



GOVT. COLLEGE OF ENGINEERING AND TECHNOLOGY, JAMMU
(Autonomous College)

COURSE SCHEME

M.Tech 1st SEMESTER COMPUTER SCIENCE & ENGINEERING
(Batch 2025 & Onwards)

Contact Hours/Week: 24

Course Code	Course Type	Course Title	Credits	Load Allocation			Marks Distribution					
				L	T	P	CWA	PRS	MSE	ESE	PRE	Total
MHST11	Humanities & Management Course	Research Methodology	4	3	1	0	20	-	20	60	-	100
MCST11	Engineering Science Course	Advanced Data Structures and Algorithms	4	3	1	0	20	-	20	60	-	100
MCST12	Engineering Science Course	Advanced Computer Networks	4	3	1	0	20	-	20	60	-	100
MCST13	Engineering Science Course	Distributed Systems	4	3	1	0	20	-	20	60	-	100
MCST14	Engineering Science Course	Information and Storage Management	4	3	1	0	20	-	20	60	-	100
MCSL11	Engineering Science Course	Advanced Data Structures and Algorithms Lab	1	0	0	2	-	40	-	-	60	100
MCSL12	Engineering Science Course	Advanced Computer Networks Lab	1	0	0	2	-	40	-	-	60	100
TOTAL			22	15	05	04	-	-	-	-	-	700

CWA- Class Work Assessment; PRS- Practical Sessional; MSE- Mid Sem Exam; PRE-Practical Exam; ESE- End Sem Exam

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Branch: CSE / E&C				
Semester	1 st			
Name of the Course	Research Methodology			
Course Code	MHST11	Credits	4	L- 3, T- 1, P-0
Mid Semester Examination	Max. Marks = 20	Class Work Assessment (CWA)	Max. Marks = 20	
End Semester Examination	Max. Marks = 60	Max. Time- 3 Hrs		

COURSE OUTCOMES (COs)	
CO 1	To develop understanding of the basic framework of research process by exploring various research designs and techniques.
CO 2	To comprehend the details of sampling designs, and also different methods of data collections.
CO 3	Design experimental hypothesis through computational techniques and analyze data through model adequacy checking
CO 4	Critically evaluate research publication misconducts and ethical issues.

Detailed Syllabus

Section-A

Research Methodology: Introduction, Objectives of Research, Significance of Research, Research Methods versus Methodology, Types of Research - Exploratory Research, Descriptive Research, Casual Research, Research Process, Defining a Research Problem, Techniques involved in defining a Problem. **(10 Hrs)**

Research Design: Need for Research Design, Features of Good Design, Different Research Designs, , Sampling Design, Steps in Sampling Design, Types of Sampling Design, Sample size determination, Questionnaire Design and Testing, Measurement and Scaling, Scaling Techniques. **(10Hrs)**

Methods of Data Collection and presentation: Methods of Data Collection (Primary and Secondary Data) , Selection of appropriate method, Data Processing Operations, Diagrammatic and graphical representation of data with Pie chart, Bar diagram, Line chart, Histogram, Frequency Polygon, Ogive curves and Spreadsheets. **(10 Hrs)**

Section-B

Statistical tools: Measure of central tendencies – Arithmetic Mean (For individual observation, Discrete series & continuous series) Median, Mode, Quartiles, Deciles and Percentiles; Measure of Dispersion- Range, Quartile Deviation, Standard Deviation, Variance and Coefficient of Variance. **(11 Hrs)**

Techniques of Hypotheses: Hypotheses meaning and basics concepts, , Types and Limitations hypothesis, Correlation (Meaning, types, merits and limitations) and Regression (Meaning, types, merits and limitations). **(10 Hrs)**

Research and Publication Ethics: Meaning, concept and principles of research ethics, Steps involved in research ethics, Research Misconduct (Fabrication, Falsification and Plagiarism). **(9 Hrs)**

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Recommended Books:

- C.R. Kothari, Research Methodology, Methods and techniques, 5th edition, 2023, New age international publisher.
- John W. Best and V. Kahn, Research in Education, 10th edition, Pearson Publication.
- John W. Creswell , Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 3rd Edition, 2008, Sage Publications.

References:

- Ranjit Kumar, RESEARCH METHODOLOGY: A Step-By-Step Guide for Beginners, 4th edition, 2016, Sage publications.
- Booth, Colomb and Williams, The Craft of Research, 2nd Edition, 2003, University of Chicago Press.
- R. Panneerselvam, Research Methodology, 2nd Edition, 2013, Prentice Hall India Learning Private Limited Publisher.
- Vishal Verma and Geetika Tandon Kapoor, Research and Publication Ethics: Core Concepts And Principles, First Edition, 2023, Bharti Publications.

INSTRUCTIONS (End Semester Examinations)

The question paper shall consist of three sections (I, II & III).

Section-I will be compulsory consisting of conceptual/analytical/objective type/short type questions with maximum 12 marks, spread over the entire syllabus (both sections A & B).

Sections II & III of the question paper will have three questions each from the respective sections (A & B) of the syllabus and each question will carry 12 marks. The candidate will have to attempt four questions, from sections (II & III) selecting two from each.

Use of scientific calculators (non-programmable), log books are permitted, wherever required.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Branch: CSE				
Semester	1 st			
Name of the Course	Advanced Data Structures and Algorithms			
Course Code	MCST11	Credits	4	L- 3, T- 1, P-0
Mid Semester Examination	Max. Marks = 20		Class Work Assessment (CWA)	Max. Marks = 20
End Semester Examination	Max. Marks = 60		Max. Time- 3 Hrs	

COURSE OUTCOMES (COs)	
CO 1	To gain knowledge about the Algorithm Design techniques, Advanced Data Structures and mathematical tools to analyze algorithms for effective problem solving in computing.
CO 2	Apply various algorithmic design paradigms and employ advanced Data Structures to model a variety of real-world problems.
CO 3	To analyze the complexity and performance of different algorithms
CO 4	To Understand the limits of efficient computation through the concepts of P, NP and NP-Complete problems and get familiar with main thrust of work in algorithm sufficient to give some context for formulating and seeking known solutions to an algorithmic problem.

Section-A

UNIT 1 : Complexity Analysis: Growth Rate of Functions, Asymptotic Notation, Asymptotic Analysis, Analyzing Algorithm Control Structures, Standard Notations and Common Functions; Recurrences: The Substitution Method, Iteration method, Master method; Amortized Analysis: Aggregate, Accounting and Potential Method **(10 hrs)**

UNIT 2: Advanced Trees : AVL Trees: Balance Factor, Insertion in AVL Trees; Splay Trees; Red-Black trees: Properties of Red-Black Trees, Rotations, Insertion, Deletion; B-Trees: Basic operations on B-Trees, Inserting and Deleting a key from a B-Tree. **(10 hrs)**

UNIT 3: Binomial and Fibonacci Heaps: Binomial Heaps: Representation, Properties and its operations; Fibonacci Heaps : Structure, Potential function, Merge-heap operations: Insert, Union, decreasing a key and deleting a node, Finding and Deleting the minimum, Bounding the maximum degree. **(10 hrs)**

Section-B

UNIT 4 : Graphs and related Algorithms: Depth and Breadth first Traversals, Topological Sort, Minimum Spanning Trees: Kruskal, Prim; Single Source Shortest Paths: Dijkstra's algorithm, Bellman Ford algorithm, Single source Shortest paths in Directed Acyclic Graphs ; All-Pairs Shortest Paths: Shortest Paths: Matrix Multiplication, Floyd-Warshall's Algorithm. **(10 hrs)**

UNIT 5: Algorithm Design Techniques :Dynamic Programming: Principle of Optimality, Elements of Dynamic Programming, Matrix-Chain Multiplication, Longest Common Subsequence; Greedy Algorithms: Characteristics and features of problems solved by Greedy Algorithms, Basic Structure of Greedy Strategy, An Activity Selection Problem, Huffman Codes. **(10 hrs)**



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UNIT 6 : NP Completeness, Approximation and Randomized Algorithms: P, NP and NP-Complete and NP Hard complexity classes, NP-Completeness and Reducibility; Approximation algorithm: Introduction, Performance ratio, Approximation algorithms for Vertex cover and Travelling Salesman problem; Randomized Algorithm: Las Vegas and Monte Carlo algorithms, Randomized Quick Sort, Randomized Minimum cut algorithm. **(10hrs)**

Suggested Books:

1. Thomas H.Cormen, Charles E.Leiserson, RonaldL.Rivest, CliffordStein, Introduction to Algorithms, MIT Press, 2022
2. Peter Brass , Advanced Data Structures , Cambridge University Press.
3. Ellis Horowitz and Sartaj Sahni, Fundamentals of Computer Algorithms-(second edition) Universities Press
4. Robert Sedgewickand KevinWayne,Algorithms,FourthEdition,PearsonEducation.
5. S. Sridhar,DesignandAnalysisofAlgorithms,FirstEdition,OxfordUniversityPress.2014
6. AlfredV.Aho, JohnE.Hopcroft, JeffreyD.Ullman,—Data Structures and Algorithm, Pearson Education, Reprint 2006.
7. Udit Agarwal , Algorithms Design and Analysis, Educational & Technical Publishers

INSTRUCTIONS (End Semester Examinations)

The question paper shall consist of three sections (I, II & III).

Section-I will be compulsory consisting of conceptual/analytical/objective type/short type questions with maximum 12 marks, spread over the entire syllabus (both sections A & B).

Sections II & III of the question paper will have three questions each from the respective sections (A & B) of the syllabus and each question will carry 12 marks. The candidate will have to attempt four questions, from sections (II & III) selecting two from each.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Branch: CSE			
Semester	1 st		
Name of the Course	Advanced Computer Networks		
Course Code	MCST12	Credits	4
			L- 3, T- 1, P-0
Mid Semester Examination	Max. Marks = 20	Class Work Assessment (CWA)	Max. Marks = 20
End Semester Examination	Max. Marks = 60	Max. Time- 3 Hrs	

COURSE OUTCOMES (COs)	
CO 1	To understand various types of routing & switching techniques and also understand various network architectures deployed in networking.
CO 2	Understand the concept of SDN basic paradigm, requirements and challenges
CO 3	Analyse the implications of shifting from traditional network architectures to SDN
CO 4	To understand various types of routing & switching techniques and also understand various network architectures deployed in networking.

Section-A

UNIT 1: Packet Switching Network: Historical background, Network services and Internal operations, Packet Network Topology, Datagram and virtual circuit, Routing in Packet Networks, Shortest Path Routing, Traffic Management and QOS at packet level; Traffic management at flow level (Congestion control).
(8hrs)

UNIT 2: Advanced Network Architecture: Overview of ATM Networks, IP forwarding Architecture, Overlay Models, MPLS, Integrated Services in Internet, RSVP, Differentiated Services, Realtime Transport Protocol.
(10 hrs)

UNIT 3 :Introducing SDN : SDN Origins and Evolution – Introduction – Why SDN?:Evolution of Switches and Control Planes: Cost, SDN Implications for Research and Innovation, Data Centre Innovation, Data Centre Needs, The Genesis of SDN , How SDN works ?:- SDN Architecture, Centralised and distributed Control planes, and Data Planes ,open flow switches, southbound and northbound protocols, Open daylight, Open flow , Alternatives definitions of SDN Methods, SDN Controllers.
(12hrs)

Section-B

UNIT 4: SDN in the Data Centre: Abstract, Data Centre Definition, Data Center Demands, Tunnelling Technologies for the Data Centre, Path Technologies in the Data Center, Ethernet Fabrics in the Data Center, SDN Use Cases in the Data Center, Open SDN versus Overlays in the Data Center, Real-World Data Center Implementations.
(08 hrs)

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UNIT 5: Network Topology and Topological Information Abstraction: Introduction, Network, Topology, Traditional Methods, LLDP, BGP-TE/LS, ALTO, I2RS Topology, SDN Applications: Reactive versus Proactive Applications, Analysing SDN Applications, Background on controllers, using Floodlight controller, Open Daylight Controller, Switch consideration, creating network virtualization tunnels, offloading flows in the data centres, Traffic Engineering for service providers. **(10hrs)**

UNIT 6 : SDN in Other Environments: Abstract, Consistent Policy configuration, Global Network View, Wide Area Networks, Service Provider and Carrier Networks, Campus Networks, Hospitality Networks, Mobile Networks, In-Line Network Functions, Optical Networks, SDN vs. P2P/Overlay Networks. Introduction to Network Function Virtualisation. **(08hrs)**

Suggested Books:

1. Communication Network by Alberto Leon Garcia and Indra Widjaja.
2. SDN: Software Defined Networks, An Authoritative Review of Network Programmability Technologies,
3. By Thomas D. Nadeau, Ken Gray Publisher: O'Reilly Media
4. Software Defined Networks: A Comprehensive Approach, by Paul Goransson and Chuck Black, Morgan Kaufmann

INSTRUCTIONS (End Semester Examinations)

The question paper shall consist of three sections (I, II & III).

Section-I will be compulsory consisting of conceptual/analytical/objective type/short type questions with maximum 12 marks, spread over the entire syllabus (both sections A & B).

Sections II & III of the question paper will have three questions each from the respective sections (A & B) of the syllabus and each question will carry 12 marks. The candidate will have to attempt four questions, from sections (II & III) selecting two from each.

Use of scientific calculators (non-programmable), log books are permitted, wherever required.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Branch: CSE				
Semester	1 st			
Name of the Course	Distributed system			
Course Code	MCST13	Credits	4	L- 3, T- 1, P-0
Mid Semester Examination	Max. Marks = 20		Class Work Assessment (CWA)	Max. Marks = 20
End Semester Examination	Max. Marks = 60		Max. Time- 3 Hrs	

COURSE OUTCOMES (COs)	
CO 1	Learn issues related to clock Synchronization and the need for global state in distributed systems when designing, implementing, and debugging distributed systems
CO 2	Understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems.
CO 3	Compare replication schemes with respect to performance, availability, and consistency concerns

Section -A

UNIT 1: Introduction: Definition, Relation to computer system components, Motivation, Relation to parallel systems, Message-passing systems versus shared memory systems, Primitives for distributed communication, Synchronous versus asynchronous executions, Design issues and challenges. A model of distributed computations: A distributed program, A model of distributed executions, Models of communication networks, Global state, Cuts, Past and future cones of an event, Models of process communications. Logical Time: A framework for a system of logical clocks, Scalar time, Vector time, Physical clock synchronization: NTP. **(10 hrs)**

UNIT 2: Global state & Snapshots recording algorithms: Introduction to System model and definitions, Snapshot algorithms for FIFO channels, Variation of Chandy-Lamport algorithm, snapshot algorithms for non-FIFO channels, snapshots in casual delivery system, Monitoring global state, Necessary and sufficient conditions for consistent global snapshot, Finding consistent global snapshot in a distributed computation. **(08hrs)**

UNIT 3: Topology abstraction and overlays: Classification and basic concepts, complexity measures and metrics, Program structure, Elementary Graph algorithms, Maximal independent set (MIS), Connected dominating set, compact routing tables, Leader election. **(06 hrs)**

UNIT 4: Message ordering and Group Communication: Message ordering paradigms, Asynchronous execution with synchronous communication, synchronous program order on an asynchronous system, Group communication, Casual ordering(CO), Total order, Multicast: propagation trees for multicast algorithms, Fault tolerant group communication, Distributed multicast algorithm at network layer. **(08 hrs)**

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Section -B

UNIT 5: Distributed Mutex & Deadlock: Distributed mutual exclusion algorithms: Introduction, Preliminaries, Lamport's algorithm, Ricart-Agrawala algorithm. Deadlock detection in distributed systems: Introduction, System model, Preliminaries, Models of deadlocks, Knapp's classification, Algorithms for the single resource model, the AND model and the OR model. **(08hrs)**

UNIT 6: Recovery & Consensus: Check pointing and rollback recovery: Introduction, Background and definitions, Issues in failure recover, Checkpoint-based recovery, Log-based rollback recovery, Coordinated check pointing algorithm, Algorithm for asynchronous check pointing and recovery. Consensus and Agreement algorithms: Problem definition, Overview of results, Agreement in a failure-free system, Agreement in synchronous systems with failures. **(10hrs)**

UNIT 7: Authentication & Self stabilization: Authentication Introduction and basic definitions: protocols based on symmetric cryptosystems and asymmetric cryptosystems, password based authentication, authentication protocol failures Introduction to self-stabilization, Issues in designing various self-stabilizing algorithms, methodologies for designing self-stabilizing systems, self-stabilizing distributed spanning trees, Self-stabilization as a solution to fault tolerance. **(08hrs)**

Suggested Books:

1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.
2. Mukesh Singhal and Niranjan G. Shivaratri. Advanced concepts in operating systems. McGraw-Hill, Inc., 1994.
3. Tanenbaum A.S., Van Steen M., —Distributed Systems: Principles and Paradigms||, Pearson Education, 2007.
4. Liu M.L., —Distributed Computing, Principles and Applications||, Pearson Education, 2004.
5. Nancy A Lynch, —Distributed Algorithms||, Morgan Kaufman Publishers, USA, 2003

INSTRUCTIONS (End Semester Examinations)

The question paper shall consist of three sections (I, II & III).

Section-I will be compulsory consisting of conceptual/analytical/objective type/short type questions with maximum 12 marks, spread over the entire syllabus (both sections A & B).

Sections II & III of the question paper will have three questions each from the respective sections (A & B) of the syllabus and each question will carry 12 marks. The candidate will have to attempt four questions, from sections (II & III) selecting two from each.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Branch: CSE				
Semester	1 st			
Name of the Course	Information Storage & Management			
Course Code	MCST14	Credits	4	L- 3, T- 1, P-0
Mid Semester Examination	Max. Marks = 20	Class Assessment (CWA)	Work	Max. Marks = 20
End Semester Examination	Max. Marks = 60	Max. Time- 3 Hrs		

COURSE OUTCOMES (COs)	
CO 1	The demand from businesses for highly available and secure access to data
CO 2	The Storage systems and infrastructure architectures and solutions available to support business needs
CO 3	The key tasks in successfully managing and monitoring a data storage infrastructure.

Section -A

UNIT 1: Introduction to Information Storage and Business Continuity: Meeting Today's Data Storage Needs, Value of data to business, Challenges in data storage and data management, List the solutions available for data storage, Information Availability, BC Terminology, BC Planning Life Cycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions. **(09 hrs)**

UNIT 2: Information Storage & Data Center Infrastructure: Information Storage - Data, Types of Data, Big Data, Information, Storage, Evolution of Storage Architecture, Data Center Infrastructure - Core Elements, Key Characteristics, Managing a Data Center, Virtualization and Cloud Computing. **(07 hrs)**

UNIT 3: Data Protection using RAID: RAID Implementation Methods - Software RAID & Hardware RAID, RAID Array Components, RAID Techniques - Striping, Mirroring & Parity, RAID Levels - 0, 1, Nested, 3, 4, 5, 6, RAID Impact on Disk Performance, RAID Comparison, Hot Spares. **(08 hrs)**

UNIT 4: Fibre Channel Storage Area Networks: Overview, Components - Node Ports, Cables and Connectors, Interconnect Devices & SAN Management Software, FC Connectivity - Point-to-Point, Arbitrated Loop, Switched Fabric, FC-SW Transmission, Switched Fabric Ports, FC Architecture - FC Protocol Stack, FC Addressing & World-Wide Names, Zoning & its types, FC SAN Topologies - Mesh & Core-Edge Fabric. **(09 hrs)**

Section-B

UNIT 5: Network-Attached Storage: General-Purpose Servers versus NAS Devices, Benefits, File Systems and Network File Sharing, Components of NAS, NAS I/O Operation, NAS Implementations & Connectivity - Unified, Gateway and Scale-Out, NAS File-Sharing Protocols - NFS & CIFS, Factors Affecting NAS Performance. **(08 hrs)**



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UNIT 6: Backup and Archive: Purpose, Considerations, Granularity, Recovery Considerations, Methods, Architecture, Restore Operations, Topologies, Backup in NAS Environments, Backup Targets - Disk, Tape & Tape Library, Backup in Virtualized Environments, Data Archive, Archiving Solution Architecture Use Case - E-mail Archiving & File Archiving. **(08 hrs)**

UNIT 7: Managing the Storage Infrastructure: Monitoring the Storage Infrastructure - Parameters, Components & Alerts, Management Activities - Availability, Capacity, Performance & Security Management, Reporting, Storage Infrastructure Management in a Virtualized Environment, Information Lifecycle Management. **(07 hrs)**

Suggested Books:

1. Information Storage and Management, Wiley, EMC Educational Services
2. Building Storage Networks, Tata McGraw Hill
3. Storage Networks: The Complete Reference, Tata McGraw Hill

INSTRUCTIONS (End Semester Examinations)

The question paper shall consist of three sections (I, II & III).

Section-I will be compulsory consisting of conceptual/analytical/objective type/short type questions with maximum 12 marks, spread over the entire syllabus (both sections A & B).

Sections II & III of the question paper will have three questions each from the respective sections (A & B) of the syllabus and each question will carry 12 marks. The candidate will have to attempt four questions, from sections (II & III) selecting two from each.

Use of scientific calculators (non-programmable), log books are permitted, wherever required.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

M. Tech Syllabus From Batch-2025 & onwards			
Branch: CSE			
Semester	1 st		
Name of the Course	Advanced Data Structures and Algorithms Lab		
Course Code	MCSL11	Credits-	1
Practical Sessional (PRS)	Max. Marks = 40		
Practical Examination (PRE)	Max. Marks= 60		

COURSE OUTCOMES (COs)	
CO 1	To provide deeper insight on advanced Data Structures and Algorithm Design Strategies
CO 2	To Implement various operations on advanced Data Structures
CO 3	Apply various algorithmic design paradigms and employ advanced Data Structures to solve a variety of real-world problems.

List of Programs:

1. Implement AVL Trees
2. Implement Red Black Trees
3. Implement Spaly Trees
4. Implement B-Trees
5. Implement Binomial Heaps
6. Implement Fibonacci Heaps
7. Implement Kruskal's algorithm for Minimum Spanning Tree
8. Implement Prim's algorithm for Minimum Spanning Tree
9. Implement Dijkstra's algorithm for single source shortest path
10. Implement Bellman-Ford algorithm for single source shortest path
11. Implement Floyd- Warshall algorithm for all pair's shortest paths
12. Implement Matrix Chain Multiplication using Dynamic Programming
13. Implement Longest Common Subsequence using Dynamic Programming
14. Implement Activity Selection Problem using Greedy Strategy
15. Implement Huffman Codes using Greedy Strategy.
16. Implement any schema to find the optimal solution for the Travelling Salesman Problem and then solve the same instance using any approximation algorithm and determine the error in the approximation.t of Experiments

Note: Minimum of ten experiments are to be performed.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

M. Tech Syllabus From Batch-2025 & onwards			
Branch: CSE			
Semester	1 st		
Name of the Course	Advanced Computer Networks Lab		
Course Code	MCSL12	Credits- 1	L- 0, T-0, P-2
Practical Sessional (PRS)	Max. Marks = 40		
Practical Examination (PRE)	Max. Marks= 60		

COURSE OUTCOMES (COs)	
CO 1	Identify and understand the various design issues of internetworking and routing protocols.
CO 2	Understand the concept of network virtualization framework.
CO 3	Understand the working principles and design issues of various SDN controllers and protocols.

List of Programs:

1. Use network Simulator (NS2/NS3/NetSim/Omnet etc.) and Network Emulator GNS3
2. Experiments related to routing protocols
3. To understand the concepts of networking in virtual machines
4. Use of Network Tools e.g. tools for file transfer, network monitoring etc.
4. Case study on SDN controllers
5. Case study on Building SDN Framework like Juniper SDN Framework, Open Daylight Controller/Frame work
6. Explore current research trends in computer networks.

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COURSE SCHEME

**M.Tech 2nd SEMESTER COMPUTER SCIENCE & ENGINEERING
(Batch 2025 & Onwards)**

Contact Hours/Week: 27

Course Code	Course Type	Course Title	Credits	Load Allocation			Marks Distribution					
				L	T	P	CWA	PRS	MSE	ESE	PRE	Total
MCST21	Engineering Science Course	Advance Machine Learning	4	3	1	0	20	-	20	60	-	100
MCST22	Engineering Science Course	Object Oriented Modelling & Design	4	3	1	0	20	-	20	60	-	100
MCSY21	Engineering Science Course	Elective A Cloud Computing	4	3	1	0	20	-	20	60	-	100
MCSY22		IOT and its Industrial Applications										
MCSY23	Engineering Science Course	Elective B Software Quality Assurance and Testing	4	3	1	0	20	-	20	60	-	100
MCSY24		Mobile Computing										
MOCM21	Engineering Science Course	NPTEL	3	3	0	0	-	-	-	100	-	100
MCSL21	Engineering Science Course	Advance Machine Learning lab	1	0	0	2	-	40	-	-	60	100
MCSZ21	Engineering Science Course	Elective A Lab Cloud Computing Lab	1	0	0	2	-	40	-	-	60	100
MCSZ22		IOT and its Industrial Applications Lab										
MCSS21	Engineering Science Course	Seminar	2	0	0	4	-	100	-	-	-	100
TOTAL			23	15	4	8	-	-	-	-	-	800

CWA- Class Work Assessment; PRS- Practical Sessional; MSE- Mid Sem Exam; PRE-Practical Exam; ESE- End Sem Exam



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Branch: CSE				
Semester	2nd			
Name of the Course	Advanced Machine Learning			
Course Code	MCST21	Credits	4	L- 3, T- 1, P-0
Mid Semester Examination	Max. Marks = 20	Class Work Assessment (CWA)	Max. Marks = 20	
End Semester Examination	Max. Marks = 60	Max. Time- 3 Hrs		

COURSE OUTCOMES (COs)	
CO 1	Demonstrate in-depth knowledge of methods and theories in the field of machine learning.
CO 2	Demonstrate the use Bayesian perspective on machine learning, Artificial neural networks, and back propagation algorithm.
CO 3	Assess the learning algorithms modelled after biological evolution, including genetic algorithms and genetic programming.
CO 4	To demonstrate the ability to critically evaluate and compare different learning models and learning algorithms.

Section-A

UNIT 1: Introduction: Well-Posed learning problems, Basic concepts, Designing a learning system, Issues in machine learning. Types of machine learning: Learning associations, Supervised learning (Classification and Regression Trees, Support vector machines), Unsupervised learning (Clustering), Instance-based learning (K-nearest Neighbor, Locally weighted regression, Radial Basis Function), Reinforcement learning (Learning Task, Q learning, Value function approximation, Temporal difference learning). **(10 hrs)**

UNIT 2: Decision Tree Learning: Decision tree representation, appropriate problems for decision tree learning, Univariate Trees (Classification and Regression), Multivariate Trees, Basic Decision Tree Learning algorithms, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning. **(10hrs)**

UNIT 3: Bayesian Learning: Bayes theorem and concept learning, Bayes optimal classifier, Gibbs algorithms, Naive Bayes Classifier, Bayesian belief networks, The EM algorithm. **(10 hrs)**

Section-B

UNIT 4 : Artificial Neural Network: Neural network representation, Neural Networks as a paradigm for parallel processing, Linear discrimination, Pairwise separation, Gradient Descent, Logistic discrimination, Perceptron, Training a perceptron, Multilayer perceptron, Back propagation Algorithm. Recurrent Networks, dynamically modifying network structure. **(10 hrs)**

UNIT 5: Genetic Algorithms: Basic concepts, Hypothesis space search, Genetic programming, Models of evolution and learning, Parallelizing Genetic Algorithms. Inductive and Analytical Learning: Learning rule sets, Comparison between inductive and analytical learning, Analytical learning with perfect domain theories: Prolog-EBG. Inductive-Analytical approaches to learning, using prior knowledge to initialize hypothesis (KBANN Algorithm), to alter search objective (Tangent Prop and EBNN Algorithm), to augment search operators (FOCL Algorithm). **(10 hrs)**

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Suggested Books:

1. Mitchell T.M., Machine Learning, McGraw Hill, 1997.
2. Alpaydin E., Introduction to Machine Learning, MIT Press, 2010.
3. Bishop C., Pattern Recognition and Machine Learning, Springer-Verlag, 2006.
4. Michie D., Spiegelhalter D. J., Taylor C. C., Machine Learning, Neural and Statistical.

INSTRUCTIONS (End Semester Examinations)

The question paper shall consist of three sections (I, II & III).

Section-I will be compulsory consisting of conceptual/analytical/objective type/short type questions with maximum 12 marks, spread over the entire syllabus (both sections A & B).

Sections II & III of the question paper will have three questions each from the respective sections (A & B) of the syllabus and each question will carry 12 marks. The candidate will have to attempt four questions, from sections (II & III) selecting two from each.

Use of scientific calculators (non-programmable), log books are permitted, wherever required.

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GOVT. COLLEGE OF ENGINEERING AND TECHNOLOGY, JAMMU
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Branch: CSE				
Semester	2 nd			
Name of the Course	Object Oriented Modelling & Design			
Course Code	MCST22	Credits	4	L- 3, T- 1, P-0
Mid Semester Examination	Max. Marks = 20	Class Work Assessment (CWA)	Max. Marks = 20	
End Semester Examination	Max. Marks = 60	Max. Time- 3 Hrs		

COURSE OUTCOMES (COs)	
CO 1	Describe the concepts of object-oriented and basic class modelling.
CO 2	Draw class diagrams, sequence diagrams and interaction diagrams to solve problems.
CO 3	Choose and apply a befitting design pattern for the given problem.

Section-A

UNIT 1: Introduction: What is Object Orientation? What is OO development? OO themes, Evidence for usefulness of OO development, OO modelling history. Modelling as Design Technique: Modelling, Abstraction; The three models. Class Modelling: Object and class concepts, Link and associations concepts, Generalization and inheritance, A sample class model, Navigation of class models. **(10 hrs)**

UNIT 2: Advanced Class Modelling: Advanced Class Modelling: Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived Data; Packages. State Modelling: Events, States, Transitions and Conditions, State Diagrams, State diagram behaviour. Advanced State Modelling: Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models. **(10hrs)**

UNIT 3: Use Case Modelling & Detailed Requirements: Overview; Detailed object-oriented Requirements definitions; System Processes-A use case/Scenario view; Identifying Input and outputs-The System sequence diagram; Identifying Object Behaviour-The state chart Diagram; Integrated Object-oriented Models. **(08 hrs)**

Section-B

UNIT 4: Process Overview: Development stages; Development life Cycle. System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement. Domain Analysis: Overview of analysis; Domain Class model: Domain state model; Domain interaction model; Iterating the analysis. **(08 hrs)**

(08 hrs)

UNIT 5: Use Case Realization: The Design Discipline within up iterations: Object Oriented Design-The Bridge between Requirements and Implementation; Design Classes and Design Class Diagrams; Interaction Diagrams- Realizing Use Case and defining methods; Designing with Sequence and Communication Diagrams; Updating the Design Class Diagram; Package Diagrams-Structuring the Major Components; Implementation Issues for 3- Layer Design. **(10 hrs)**

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UNIT 6: Introduction: What is a design pattern? Describing design patterns, the catalogue of design patterns, Organizing the catalogue, how design patterns solve design problems, how to select a design pattern, how to use a design pattern. Creational Patterns: Abstract Factory; Builder; Prototype; Singleton. Structural Patterns: Adaptor; Flyweight; Proxy. **(08 hrs)**

Suggested Books:

1. Michael Blaha, James Rumbaugh: Object Oriented Modelling and Design with UML, 2nd Edition, Pearson Education, 2005
2. Satzinger, Jackson and Burd: Object-Oriented Analysis & Design with the Unified Process, Cengage Learning, 2005.
3. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides: Design Patterns –Elements of Reusable Object-Oriented Software, Pearson Education, 2007.

INSTRUCTIONS (End Semester Examinations)

The question paper shall consist of three sections (I, II & III).

Section-I will be compulsory consisting of conceptual/analytical/objective type/short type questions with maximum 12 marks, spread over the entire syllabus (both sections A & B).

Sections II & III of the question paper will have three questions each from the respective sections (A & B) of the syllabus and each question will carry 12 marks. The candidate will have to attempt four questions, from sections (II & III) selecting two from each.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Branch: CSE				
Semester	2nd			
Name of the Course	Cloud Computing			
Course Code	MCYS21	Credits	4	L- 3, T- 1, P-0
Mid Semester Examination	Max. Marks = 20	Class Work Assessment (CWA)	Max. Marks = 20	
End Semester Examination	Max. Marks = 60	Max. Time- 3 Hrs		

COURSE OUTCOMES (COs)	
CO 1	Understand cloud computing models and architecture.
CO 2	Understand security implications in cloud.
CO 3	Analyse the operation, implementation and performance of cloud computing systems and relative merits and suitability of each for complex data intensive applications.
CO 4	Analyse the migration risks and cost in cloud computing.

Section-A

UNIT 1: Introduction: Historical and Evolution : Distributed Systems ,Virtualization, Web Service-Oriented Computing, Types of computing, Building Cloud Computing Environments, Principles of Parallel and Distributed Computing: Parallel vs. Distributed Computing, General Concepts , Definitions and Components of a Distributed System, Architectural Styles for Distributed Computing, Models for Inter-Process Communication, Technologies for Distributed Computing : Remote Procedure Call, Distributed Object Frameworks, Service Oriented Computing. **(08 hrs)**

UNIT 2: Introduction to Virtualization: Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Execution Virtualization, Other Types of Virtualization i.e. server, storage and network virtualization, Virtualization security threats and security recommendations Virtualization and Cloud Computing, Pros and Cons of Virtualization, Case Studies: Xen(Para virtualization), VMware(Full Virtualization),Microsoft(Hyper-V). **(10hrs)**

UNIT 3: Cloud Computing Architecture: Cloud Definition, Cloud Reference Model, Architecture, Infrastructure /Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds (Public, Private, Hybrid and Community), SaaS and Paas : Salesforce.com and Force.com , Migrating to cloud : Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud. **(10 hrs)**

Section-B

UNIT 4 : Cloud Computing Issues & Challenges: Open challenges and benefits: Cloud interoperability, Scalability and Fault Tolerance, Cloud Bursting, Capacity Planning ,Load Balancing, Role of Service Oriented Architecture, Security Trust and Privacy Issues: Cloud Security, Threats to cloud, Infrastructure and Information Security, Cloud Security Management Framework, Security –as –a service, Privacy and Compliance Issues, Portability and Interoperability Issues. **(08 hrs)**



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UNIT 5: Cloud Implementation & Environment: Technologies and Tools for Cloud Computing Aneka Cloud Platform, Aneka Resource Provisioning Service, Hybrid Cloud Implementation, Workflow Engine for Clouds: Workflow Management Systems and Clouds, Architecture of Workflow Management Systems, Utilizing Cloud for Workflow Execution, Data intensive computing: Technologies, Map Reduce Programming Model, SLA Management in Cloud Computing. **(10 hrs)**

UNIT 6: Cloud Platforms in Industry: Amazon Web services, Elastic Compute Cloud (EC2), Simple Storage Services (S3), Simple Queuing Services (SQS), Google App Engine- PaaS, Windows Azure, A comparison of cloud computing platforms. **(08 hrs)**

Suggested Books:

1. Rajkumar Buyya , Christian Vecchiola, S ThamaraiSelvi, —Mastering Cloud Computing, McGraw Hill.
2. Rajkumar Buyya , James Broberg, Andrzej Goscinski, — CLOUD COMPUTING Principles and Paradigms, John Wiley & Sons, Inc., Hoboken, New Jersey.
3. T. Velte, A. Velte, R. Elsenpeter, Cloud Computing, A Practical Approach, McGraw-Hill, 2009Barrie Sosinsky, Cloud Computing Bible, Wiley.
4. Jurg Van Vliet and Flavia Paganelli, Programming Amazon EC2, O'Reilly.

INSTRUCTIONS (End Semester Examinations)

The question paper shall consist of three sections (I, II & III).

Section-I will be compulsory consisting of conceptual/analytical/objective type/short type questions with maximum 12 marks, spread over the entire syllabus (both sections A & B).

Sections II & III of the question paper will have three questions each from the respective sections (A & B) of the syllabus and each question will carry 12 marks. The candidate will have to attempt four questions, from sections (II & III) selecting two from each.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Branch: CSE				
Semester	2nd			
Name of the Course	IOT and its Industrial Applications			
Course Code	MCSY22	Credits	4	L- 3, T- 1, P-0
Mid Semester Examination	Max. Marks = 20	Class Work Assessment (CWA)		Max. Marks = 20
End Semester Examination	Max. Marks = 60	Max. Time- 3 Hrs		

COURSE OUTCOMES (COs)	
CO 1	Attain knowledge of IoT, design, Architecture, communication protocols and sensors.
CO 2	Implement the concepts Python programming tools, Res-pi and Aurdino.
CO 3	Analyze challenges in IoT and its applications in real time scenario.
CO 4	While the promise of the Industrial Internet of Things (IIoT) brings many new business prospects, it also presents significant challenges ranging from technology architectural choices to security concerns.

Section-A

UNIT 1: Introduction to IoT: IoT Definition, Characteristics. IoT Functional Blocks, Physical design of IoT, Logical design of IoT, IoT Architecture, Various architectural views of IoT such as Functional, Information, Operational and Deployment. **(08 hrs)**

UNIT 2: IoT to M2M: IoT and M2M fundamentals, Devices and gate ways, Definitions, M2M Value Chains, IoT Value Chains, Difference between IoT and M2M. **(06 hrs)**

UNIT 3: Network and Communication Protocol: IoT standards and protocol, Wireless medium access issues, MAC control survey, constrained application protocol (CoAP). Message queue Telemetry transport protocol(MQTT), AMQP, security ion IoT protocol, Sensor deployment and node discovery, Data handling and analyst, Cloud Platform for IoTs. **(08hrs)**

Section-B

UNIT 4 : Sensors and Actuators Modules: Concept, layout, working and different applications of sensors and actuators, Temperature Sensor, Pressure Sensor, Proximity Sensor, Accelerometer and Gyroscope Sensor, IR Sensor, Optical Sensor, Gas Sensor, Smoke Sensor. ultrasonic sensor, relay. **(08 hrs)**

UNIT 5: Developing IoT based Systems: Introduction to Python, Implementing IoT concepts with python, Introduction to Arduino and Raspberry Pi programming, Implementation of IoT sensors with Arduino and Raspberry, Smartphone (Cellular), Bluetooth, LoRaWAN, Zigbee and Wi-Fi interfacing with R-Pi and Arduino. Introduction to ESP8266. **(12 hrs)**

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UNIT 6: Control & Supervisory Level of Automation: Programmable logic controller (PLC), Real-time control system, Supervisory Control & Data Acquisition (SCADA), HMI in an automation process, ERP & MES. (08 hrs)

UNIT 7: Application of IIOT: Health monitoring, IOT smart city, Smart irrigation, Robot surveillance. Home Appliances Control Using Blynk Application, IIoT based smart energy meter. (10 hrs)

Suggested Books:

1. "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, 1st Edition, Academic Press, 2014.
2. "Internet of Things (A Hands-on Approach)", Vijay Madiseti and Arshdeep Bahga, 1st Edition, VPT, 2014
3. "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", Francis da Costa, 1st Edition, Apress Publications, 2013.
4. "Getting Started with the Internet of Things", Cuno Pfister, O'Reilly Media, ISBN: 978-1-4493-9357-1, 2011.
5. The Internet of Things in the Industrial Sector, Mahmood, Zaigham (Ed.) (Springer Publication).
6. Industrial Internet of Things: Cyber manufacturing System, Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat (Springer Publication).
7. Industrial IoT Challenges, Design Principles, Applications, and Security by Ismail Butun (editor).

INSTRUCTIONS (End Semester Examinations)

The question paper shall consist of three sections (I, II & III).

Section-I will be compulsory consisting of conceptual/analytical/objective type/short type questions with maximum 12 marks, spread over the entire syllabus (both sections A & B).

Sections II & III of the question paper will have three questions each from the respective sections (A & B) of the syllabus and each question will carry 12 marks. The candidate will have to attempt four questions, from sections (II & III) selecting two from each.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Branch: CSE			
Semester	2 nd		
Name of the Course	Software Quality Assurance and Testing		
Course Code	MCSY23	Credits	4
Mid Semester Examination	Max. Marks = 20	Class Work Assessment (CWA)	Max. Marks = 20
End Semester Examination	Max. Marks = 60	Max. Time- 3 Hrs	

COURSE OUTCOMES (COs)	
CO 1	Perform functional and non-functional tests in the life cycle of the software product.
CO 2	Understand system testing and test execution process and identify defect prevention techniques and software quality assurance metrics.
CO 3	Apply techniques of quality assurance for typical applications.

Section-A

UNIT 1: Need for Software Quality: Software Quality Assurance (SQA) -Definition And Objectives – Software Quality Factors – McCall's Quality Model – SQA System and Architecture – Software Project Life Cycle Components – Management of SQA components – Pre-Project Software Quality Components – Contract Review– Development and Quality Plans. Software Quality: People's Quality Expectations, Frameworks and ISO-9126, Quality Characteristics ISO 9000:2000, Software Quality Standard, Maturity models: Test Process Improvement, Testing Maturity Model. **(10 hrs)**

UNIT 2: Software Testing: Concepts, Issues and Techniques Quality Revolution, Verification and Validation, Failure, Error, Fault and Defect, Objectives of Testing, Testing Activities, Test Case Selection , White Box and Black test Planning and design, Test Tools and Automation, Power of Test, Test Team Organization and Management, Test Groups, Software Quality Assurance Group ,System Test Team Hierarchy, Team Building. **(08hrs)**

UNIT 3: System Testing: System Testing, System Integration Techniques: Incremental, Top Down, Bottom Up, Sandwich and Big Bang, Software and Hardware Integration, Hardware Design Verification Tests, Hardware and Software Compatibility Matrix Test Plan for System Integration, Built-in Testing, Functional testing :Testing a Function in Context, Boundary Value Analysis, Decision Table, Acceptance testing : Selection of Acceptance Criteria, Acceptance Test Plan, Execution Test, software reliability : Fault and Failure, Factors Influencing Software, Reliability Models. **(08hrs)**

Section-B

UNIT 4 : System Test Categories: Taxonomy of System Tests, Interface Tests, Functionality Tests, GUI Tests, Security Tests, Feature Tests, Robustness Tests, Boundary Value Tests, Power Cycling Tests ,Interoperability Tests, Scalability Tests, Stress Tests, Load and Stability Tests, Reliability Tests, Regression Tests, Regulatory Tests, Test Generation from FSM models: State-Oriented Model, Finite-State Machine, Transition Tour Method, Testing with State Verification, Test Architectures: Local, distributed, Coordinated, Remote, system test design **(10 hrs)**

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UNIT 5: Software Quality Infrastructure: Procedures and Work Instructions – Supporting Quality devices – Templates – Checklists -Staff Training and Certification – Corrective and Preventive Actions – Configuration Management –Software Change Control – Configuration Management Audit -Documentation Control – Storage and Retrieval.

(08 hrs)

UNIT 6: Software Quality Assurance: Quality Assurance - Root Cause Analysis, Modelling, technologies, standards and methodologies for defect prevention; Fault Tolerance and Failure Containment - Safety Assurance and Damage Control, Hazard analysis using fault-trees and event-trees, Comparing Quality Assurance Techniques and Activities, QA Monitoring and Measurement, Risk Identification for Quantifiable Quality Improvement, Case Study: FSM-Based Testing of Web-Based Applications.

(10 hrs)

Suggested Books:

1. Software Testing And Quality Assurance-Theory and Practice, Kshirasagar Nak Priyadarshi Tripathy, John Wiley & Sons Inc, 2008.
2. Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement, Jeff Tian, John Wiley & Sons, Inc., Hoboken, New Jersey. 2005.
3. Software Quality Assurance - From Theory to Implementation, Daniel Galin, Pearson Education Ltd UK, 2004.
4. Software Quality Assurance, Milind Limaye, TMH ,New Delhi, 2011.

INSTRUCTIONS (End Semester Examinations)

The question paper shall consist of three sections (I, II & III).

Section-I will be compulsory consisting of conceptual/analytical/objective type/short type questions with maximum 12 marks, spread over the entire syllabus (both sections A & B).

Sections II & III of the question paper will have three questions each from the respective sections (A & B) of the syllabus and each question will carry 12 marks. The candidate will have to attempt four questions, from sections (II & III) selecting two from each.

Use of scientific calculators (non-programmable), log books are permitted, wherever required.

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**GOVT. COLLEGE OF ENGINEERING AND TECHNOLOGY, JAMMU
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Branch: CSE				
Semester	2nd			
Name of the Course	Mobile Computing			
Course Code	MCSY24	Credits	4	L- 3, T- 1, P-0
Mid Semester Examination	Max. Marks = 20	Class Work Assessment (CWA)	Max. Marks = 20	
End Semester Examination	Max. Marks = 60	Max. Time- 3 Hrs		

COURSE OUTCOMES (COs)	
CO 1	Explain state of art techniques in mobile communication.
CO 2	Discover CDMA, GSM, MobileIP, WiMax.
CO 3	Demonstrate program for CLDC, MIDP let model and security concerns.

Section-A

UNIT 1: Mobile Computing Architecture: Architecture for Mobile Computing, Design Considerations for Mobile Computing. Emerging Technologies: Wireless broadband (WiMAX), Mobile IP: Introduction, discovery, Registration, Tunneling, Cellular IP ,Wireless Networks: Global Systems for Mobile Communication (GSM): GSM Architecture, Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM, GSM Frequency allocation. Short Service Messages (SMS): Introduction to SMS, SMS Architecture, SMMT, SMMO, applications. **(12 hrs)**

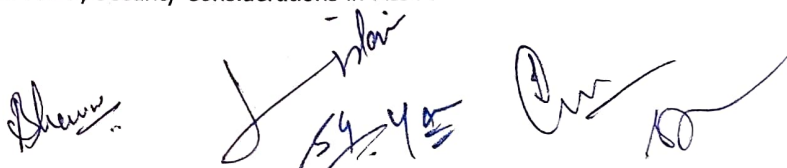
UNIT 2: GPRS and Packet Data Network: GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Billing and Charging in GPRS. Spread Spectrum technology, IS-95, CDMA versus GSM, Wireless Data, Applications on 3G, Mobile Client: Moving beyond desktop, Mobile handset overview, Mobile phones and their features, PDA, Design Constraints in applications for handheld devices **(10hrs)**

UNIT 3: Mobile OS and Computing Environment: Smart Client Architecture, The Client: User Interface, Data Storage, Performance, Data Synchronization, Messaging. The Server: Data Synchronization, Enterprise Data Source, Messaging. Mobile Operating Systems: WinCE, Palm OS, Symbian OS, Linux, Proprietary OS Client Development: The development process, Need analysis phase, Design phase, Implementation and Testing phase, Deployment phase, Development Tools, Device Emulator **(12 hrs)**

Section-B

UNIT 4: Building Wireless Internet Applications: Thin client overview: Architecture, Wireless Applications Protocol (WAP) Overview, Wireless Languages: Markup Languages, HDML, WML, 10 Hours HTML, cHTML, XHTML, VoiceXML **(10 hrs)**

UNIT 5: J2ME: Introduction, CDC, CLDC, MIDP; Programming for CLDC, MIDlet model, Provisioning, MIDlet life-cycle, Creating new application, MIDlet event handling, GUI in MIDP, Low level GUI Components, Communication in MIDP, Security Considerations in MIDP. **(10 hrs)**





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Suggested Books:

1. Ashok Talukder, Roopa Yavagal, Hasan Ahmed: Mobile Computing, Technology, Applications and Service Creation, 2nd Edition, Tata McGraw Hill, 2010.
2. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley India, 2003.

INSTRUCTIONS (End Semester Examinations)

The question paper shall consist of three sections (I, II & III).

Section-I will be compulsory consisting of conceptual/analytical/objective type/short type questions with maximum 12 marks, spread over the entire syllabus (both sections A & B).

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Use of scientific calculators (non-programmable), log books are permitted, wherever required.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Branch: CSE				
Semester	2 nd			
Name of the Course	NPTEL			
Course Code	MOCM21	Credits	3	L- 3, T- 0, P-0
Mid Semester Examination	Max. Marks = -	Class Work Assessment (CWA)	Max. Marks = -	
End Semester Examination	Max. Marks = 100	Max. Time- 3 Hrs		

The students shall register for a 12 week NPTEL/ SWAYAM course offered by IIT Madras ,out of the list of courses floated by SWAYAM around the time of commencement of the semester. However, the selected NPTEL course should not be similar to the regular courses offered as a part of the department curriculum. The choice of course needs to be duly endorsed by the Department Academic Committee.

The overall monitoring of the NPTEL course will be under the supervision of the teacher incharge of the department.

The NPTEL/SWAYAM certification course comprises of Assignments (25%) and Proctored Examination (Online examination MCQ's based =75%) conducted at the end of the semester by IIT Madras as per the schedule.

The marks obtained by the students in the NPTEL/SWAYAM certification course will be tabulated by the concerned department.

NOTE:- In case the student does not pass the certification exam or remains absent in the proctored examination, no certificate will be given to the candidate by NPTEL and the student will be deemed to have failed in that course. The student will have to register again for the next semester NPTEL course and pass the examination along with a certificate.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

M. Tech Syllabus From Batch-2025 & onwards			
Branch: CSE			
Semester	2 nd		
Name of the Course	Advance Machine Learning Lab		
Course Code	MCSL21	Credits	1
Practical Sessional (PRS)	Max. Marks = 40		
Practical Examination (PRE)	Max. Marks= 60		

COURSE OUTCOMES (COs)	
CO 1	Understand the implementation procedures for the machine learning algorithms.
CO 2	Design Python programs for various learning algorithms with appropriate data set.
CO 3	Identify and apply Machine Learning algorithms to solve real world problems.

List of Programs:

17. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
18. Write a program to implement k-Nearest Neighbour algorithm to classify the Iris data set. Print both correct and wrong predictions. Python ML library classes can be used for this problem.
19. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
20. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. Python ML library classes/API can be used in the program.
21. Assuming a set of documents that need to be classified, use the naive Bayesian Classifier model to perform this task. Calculate the accuracy, precision, and recall for your data set.
22. Write a program to construct a Bayesian Network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.
23. Build an Artificial Neural Network by implementing the Back Propagation algorithm and test the same using appropriate data sets.
24. Implement an algorithm to demonstrate the significance of genetic algorithm
25. Train a model to translate text from one language to another using sequential data generation.
26. Train a reinforcement learning agent to play a game by rewarding it for good decisions and penalizing it for bad ones, with the goal of maximizing its score over time. Implement Prim's algorithm for Minimum Spanning Tree.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

M. Tech Syllabus From Batch-2025 & onwards			
Branch: CSE			
Semester	2 nd		
Name of the Course	Cloud Computing Lab		
Course Code	MCSZ21	Credits	1
Practical Sessional (PRS)	Max. Marks = 40		
Practical Examination (PRE)	Max. Marks= 60		
L- 0, T-0 , P-2			

COURSE OUTCOMES (COs)	
CO 1	Install and configure various Cloud computing environments.
CO 2	Understand deployment of service and its usage over cloud.
CO 3	Implement Virtualization using VM Ware's Workstation/KVM.

List of Programs:

1. Study of Cloud Computing & Architecture viz Eucalyptus, Nimbu, Open Nebukla, Cloud Sim
2. To implement Cloud using framework and related services
3. To understand various concepts practically about virtualisation and data storage applied using AWS / Azure / Google Cloud
4. Design and deploy a private cloud using open source tools
5. Project work for design of cloud environment using open source.
6. Case study on Amazon EC2
7. Case-study on Serverless architecture of AWS
8. Case study on Microsoft Azure

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

M. Tech Syllabus From Batch-2025 & onwards			
Branch: CSE			
Semester	2 nd		
Name of the Course	IOT and its Industrial Applications Lab		
Course Code	MCSZ22	Credits	1
Practical Sessional (PRS)	Max. Marks = 40		
Practical Examination (PRE)	Max. Marks= 60		

COURSE OUTCOMES (COs)	
CO 1	Familiarize with various controllers, sensors and actuators.
CO 2	Acquire knowledge about various IoT based connectivity modules.
CO 3	Design a real time project.

List of Programs:

1. Introduction to Raspberry pi, Arduino & ESP 32.
2. Experiment to perform interfacing of raspberry pi/Arduino with LED and switch.
3. Experiment to perform serial Communication using raspberry pi/Arduino.
4. Experiment to perform transferring of data through Bluetooth app to raspberry pi/Arduino.
5. Experiment to setup the thing speak cloud for data reception & transmission
6. Experiment to transmit temperature & humidity sensor data to thing speak cloud
7. Experiment to perform graphical Visualization of light intensity data on thing speak cloud and downloading of logged data into Excel format
8. Experiment to setup the Blynk app cloud for data reception & transmission
9. Experiment to perform Interfacing of raspberry pi/Arduino with relay module and controlling through blynk platform.
10. Experiment to perform Interfacing of Esp32 with stepper motor & control the direction of motor through IoT platform
11. Experiment to perform Interfacing of Esp32 with motion sensor & LCD display and display motion detection information on LCD.
12. Experiment to perform Interfacing of Esp32 with IR sensor & OLED display and display obstacle detection information on OLED
13. Experiment to study Digital Input/Output using Ladder Logic.
14. Experiment to study Timer/Counter using Ladder Logic.
15. Experiment to study Analog Input/Output of PLC.
16. Experiment to perform interfacing of HMT with PLC.
17. Experiment to perform IOT control application through SCADA.

NOTE: Minimum Eight experiments to be performed. Additional experiments based upon course contents. Project application consists of Home automation, Health sector, smart farming, Surveillance systems, connected vehicles, industrial automation etc.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

M. Tech Syllabus From Batch-2025 & onwards			
Branch: CS			
Semester	2 nd		
Name of the Course	Seminar		
Course Code	MCSS21	Credits	2
Practical Sessional (PRS)	Max. Marks = 100		
Practical Examination (PRE)	Max. Marks = -		
	L- 0, T-0 , P-4		

COURSE OUTCOMES (COs)	
CO 1	An ability to work in actual working environment.
CO 2	An ability to utilize technical resources.
CO 3	An ability to write technical documents and give oral presentations related to the work completed.

General guidelines for Presentation and File:

Content: Report must contain abundant material clearly related to topic; points should be clearly made and all evidence must support the topic along with varied use of materials.

Coherence and Organization: Topic should be clearly stated and developed; specified examples must be incorporated that would clearly develop the concept; conclusion must be clear and must flow together well.

Multimedia Material used: Report should have a balanced use of multimedia materials to properly showcase the work done.

Note: Seminar will be evaluated on internal scheme with following components:

- | | |
|-----------------|-----|
| 1) Presentation | 30% |
| 2) Viva-Voce | 30% |
| 3) Report | 40% |

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J. Islam
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