, Principal sources of optimization, Optimization of basic blocks, Introduction to global data flow analysis, Runtime environments.

MCST-202
SOFTWARE ENGINEERING

UNIT–I

Fundamentals of Software Engineering and Process models.- Definition, Software characteristics and Application. Software myths, Software engineering- A layered technology and SDLC. Software process models: Linear sequential model, prototyping model, RAD Model. Evolutionary process models: Incremental process models and Spiral model. Component based, 4GT. Maturity Models: CMM, CMMI, PCMM, PSP, TSP, Process patterns, process assessment. Unified process: SEI CMM and ISO 9001. PSP and Six Sigma. Clean room technique

UNIT–II

Managing Software Projects & Design Engineering- The management spectrum, software quality, measurement and metrics. Software project estimation, decomposition techniques. Empirical estimation models(COCOMO), the Make & Buy Decision. System models: Context Models, Behavioral models, Data models, Object models. Design process, Design quality and design model. Fundamental issues in software design: Goodness of design, cohesions, coupling. Function-oriented design and object – oriented concepts. Architectural styles and patterns, Architectural Design: Unified Modelling Language (UML), User interface design. Risk Analysis and management.

UNIT–III

S/W Requirements, S/W Metrices & Testing Strategies- S/W Requirements: Functional and non-functional requirements, User requirements, System requirements.SRA & SRS. S/W Metrices: Process Metrices, Project Metrices & Product Metrices. Testing Strategies : A strategic approach to software testing, Testing fundamentals, Test Case Design. Types Of Testing: Black-Box Testing, White-Box Testing, Validation testing, System testing, the art of Debugging. Code walkthrough and reviews. Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

UNIT-IV

Testing Plan and Maintenance- Snooping for information, Coping with complexity through teaming, Testing plan focus areas, Testing for recoverability, Planning for troubles, Preparing for the tests: Software Reuse, Developing good test programs , Data corruption, Tools, Test Execution ,Testing with a virtual computer, Simulation and Prototypes, Managing the Test, Customer's role in testing, Software maintenance issues and techniques. Software reuse. Client-Server software development.

UNIT–V

Software Reengineering and Project Management- Software Reengineering, Reverse Engineering & Forward Engineering, Life Cycle Phases and Process artefacts, Restructuring. Model based software architectures, Software process and Iteration workflows, Major and Minor milestones, Periodic status assessments, Process Planning, Project Control and process instrumentation: Seven core metrics, management indicators, quality indicators, life-cycle expectations, CCPDS-R Case Study and Future Software Project Management Practices.

MCST-203
ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM

UNIT–I

Fundamentals of Artificial Intelligence

Introduction to AI, Intelligent Agents: Agents and Environments, AI Techniques, Foundations of A.I., History of AI, Areas and state of the art in A.I., Knowledge: Introduction, Knowledge Based system Definition of Knowledge and Knowledge Representation, Examples of Search Problems, Defining the Problem as a State Space Search, Uninformed Search Techniques- DFS, BFS, Best-First Search, A* Algorithm, Problem Reduction, AO*Algorithm, Constrained Satisfaction Problems: Various CSP problems,.

UNIT–II

Symbolic and Structured Representations of Knowledge

Knowledge Representation: Procedural Vs Declarative Knowledge, Representations & Approaches to Knowledge Representation, Frame, Conceptual dependency , Semantic Net Scripts etc. Forward Vs Backward Reasoning. Symbolic Logic: Propositional Logic, First Order Predicate Logic: Representing Instance and is-a Relationships, Computable Function and Predicates, Syntax & Semantics of FOPL.

UNIT–III

A.I. Programming languages

Introduction to LISP ,Basic list manipulation functions, Predicate function, Logical function, Input/output and local variables, Lists and Arrays, simple program in LISP, Introduction to PROLOG.

UNIT–IV

Natural Language Processing and Planning

Natural Language Processing: Role of Knowledge in Language Understanding, Approaches Natural Language Understanding, Steps in Natural Language Processing, Syntactic Processing and Augmented Transition Nets, Semantic Analysis, NLP Understanding Systems; Planning: Components of a Planning System, Goal Stack Planning, Hierarchical Planning, Partial Order Planning, Hierarchical Planning, Conditional Planning, Reactive Systems.

UNIT–V

Experts Systems

Overview of an Expert System, Structure of an Expert Systems, Different Types of Expert Systems-Rule Based, Model Based, Non-Production System Architecture, Case Based and Hybrid Expert Systems, Knowledge Acquisition and Validation Techniques, Black Board Architecture, Knowledge Building System Tools.

MCST-204
EMBEDDED SYSTEM PROGRAMMING

UNIT–I

Introduction to Embedded Systems

Embedded System Design Process, Formalisms for System Design, Processor technology, IC technology, Design technology, General-Purpose Processor: Introduction, Basic Architecture, Operation, Super-Scalar & VLIW Architecture, Application Specific Instruction Set Processors, Microcontrollers, Digital Signal Processors, Selecting a Microprocessor, Memory: Introduction, Memory write ability, Storage performance, Tradeoff s, Common memory types Memory hierarchy and cache.

UNIT–II

AVR 8515 microcontroller

Architecture and Programming in assembly and C, Interfacing Analog and digital blocks: Analog-to-Digital Converters (ADCs), Digital-to-Analog, Converters (DACs). Microprocessor interfacing: I/O addressing, Port and Bus based, I/O, Memory mapped I/O, Standard I/O interrupts, Direct memory access, Advanced communication principles parallel, serial and wireless, Serial protocols I2C, Parallel protocols PCI bus, Wireless protocol IrDA, blue tooth.

UNIT–III

The 8051 Micro controller & Embedded System Programming

8051 Micro controller Architecture, Input / Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input /Output, Interrupts. Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Interrupts. Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication.

UNIT–IV

Embedded System Software

Design tradeoffs due to thermal considerations and Effects of EMI/ES etc., Software aspect of embedded systems: Challenges and issues in embedded software development, Co-design, Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Embedded software development environments. Real time operating systems, Kernel architecture: Hardware, Task/process control subsystem, Device drivers, File subsystem, system calls embedded operating systems.

UNIT–V

Development for embedded systems

Embedded system development process, Determine the requirements, Design the system architecture, Choose the operating system, Choose the processor, Choose the development platform, Choose the programming language, Coding issues, Code optimization, Efficient input/output, Testing and debugging, Verify the software on the host system, Verify the software on the embedded system.

MCST-205
SOFT COMPUTING TECHNIQUES

UNIT–I
Introduction
What is soft computing? Different tools of soft computing and its comparison, area of application.

UNIT-II
Artificial Neural Network
ANN: Architecture, What is a neural network? Structure of biological neurons relevant to ANNs Different types of ANN, Single layer Perception Classifier; XOR problem Supervised and unsupervised learning, EBPA network, Kohenen network, Feed-forward & feedback networks; Learning Process: Memory based learning, Hebbian learning, Competitive, Boltzmann learning, perception learning, delta learning, Widrow- Hoff learning, correction learning, Winner –lake all learning rule, Hopfield networks, Training & Examples, Associative memories etc.

UNIT-III
Fuzzy Logic
Introduction to Classical Sets & Fuzzy Sets, Membership Function, a-cuts, Properties of a-cuts, Decomposition, Theorems, Extension Principle, Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations, Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables Fuzzy Relations: Crisp & Fuzzy Relations, Fuzzy Measures, ,Applications of Fuzzy Logic.

UNIT–IV
Genetic Algorithm
What is Optimization?, Introduction, Application, GA operators: selection, crossover and mutation ,different techniques of selection ,crossover and mutation, different types of chromosomes: Binary chromosome etc. ,Basic GA and its variations, Application of Genetic algorithm ,

UNIT-V
Hybrid soft commuting:
Design of Neuro-Fuzzy model like ANFIS , Neuro-Genetic, Fuzzy-Genetic Neuro-Fuzzy-Genetic model and experiments with MATLAB.

MCST- 206
ADVANCED TRENDS AND TECHNOLOGY IN COMPUTER SCIENCE

UNIT–I

Big Data Analytics

Big Data Analytics Applications, Product Selection, Design and Engineering, Location-Based Services, Online Advertising, Architecture Components: Massively Parallel Processing (MPP) Platforms, Unstructured Data Analytics and Reporting: Search and Count, Context-Sensitive and Domain-Specific Searches, Categories and Ontology, Qualitative Comparisons, Data Privacy Protection, Real-Time Adaptive Analytics and Decision Engines, Implementation of Big Data.

UNIT–II

Cloud Computing

Cloud Computing Overview, Applications, Intranets and the Cloud, Cloud Computing Services, Business Applications and Examples, Deleting Your Datacenter, Benefits & Limitations of Cloud Computing, Accessing the Cloud - Platforms, Web Applications, Web APIs,Web Browsers. Cloud Storage - Overview, Cloud Storage Providers, Standards - Application, Client, Infrastructure, Service,

UNIT–III

Grid Computing

Grid Architecture and Service modelling, Grid resource management, Grid Application trends, Characterization of Grids, Organizations and their Roles, Grid Computing Road Maps, Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems. Grid Middleware: List of globally available Middlewares.

UNIT–IV

Cluster Computing

Role of Clusters, Definition and Taxonomy Of Parallel Computing, Hardware System Structure, Node Software, Cluster Planning, Architecture , Node Hardware and Node Software, Design Decisions, Network Hardware: Internet technologies, Ethernet, System Access Models, Assigning Names, Node Software, Cluster Workload Management Activities, Queuing, scheduling and monitoring, Virtualization technologies.

UNIT–V

Pervasive Computing

Introduction: Pervasive Computing, Evolution of Pervasive Computing, Pervasive Computing Principles, Pervasive Computing Characteristics, Pervasive Information Technology, Pervasive Architecture: Background, Scalability and Availability, Pervasive Web Application Architecture, Implementation Issues, Pervasive Devices : Device Categories, Device Characteristics, Software Components in the Device, Information Access Devices, Smart Identification and Embedded Controls, Pervasive Applications.

MCSP-207
LAB: MATLAB

MCSP-208
MAJOR PROJECT

Note:

1. It is compulsory, that students would have group of maximum of two students and project should be done under Government Sectors/ Public Sector/Pvt. Limited S/W Company/ Software Technology Park of India/ ISO 9001 certified company only.
2. The students should not make any project under local or private institutions.
3. The students should make project themselves and project will not be copy of other project.

Steps for Live Project

1. Getting customer's requirements
2. Preparing designs, database and business logics
3. Developing software application project
4. Testing and implementing the project
5. Troubleshooting the project application after implementation

The break-up of marks for Practical will be as follows:

Sr. No.	Argument	Maximum Marks	Minimum Passing Marks
1.	Lab Record	50	
2.	Viva-voce	50	
3.	Program Development and Execution	100	
	Total Marks	200	80

The break-up of marks for Major Project will be as follows:

Sr. No.	Argument	Maximum Passing Marks	Minimum Passing Marks
1.	Project Record	200	
2.	Presentation and Viva-voce	300	
3.	Program Development and Execution	100	
	Total Marks	600	240