GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA (JHAJJAR)

An Autonomous Institute

'A' GRADE ACCREDITED BY NAAC

Evaluation Scheme and Syllabus for

Master of Technology (Computer Science and Engineering)

Effective from the Session: 2025-26

APPROVED BY AICTE, NEW DELHI AND AFFILIATED TO MDU, ROHTAK

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	2 Practical (P) per week	1 Credit
3	2 Seminar per Week	2 Credit
4	4 Project Per Week	2 Credit

2. RANGE OF CREDIT

A credit of 86 is required for a student to be eligible for a postgraduate degree in Computer Science and Engineering.

3. STRUCTURE OF POSTGRADUATE ENGINEERING PROGRAM (M.TECH)

Sr. No.	Category	Breakup of Credits
1	Professional Core Courses	32
2	Professional Elective Courses (Relevant to chosen specialization/branch)	8
3	Mandatory Learning Course	3
4	Multidisciplinary Open Elective Courses	6
5	Foundation Elective Courses	3
6	Seminar	6
7	Lab Courses	4
8	Project	2
9	Dissertation	22
	Total Credits	**86**

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Professional Core Courses	PCC
2	Professional Elective Courses (Relevant to chosen specialization/branch)	PEC
3	Mandatory Learning Course	MLC
4	Multidisciplinary Open Elective Courses	OEC
5	Foundation Elective Courses	FEC
6	Seminar	SM
7	Lab Courses	LC
8	Project	PROJ
9	Dissertation	DISS

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (Computer Science & Engineering) –3rd Semester

w.e.f. 2025-26

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTCSE-201A	Knowledge Based System	4	0	0	4	4	40	60		100	3
2	Professional Elective Courses	Refer Table -IV	.....	4	0	0	4	4	40	60		100	3
3	Multidisciplinary Open Elective Courses	Refer Table -V	.....	3	0	0	3	3	40	60		100	3
4	Mandatory Learning Courses	MLC-01A	Research Methodology and IPR	3	0	0	3	3	40	60		100	3
5	Project Courses	PROJ-MTCSE-213A	Project	0	0	4	4	2	50		50	100	3
6	Seminar	SM-MT-215A	Seminar-III	0	0	2	2	2	50			50	
7	Dissertation	DISS-MTCSE-217A	Dissertation (Phase-1)	0	0	4	4	2	100			100	3
Total Credits								**20**				**650**	

Table IV: Professional Elective Courses

Sr. No.	Course Code	Course Name
1	PEC- MTCSE-203A	Quantum Computing
2	PEC- MTCSE-205A	Cloud Computing
3	PEC- MTCSE-207A	Blockchain and Applications
4	PEC- MTCSE-209A	Network Security
5	PEC- MTCSE-211A	Advanced Signal Processing

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (Computer Science & Engineering) – 4th Semester

w.e.f. 2025-26

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Dissertation	DISS-MTCSE-202A	Dissertation and viva (Phase-2)	-	-	20	20	20	250		500	750	
Total Credits								**20**				**750**	

Course Code	**PCC-MTCSE-201A**					
Category	Professional Core Courses					
Course Title	**Knowledge Based System**					
Scheme and Credits	L	T	P	**Credits**	**Semester-III**	
	4	0	0	**4**		
Course Objectives	The objectives of this course are • To introduce the basics of logic, reasoning, and logic programming. • To explain knowledge representation methods and inference techniques. • To expose students to search strategies for AI problem-solving. • To enable students to understand techniques for managing uncertainty and agent-based systems.					
Assessment	40 Marks					
End Semester Examination	60 Marks					
Total Marks	100					
Duration of Exam	03 Hours					

Course Outcomes: After studying this course, the students will be able to

COs	**Skill Demonstrated**	**RBT Level**
CO1	Recall fundamental concepts of logic, knowledge representation, search strategies, and uncertainty management in artificial intelligence systems.	Level 1: Remember
CO2	Explain the working of logic programming, inference mechanisms, and knowledge-based systems including semantic nets, frames, and agents.	Level 2: Understand
CO3	Implement logic-based reasoning techniques, search algorithms, and knowledge representation models to solve AI-related problems.	Level 3: Apply
CO4	Analyze and differentiate between various logic reasoning methods, search techniques, and uncertainty handling approaches to determine their applicability in intelligent systems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Logic: Propositional Logic concepts, Semantic Tableaux and Resolution in Propositional Logic, First-Order Predicate Logic (FOPL),Semantic Tableaux in Predicate Logic, Resolution in Predicate Logic, Logic Programming in Prolog.

Unit-II

Knowledge Representation: Semantic Nets, Partitioned Nets, Parallel Implementation of Semantic Nets, Frames, Common Sense Reasoning and Thematic Role Frames, Architecture of Knowledge Based System, Rule Based Systems, Frame based systems, Forward and Backward Chaining.

Unit-III

Search Techniques: Uninformed Search-Depth-First Search (DFS), Breadth-First Search (BFS), Depth-Limited Search (DLS), Iterative Deepening DFS, Uniform Cost Search (UCS).
Heuristic Search: Greedy Best-First Search, A*, Hill Climbing.

Unit-IV

Uncertainty Management in Expert Systems: Fuzzy Logic, Probabilistic Methods, Bayesian Theory, Dempster-Shafer Theory, Bayes Network, Introduction to Agents and their Application in Intelligent Systems.

Suggested Readings

1 Artificial Intelligence: A New Synthesis, Nils J. Nilsson, Morgan Kaufmann.
2 Artificial Intelligence, Elain Rich, Kevin Knight, Tata McGraw-Hill.
3 Artificial Intelligence: A modern approach, Staurt Russel and Peter Norvig, Pearson Education India.
4 Artificial Intelligence, Patrick Henry Winston, Pearson India.
5 The Essence of Logic, John Kelly, Prentice Hall.

Useful Video links

Unit No.	Topics	Links
Unit-I	Propositional Logic concepts	https://youtu.be/xlUFkMKSB3Y
	Semantic Tableaux Method for Predicate Logic	https://youtu.be/We9w5fJmcsI
	Resolution in Predicate Logic	https://youtu.be/CgQ6U_ub5Uo
Unit-II	Semantic Net	https://youtu.be/RTmafl2rzEw
	Frames	https://youtu.be/nXJ_2uGWM-M
Unit-III	DFS and BFS	https://youtu.be/TMLyKcBtHuo
	Heuristic Search	https://youtu.be/Rahq1F-n650
Unit-IV	Expert Systems	https://youtu.be/nE5c5w4aizU
	Bayesian Networks	https://youtu.be/rFQsbArQE6Y
	Intelligent Agents	https://youtu.be/d39tTuUbDVw

Course Code	**PEC- MTCSE-203A**				
Category	Professional Elective Courses				
Course Title	**Quantum Computing**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	**4**	
Course Objectives	The objectives of this course are ● To introduce the foundational principles of classical and quantum computing, including the mathematical framework of Hilbert spaces and quantum mechanics. ● To explain the quantum computational model, qubit representation, quantum gates, and circuit design. ● To develop the ability to implement and analyze key quantum algorithms such as Deutsch-Jozsa, Simon's, and Quantum Fourier Transform. ● To familiarize students with quantum computational complexity, error correction techniques, and fault-tolerant quantum computing principles.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skill Demonstrated**	**RBT Level**
CO1	Define key concepts of quantum and classical computing models, quantum states, and gates.	Level 1: Remember
CO2	Explain the principles of quantum mechanics as applied to computation, including qubit behavior, quantum entanglement, quantum measurement, and the functioning of quantum circuits.	Level 2: Understand
CO3	Apply the concepts and principles of quantum algorithms to solve basic computational problems.	Level 3: Apply
CO4	Analyze various quantum computing concepts, algorithms, quantum error correction codes and computational complexity to evaluate the feasibility and reliability of quantum computation under noisy environments.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Foundation: Overview of traditional computing, Church-Turing thesis, circuit model of computation, reversible computation, quantum physics, quantum physics and computation, Dirac notation and Hilbert Spaces, dual vectors, operators, the spectral theorem, functions of operators, tensor products, Schmidt decomposition theorem.

Unit-II

Qubits and Quantum Model of Computation: State of a quantum system, time evolution of a closed system, composite systems, measurement, mixed states and general quantum operations, quantum circuit model, quantum gates, universal sets of quantum gates, unitary transformations, quantum circuits.

Unit-III

Quantum Algorithms: Superdense coding, quantum teleportation, applications of teleportation, probabilistic versus quantum algorithms, phase kick-back the Deutsch algorithm, the Deutsch, Jozsa algorithm, Simon's algorithm, quantum phase estimation, quantum Fourier Transform, eigen value estimation.

Unit-IV

Quantum Computational Complexity and error correction: Computational complexity, black-box model, lower bounds for searching, general black-box lower bounds, polynomial method, block sensitivity, adversary methods, classical error correction, classical three-bit code, fault tolerance, quantum error correction, three- and nine-qubit quantum codes, fault-tolerant quantum computation.

Suggested Readings:

1. An introduction to Quantum Computing by P. Kaye, R. Laflamme, and M. Mosca, Oxford University Press, 1999.
2. Quantum Computing by V. Sahni, Tata McGraw-Hill Publishing Company, 2007.
3. Quantum Computation And Quantum Information by Michael A. Nielsen and Isaac L. Chuang, Cambridge University Press, 2013.

Useful Video links

Unit No.	Topics	Links
Unit-I	Quantum Computing	https://youtu.be/7WSe4QA8Gts
	Spectral Theorem	https://youtu.be/ym9TBGngBDY
Unit-II	Qubits	https://youtu.be/6oHnkzjrGUc
	Quantum gates	https://youtu.be/m4llFGkoXeE
Unit-III	Deutsch Jozsa algorithm	https://youtu.be/3775XAgRw8M
	Simon's algorithm	https://youtu.be/bNyg9rFPWhg
Unit-IV	Quantum error correction	https://youtu.be/O9LrBncWUtI

Course Code	**PEC- MTCSE-205A**				
Category	Professional Elective Courses				
Course Title	**Cloud Computing**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	**4**	
Course Objectives	The objectives of this course are ● To provide a comprehensive understanding of cloud computing concepts, characteristics, components, and service models such as SaaS, PaaS, and IaaS. ● To familiarize students with various cloud computing platforms (e.g., Amazon EC2, Google App Engine, Microsoft Azure), architecture, and migration challenges. ● To introduce cloud programming frameworks and storage technologies such as Map Reduce, GFS, HDFS, and Hadoop, along with fundamentals of cloud security and privacy. ● To explain the role of networking and virtualization technologies in cloud computing, including hypervisors and virtual resource management across data centers.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts, characteristics, service models, architecture, platforms, and virtualization technologies of cloud computing.	Level 1: Remember
CO2	Explain the working principles of cloud services, cloud architecture, programming models, storage frameworks, and security mechanisms.	Level 2: Understand
CO3	Apply cloud computing models, platforms, programming frameworks (like Hadoop), and virtualization tools in solving practical computing problems.	Level 3: Apply
CO4	Analyze various cloud computing architectures, programming paradigms, and security approaches to evaluate their effectiveness in real-world scenarios.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Cloud Computing: Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others; Comparison among SAAS, PAAS, IAAS; Cloud computing platforms: Infrastructure as service: Amazon EC2, Platform as Service: Google App Engine, Microsoft Azure, Challenges, Risks and Approaches of Migration into Cloud, Future of the cloud.

Unit-II

Networking Support for Cloud Computing: Ubiquitous Cloud and the Internet of Things. Cloud Computing Architecture: Cloud Reference Model, Layer and Types of Clouds, Services models, Web services, Data center design and interconnection Network, Architectural design of Computer and Storage Clouds.

Unit-III

Cloud Programming and Software: Fractures of cloud programming, Parallel and distributed programming paradigms, High level Language for Cloud. Introduction to Map Reduce, GFS, HDFS, Hadoop Framework.
Cloud security fundamentals: Vulnerability assessment tool for cloud, Privacy and Security in cloud.

Unit-IV

Virtualization Technology: Definition, Understanding and Benefits of Virtualization, Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms, Hypervisor, VMware, KVM, Xen. Virtualization of CPU, Memory, I/O Devices, Virtual Cluster and Resources Management, Virtualization of Server, Desktop, Network, and Virtualization of data-center.

Suggested Readings:

1. Cloud Computing Bible by Sosinsky Barrie, Wiley India, 2011.
2. Cloud computing: Principles and paradigms by Buyya, Rajkumar, James Broberg, and Andrzej M. Goscinski, eds., Vol. 87, John Wiley & Sons, 2010.
3. Cloud Computing Black Book by Jayaswal, Kailash, John Wiley & Sons, 2014.
4. Cloud Computing: A Practical Approach by Velte, Anthony T., Toby J. Velte, and Robert Elsenpeter, McGraw-Hill, Inc. 2019.
5. Cloud Computing: A Complete Guide by Gerardus Blokdyk, Starcooks, 2019.

Useful Video links

Unit No.	Topics	Links
Unit-I	Cloud Computing	https://youtu.be/NzZXz3fJf6o?list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J
	SAAS, PAAS, IAAS	https://youtu.be/lOh2xUACaU?list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J
Unit-II	Cloud Computing Web Services	https://youtu.be/GtJGB1WxRW8?list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J
Unit-III	Cloud file system, GFS	https://youtu.be/Dr6MSqRFaZQ?list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J
	Map reduce	https://youtu.be/XWNEhvb2PM?list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J
	Cloud Security	https://youtu.be/LcAPj95KeSA?list=PL-FqPEn1dZJDg-6LHNYnappA6DcXz3ieZ
Unit-IV	Virtualization	https://youtu.be/AkST9AO01x0?list=PLFW6lRTa1g82dte3YD_7-GoZXcBiK6K9G

Course Code	**PEC- MTCSE-207A**				
Category	Professional Elective Courses				
Course Title	**Blockchain and Applications**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	**4**	
Course Objectives	The objectives of this course are ● To introduce the fundamental concepts of distributed record keeping, consensus algorithms, and the motivation behind blockchain technology. ● To explain the cryptographic foundations and key technologies that enable blockchain systems, including hash functions, digital signatures, and fault-tolerant computing. ● To develop an understanding of major blockchain platforms such as Bitcoin and Ethereum, their consensus mechanisms, scripting languages, and smart contract capabilities. ● To analyze advanced blockchain concepts including security challenges, privacy-preserving techniques, and emerging consensus algorithms for scalable and secure blockchain solutions.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts of blockchain technology, including consensus algorithms, cryptographic foundations, and key blockchain platforms like Bitcoin and Ethereum.	Level 1: Remember
CO2	Explain the principles of distributed record keeping, cryptographic techniques, consensus mechanisms, and the functionality of smart contracts in blockchain systems.	Level 2: Understand
CO3	Apply blockchain protocols and consensus algorithms to design and implement secure and scalable distributed ledgers and smart contract solutions.	Level 3: Apply
CO4	Analyze the challenges related to blockchain scalability, security vulnerabilities, and privacy concerns, and evaluate advanced blockchain technologies and consensus mechanisms to address these issues.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Need for Distributed Record Keeping and Consensus algorithms: Modeling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems, Why Nakamoto came up with Blockchain based cryptocurrency.

Unit-II

Blockchain Technologies: Technologies borrowed in Blockchain — hash pointers, consensus, Byzantine fault-tolerant distributed computing, digital cash, Atomic Broadcast, Consensus, Byzantine Models of fault tolerance. Cryptographic Foundations of Blockchain: Hash functions, Puzzle friendly Hash, Collision-resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems.

Unit-III

Bitcoin Blockchain and Alternatives: Bitcoin blockchain, Challenges and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use.

Unit-IV

Ethereum, Smart Contracts, and Advanced Blockchain Concepts: Ethereum and Smart Contracts, Turing Completeness of Smart Contract Languages, Verification challenges, Using smart contracts to enforce legal contracts, Comparing Bitcoin scripting vs. Ethereum Smart Contracts, Hyper-ledger Fabric, Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, Attacks on Blockchains: Sybil attacks, selfish mining, 51% attacks, Advent of Algorand, Sharding-based consensus algorithms.

Suggested Readings

1. Blockchain: Blueprint for a New Economy by Melanie Swan, O'Reilly Media, 2015.
2. Blockchain: The Blockchain For Beginners Guide To Blockchain Technology And Leveraging Blockchain Programming by Josh Thompsons, 2017.
3. Cloud Computing Black Book by Jayaswal, Kailash, John Wiley & Sons, 2014.
4. Cloud Computing: A Practical Approach by Velte, Anthony T., Toby J. Velte, and Robert Elsenpeter, McGraw-Hill, Inc. 2019.
5. Cloud Computing: A Complete Guide by Gerardus Blokdyk, Starcooks, 2019.

Useful Video links

Unit No.	Topics	Links
Unit-I	Byzantine Faults	https://youtu.be/sm2jMy-uZkI
	Consensus algorithms	https://youtu.be/fN8F54C39RY
Unit-II	Blockchain Technologies	https://nptel.ac.in/courses/106105235
	Cryptography	https://youtu.be/uTsAiyZ_cZ4
Unit-III	Bitcoin blockchain	https://youtu.be/fN8F54C39RY
	Proof of Work	https://youtu.be/fN8F54C39RY
Unit-IV	Ethereum	https://youtu.be/KVqA1ZgLZ88?list=PLVJwWHqgHJMkoPss8K8M2JjPvPQ961V-I
	Smart Contracts	https://youtu.be/0hVR_utJ2W8

Course Code	**PEC- MTCSE-209A**				
Category	Professional Elective Courses				
Course Title	**Network Security**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	**4**	
Course Objectives	The objectives of this course are ● Understand basic concepts of network security, attacks, and classical encryption techniques. ● Explore modern cryptographic algorithms and key management techniques. ● Learn and evaluate secure communication protocols used over the internet. ● Examine authentication methods, firewalls, and system-level security mechanisms.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skill Demonstrated**	**RBT Level**
CO1	Define fundamental concepts, terminologies, and mechanisms related to network security, including classical encryption techniques, cryptographic algorithms, security protocols, and system-level security practices.	Level 1: Remember
CO2	Explain the principles, working mechanisms, and roles of symmetric and asymmetric encryption, block cipher operations, authentication protocols, and security standards used in networked systems.	Level 2: Understand
CO3	Apply suitable cryptographic methods, security protocols, and firewall configurations to secure data communication and protect against common threats in real-world networking environments.	Level 3: Apply
CO4	Analyze security threats and vulnerabilities in network systems by evaluating encryption methods, authentication protocols, and firewall architectures to propose appropriate countermeasures.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Services, Mechanisms and attacks, OSI security architecture, Network security model; Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography). Plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography.

Unit-II

Block Ciphers & Public Key Cryptography: Data Encryption Standard, Block cipher principles, block cipher modes of operation, Advanced Encryption Standard (AES), Triple DES, Blowfish, RC5 algorithm.
Public key cryptography: Principles of public key cryptosystems, The RSA algorithm, Key management, Diffie Hellman Key exchange, Elliptic curve arithmetic, Elliptic curve cryptography.

Unit-III

Internet Security Protocols: basic concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure HyperText Transfer protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), SSL versus SET, Electronic Money, Email Security.

Unit-IV

Security Practice & System Security: Authentication applications, Kerberos, X.509, Authentication services, Internet Firewalls for Trusted System: Roles of Firewalls, Firewall related terminology, Types of Firewalls, Firewall designs, SET for E-Commerce Transactions. Intruder, Intrusion detection system, Virus and related threats, Countermeasures, Firewalls design principles, Trusted systems, Practical implementation of cryptography and security.

Suggested Readings

1. Cryptography and Network Security by AtulKahate, TMH.
2. Network Management Principles & Practices by Subramanian, Pearson Education India.
3. Network Management by U. Black (MGH).
4. Cryptography & Network Security by Behrouz A. Forouzan, Tata Mc Graw Hill, 2007.

Useful Video links

Unit No.	Topics	Links
Unit-I	Classical Cryptosystems	https://youtu.be/Vazi_07u_ck?list=PL71FE85723FD414D7
	Symmetric Key Ciphers	https://youtu.be/QbczPuEphUY?list=PL71FE85723FD4147
Unit-II	Block Cipher Standards (DES)	https://youtu.be/eCAHcfA2c8?list=PL71FE85723FD414D7
	RSA algorithm	https://youtu.be/cOpYHlqis3o?list=PL71FE85723FD414D7
Unit-III	SSL	https://youtu.be/3xCRJ79YYVQ
	TLS	https://youtu.be/tcQQ9A8M2L0
Unit-IV	Firewalls and Intrusion detection system	https://youtu.be/2YGUvopGkQc?list=PL71FE85723FD417

Course Code	**PEC- MTCSE-211A**				
Category	Professional Elective Courses				
Course Title	**Advanced Signal Processing**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	4	0	0	**4**	
Course Objectives	The objectives of this course are ● To introduce the fundamental concepts of discrete-time signals and systems. ● To develop understanding of digital filter design techniques, their structures, characteristics, and limitations due to finite word length effects. ● To equip students with the skills to implement efficient digital signal processing algorithms for real-time and high-performance applications. ● To enable learners to explore various spectral estimation techniques, and to introduce the architectural features and principles of modern DSP processors for effective signal processing implementation.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skill Demonstrated**	**RBT Level**
CO1	Define the fundamental concepts of discrete-time signals and systems.	Level1: Remember
CO2	Explain digital filter design techniques, signal processing operations and the role of transform methods in frequency domain representation.	Level2:Understand
CO3	Apply appropriate mathematical and algorithmic techniques to analyze discrete-time signals, design IIR and FIR filters, implement FFT algorithms, and perform power spectrum estimation using classical and parametric approaches.	Level 3: Apply
CO4	Analyze the performance and limitations of digital signal processing systems, compare various filter structures, and examine different spectral estimation methods and architectural designs.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Discrete Time Signals and Systems: Frequency Domain Representation, Z-Transforms, Discrete Fourier Transforms, Impulse Response and Transfer functions, Convolution and Correlation.

Unit-II

IIR Filter Design: Filter Approximation, Impulse Invariant Method, Bi-linear Transformation method filter structures, Finite word length effects, limitations of IIR filters. FIR Filter Design: Linear phase response, Windowing technique, Gibb's Phenomenon, Frequency Sampling Method, FIR Filter structures.

Unit-III

Frequency Domain Realization of Digital Filters, Radix-2 FFT Algorithm, Introduction to Multirate digital signal processing.

Unit-IV

Power Spectrum Estimation, Classical Spectral Estimation, Parametric Modeling- AR, MA, ARMA methods, Minimum variance spectral estimation, Principles of DSP Architecture.

Suggested Readings

1. Digital Signal Processing, Principles, Algorithms and Applications by G. J. Proakis and D. G. Manolakis, 4th ed. Pearson Education.
2. Digital Signal Processing by S. K. Mitra, 3rd ed. TMH.
3. Discrete Time Signal Processing by A.V. Oppenheim and R.W. Schafer, PHI 1992.
4. Modern Spectral Estimation by Steven M. Kay, PHI 1988.
5. Lab view DSP and Digital communication by Clark Cory.L, TMH 2005.
6. Introduction to Digital Signal Processing by Roman Kuc, McGraw Hill 1988

Useful Video links

Unit No.	Topics	Links
Unit-I	Discrete Time Signals and Systems	https://youtu.be/a5xq-XeD5V8
	Discrete Fourier Transforms	https://youtu.be/UBv_E_7eS9w
Unit-II	IIR Filter	https://youtu.be/CmIidApT5EA
	FIR Filter	https://youtu.be/HP5pCUyEEcg
Unit-III	Radix-2 FFT Algorithm	https://youtu.be/xMKgWNHELiw
	Multirate digital signal processing	https://youtu.be/_MdjuI47k8E?list=PLyqSpQzTE6M_h5UgZWpybzBVDGmHGhQQb
Unit-IV	Spectral Estimation	https://youtu.be/5lHJYbkrH6o

Course Code	**MLC-01A**				
Category	Mandatory Learning Course				
Course Title	**Research Methodology and IPR**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	3	0	0	**3**	
Course Objectives	The objectives of this course are: • To enable students to identify and define research problems, formulate objectives and apply appropriate investigative approaches in research methodology. • To impart knowledge of data sources, data collection methods, data processing and the application of statistical tools for research analysis. • To develop awareness of research ethics, plagiarism issues and effective practices in technical writing, report preparation, and research documentation. • To provide a comprehensive understanding of intellectual property rights, patent procedures, technology transfer and international frameworks for innovation protection.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skill Demonstrated**	**RBT Level**
CO1	Identify research problems, objectives, and data sources based on fundamental research methodology principles.	Level 1: Remember
CO2	Explain intellectual property rights, patent procedures, and international frameworks for technology transfer and innovation protection.	Level 2: Understand
CO3	Apply research ethics to prepare plagiarism-free technical reports, research papers, and proposals using effective writing and presentation techniques.	Level 3: Apply
CO4	Analyze research data through classification and tabulation to extract meaningful patterns and conclusions using statistical tools and methods	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem, Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.

Unit-II

Effective literature studies approaches, analysis, Plagiarism, Research ethics, Effective technical writing, how to write the report, Paper, Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

Unit-III

Sampling Methods, Need, Meaning & Type of Sample, Sources of Data, Primary and Secondary, Classification and Tabulation of Data Processing, Analysis and Interpretation of Data, Chi Square Test, significance of statistics in Socio-legal Research, Use of Computer in the Research field work and report writing.

Unit-IV

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, and development. International Scenario: International cooperation on Intellectual Property, Procedure for grants of patents, Patenting under PCT. Patent Rights: Scope of Patent Rights, Licensing and transfer of technology.

Suggested Readings

1. Research Methodology: Methods and Techniques (4th ed.) by Kothari, C. R., & Garg, G, New Age International Publishers.
2. Research Methodology: A Step-by-Step Guide for Beginners (4th ed.). by Kumar, R, SAGE Publications India. ISBN: 978-9351501337
3. Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets (6th ed.) byBouchoux, D. E, Cengage Learning.
4. Intellectual Property Rights Under WTO by T. Ramappa, S. Chand.

Useful Video links

Unit No.	Topics	Links
Unit-I	Defining/formulating research problem	https://www.youtube.com/watch?v=oTc4_zjmev0
	Research types, descriptive, analytical, action, empirical, research methodology	https://www.youtube.com/watch?v=tjDBPRoyDJA
Unit-II	Types of Plagiarism	https://www.youtube.com/watch?v=5--ssYqyWoE
	Research Ethics	https://www.youtube.com/watch?v=4tRCov8pVgQ
Unit-III	Primary data and Secondary Data	https://www.youtube.com/watch?v=caUiRsg5M6k
	Sampling techniques	https://www.youtube.com/watch?v=sKtoW5cXt14
Unit-IV	Patent Trademarks and Copyrights.	https://www.youtube.com/watch?v=XQ8tRdcr0xQ
	What is Patent? Patent Filing Procedure in India	https://www.youtube.com/watch?v=azMNhrkRzww

Course Code	**PROJ-MTCSE-213A**				
Category	Project				
Course Title	**Project**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	0	0	4	2	
Course Objectives	The objectives of this course are to • Identify suitable research topics in Computer Science and Engineering for independent investigation. • Understand research methodologies, documentation, and referencing aligned with existing literature. • Develop technical writing skills using appropriate tools, formats, and referencing techniques. • Analyze, interpret, and synthesize research findings within a defined research scope or topic.				
Assessment	50 Marks				
End Semester Examination	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Identify complex engineering problems relevant to project work based on domain knowledge and real-world challenges.
CO2	Describe the workflow, technical background, and tools required for planning and executing engineering projects.
CO3	Apply appropriate methods, tools, and techniques to carry out project development and prepare technical documentation.
CO4	Analyze the key stages of project development to ensure systematic execution and identify performance issues.
CO5	Evaluate alternative approaches and select suitable methodologies to achieve optimal and feasible project outcomes.
CO6	Design innovative and practical engineering solutions to address societal and industrial needs.

Course Code	**SM-MT-215A**				
Category	Seminar				
Course Title	**Seminar-III**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	0	0	2	**2**	
Course Objectives	The objectives of this course are ● To develop students' ability to effectively present research topics and findings by effective communication. ● To improve problem-solving and critical thinking skills of the students. ● To expose students to the latest trends and advancements by reviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skill Demonstrated**
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:

This is a course designed to help M.Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO5

Course Code	**DISS-MTCSE-217A**				
Category	Dissertation				
Course Title	**Dissertation (Phase-1)**				
Scheme and Credits	L	T	P	**Credits**	**Semester-III**
	0	0	4	2	
Course Objectives	The objectives of this course are to • Introduce students to identifying relevant research topics in Computer Science and Engineering. • Explain the research process, including literature review, documentation, and structured writing. • Develop proficiency in using research tools, reference management, and academic writing techniques. • Enhance ability to analyze, synthesize, and present research findings in a chosen domain.				
Assessment	100 Marks				
End Semester Examination					
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Identify the research topic/area relevant to the field of Computer Science and Engineering to carry out the research.
CO2	Understand the research process, literature review, result formulation and writing conclusions with reference to existing literature.
CO3	Apply appropriate tools, references and writing skills for effective report writing related to research work.
CO4	Analyze and synthesize research findings to the agreed area of research carried out.
CO5	Evaluate the research methods and available knowledge to propose appropriate solutions to the specific research problem.
CO6	Design engineering solutions by developing improved results, properly documenting them in a thesis or report, and publishing them in journals or conferences.

Each student will undertake their dissertation under the supervision of one or more supervisors. The dissertation topic must be approved by a committee constituted by the Head of the concerned Department.

Students are required to deliver two seminar presentations: the first, at the beginning of Dissertation Phase-I, to outline the scope of the work and finalize the topic; the second, towards the end of the semester, to present the progress and work completed during the semester.

The committee will evaluate both presentations and award sessional marks out of 100. Students who fail to secure the minimum passing marks must improve their grade before proceeding to the 4th semester. Failure to do so will require the student to repeat Dissertation Phase-I in the next regular 3rd semester.

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (Computer Science & Engineering) –4th Semester

w.e.f. 2025-26

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Dissertation	DISS-MTCSE-202A	Dissertation (Phase-2)	-	-	20	20	20	250		500	750	
Total Credits								**20**				**750**	

Course Code	**DISS-MTCSE-202A**				
Category	Lab Courses				
Course Title	Dissertation				
Scheme and Credits	L	T	P	**Credits**	**Semester-IV**
	0	0	20	20	
Course Objectives	The objectives of this course are to • Introduce research fundamentals and help identify relevant topics in Computer Science and Engineering. • Understand literature review, structured research methodology and documentation of results and conclusions. • Develop skills in using research tools, technical writing, referencing, and report formatting. • Analyze, evaluate, and present research findings through effective report or thesis preparation.				
Assessment	250Marks				
End Semester Examination	500 Marks				
Total	750Marks				
Duration of Exam	03Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Identify the research topic/area relevant to the field of Computer Science and Engineering to carry out the research.
CO2	Understand the research process, literature review, result formulation and writing conclusions with reference to existing literature.
CO3	Apply appropriate tools, references and writing skills for effective report writing related to research work.
CO4	Analyze and synthesize research findings to the agreed area of research carried out.
CO5	Evaluate the research methods and available knowledge to propose appropriate solutions to the specific research problem.
CO6	Design engineering solutions by developing improved results, properly documenting them in a thesis or report, and publishing them in journals or conferences.

Dissertation Phase-1 will continue as the final dissertation in the 4th semester. Sessional marks, out of 250, will be awarded by an internal committee constituted by the Head of the Department. The assessment will be based on presentations, reports, and related materials submitted to the committee. Failure to appear before the committee will result in disqualification from submitting the dissertation.

If a student scores less than 40% in the sessional assessment, they must revise and resubmit the dissertation after incorporating all required corrections and improvements. The revised dissertation will be evaluated in the next academic session.

At the end of the semester, each student is required to submit three soft-bound copies of their Master's dissertation to the office of the Head of the Department. One copy will be retained for departmental records, one will be provided to the supervisor, and one will be sent by mail to the external examiner, following their appointment and notification from the university.

The dissertation will be evaluated by a committee consisting of the Head of the Department, the dissertation supervisor(s), and one external examiner. The external examiner will be appointed by the Chairman of the Board of Studies. If the appointed examiner is unable to attend, the Director of the Institute, upon the recommendation of the Head of the Department, is authorized to appoint a substitute examiner from another institution or the parent institute.

Students must defend their dissertation through a presentation before the evaluation committee, which will assign marks accordingly.

Note:

- The scheme for awarding grades will be provided by the department to the examiner(s).
- The plagiarism of the dissertation report must be below 10%; otherwise, the report will not be accepted.
- Each student must publish at least one research paper related to their dissertation work in a peer-reviewed journal, IEEE conference, or SCOPUS/SCI-indexed journal before the final submission of Dissertation Phase-2.
- The student must follow the guidelines for the Dissertation report format as per Annexure-I.