Muffakham Jah College of Engineering and Technology

(Sultan-ul-Uloom Education Society)

An Autonomous Institution

Approved by AICTE and Affiliated to Osmania University

Accredited by NAAC with A+ Grade and NBA Accreditation for CE, CSE, ECE & MECH.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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Scheme and Syllabus of M.Tech (Computer Science and Engineering)

(R26 Regulations)

Academic Year 2026-2027

Summary of Category-wise Credit Distribution M.Tech. (CSE)

S.NO	CATEGORY	ABBREVIATION	CREDITS
1	Professional Core Courses	PC	16.5
2	Mandatory Courses	MC	3
3	Professional Electives	PE	12
4	Open Electives	OE	3
5	Project Work and Seminar	PW	30.5
6	MOOCS/NPTEL	MOOCS/NPTEL COURSE	3
		TOTAL CREDITS	68

CREDIT SUMMARY OF I-IV SEMESTERS (SEMESTER-WISE)

S.NO	SEMESTER	NO.OF CREDITS
1	I	19.5
2	II	19.5
3	III	13
4	IV	16
	TOTAL CREDITS	68

M.TECH (CSE) SEMESTER-I

S. No.	Course Type/Code	Course Name	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	26PC2101CS	Deep Learning	3	-	-	3	40	60	3	3
2	26PC2102CS	Gen AI	3	-	-	3	40	60	3	3
3	Professional Elective – I	1.Database Programming with PL/SQL 2. Mathematical Foundations of Computer Science 3. Natural Language Processing 4. Advanced UNIX Programming	3	-	-	3	40	60	3	3
4	Professional Elective – II	1. Applied Cryptography 2. Software Quality Engineering 3. Mining Massive Datasets 4. Advanced Data Structures	3	-	-	3	40	60	3	3
5	26OE910XYZ	Open Elective	3	-	-	3	40	60	3	3
6	26AD900XYZ	Audit Course-I	2	-	-	2	50	-	-	0
7	26PC2151CS	Deep Learning Lab	-	-	3	3	40	60	3	1.5
8	26PC2152CS	Gen AI Lab	-	-	3	3	40	60	3	1.5
9	26PW2154CS	Seminar	-	-	3	3	50	--	3	1.5
		Total	**17**	**-**	**09**	**26**	**380**	**420**	**24**	**19.5**

M.TECH (CSE) SEMESTER-II

S. No.	Course Type/Code	Course Name	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	26PC2103CS	Advanced Algorithms	3	-	-	3	40	60	3	3
2	26PC2104CS	Agentic AI Engineering	3	-	-	3	40	60	3	3
3	Professional Elective – III	1. Enterprise Cloud Concepts 2. Cyber Security 3. Parallel Computing 4. Large Language Models	3	-	-	3	40	60	3	3
4	Professional Elective – IV	1. Advanced Operating Systems 2. Adhoc Sensor Networks 3. Quantum Computing 4. Advanced Computer Architecture	3	-	-	3	40	60	3	3
5	26SD5125ME	Research Methodology & IPR	3	-	-	3	40	60	3	3
6	26AD901XYZ	Audit Course-II	2	-	-	2	50	-	-	0
7	26PC2153CS	Agentic AI Engineering Lab	-	-	3	3	40	60	3	1.5
8	26PW2155CS	Mini Project with Seminar	-	-	6	6	40	60	3	3
Total			**17**	**-**	**09**	**26**	**330**	**420**	**21**	**19.5**

SEMESTER-III

S. No.	Course Type/Code	Course Name	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1		MOOCS/ NPTEL Courses	As per MOOCS/ NPTEL							3
2	26PW2156CS	Dissertation-I	-	-	20	20	40	60	3	10
		Total	**-**	**-**	**20**	**20**	**40**	**60**	**3**	**13**

SEMESTER-IV

S. No.	Course Type/Code	Course Name	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	26PW2157CS	Dissertation-II	-	-	32	32	50	150	-	16
		Total	**-**	**-**	**32**	**32**	**50**	**150**	-	**16**

*The concerned department should notify the list of NPTEL courses before the start of I semester.
* The student may complete the NPTEL course anytime from Semester-I to Semester-III. However, it will be considered in Semester-III only.

PC: Program Core **PE:** Professional Elective **OE**: Open Elective **AD**: Audit Course
MC: Mandatory Course **HS**: Humanities and social science

L: Lecture **T**: Tutorial **P**: Practical **D**: Drawing
CIE: Continuous Internal Evaluation **SEE:** Semester End Examination (Univ. Exam)

List of Subjects of Professional Electives I to IV

	Professional Electives			
Professional Elective I	**26PE2101CS** Database Programming with PL/SQL	**26PE2102CS** Mathematical Foundations of Computer Science	**26PE2103CS** Natural Language Processing	**26PE2104CS** Advanced UNIX Programming
Professional Elective II	**26PE2105CS** Applied Cryptography	**26PE2106CS** Software Quality Engineering	**26PE2107CS** Mining Massive Datasets	**26PE2108CS** Advanced Data Structures
Professional Elective III	**26PE2109CS** Enterprise Cloud Concepts	**26PE2110CS** Cyber Security	**26PE2111CS** Parallel Computing	**26PE2112CS** Large Language Models
Professional Elective IV	**26PE2113CS** Advanced Operating Systems	**26PE2114CS** Adhoc Sensor Networks	**26PE2115CS** Quantum Computing	**26PE2116CS** Advanced Computer Architecture

LIST OF SUBJECTS FOR AUDIT COURSE-I (AD-I)

S. No.	Course Code	Course Title
1	26AD9001HS	English for Research Paper Writing
2	26AD9002CE	Disaster Management
3	26AD9003HS	Sanskrit for Technical Knowledge
4	26AD9004HS	Value Education

LIST OF SUBJECTS FOR AUDIT COURSE-II (AD-II)

S. No.	Course Code	Course Title
1.	26AD9011HS	Constitution of India and Fundamental Rights
2.	26AD9012HS	Pedagogy Studies
3.	26AD9013HS	Stress Management by Yoga
4.	26AD9014HS	Personality Development through Life Enlightenment Skills

LIST OF OPEN ELECTIVES

S. No.	Course Code	Course Title
1	26OE9101CE	Cost Management of Engineering Projects
2	**26OE9102CS	Business Analytics**
3	26OE9103EC	Embedded Systems Design
4	26OE9104EE	Waste to Energy
5	26OE9105ME	Industrial Safety

Note: ** Open Elective course is not offered to the students of CSE,CSM and IT Departments.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

DEEP LEARNING

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PC2101CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand the complexity of Deep Learning algorithms and their limitations 2. To develop the ability to perform experiments in Deep Learning using real-world data.	1. Implement deep learning algorithms, understand the architecture and working of neural network layers 2. Learn topics such as convolutional neural networks, recurrent neural networks, training deep networks and high-level interfaces 3. Understand applications of Deep Learning to Computer Vision 4. Analyze deep learning applications in NLP

UNIT - I

Introduction: Feed forward Neural networks, Gradient descent and the back propagation algorithm, Unit saturation, the vanishing gradient problem, and ways to mitigate it. ReLU, Heuristics for avoiding bad local minima, Heuristics for faster training, Nesterov accelerated gradient descent, Regularization, Dropout

UNIT - II

Convolutional Neural Networks: Architectures, convolution/pooling layers, Recurrent Neural Networks: LSTM, GRU, Encoder Decoder architectures. Deep Unsupervised Learning: Auto encoders, Variational Auto-encoders, Adversarial Generative Networks, Auto-encoder and DBM Attention and memory models, Dynamic Memory Networks.

UNIT - III

Applications of Deep Learning to Computer Vision: Image segmentation, object detection, automatic image captioning, Image generation with Generative Adversarial networks, video to text with LSTM models, Attention Models for computer vision tasks

UNIT -IV

Applications of Deep Learning to NLP: Introduction to NLP and Vector Space Model of Semantics, Word Vector Representations: Continuous Skip-Gram Model, Continuous Bag-of-Words model (CBOW), GloVe, Evaluations and Applications in word similarity

UNIT -V

Analogy reasoning: Named Entity Recognition, Opinion Mining using Recurrent Neural Networks: Parsing and Sentiment Analysis using Recursive Neural Networks: Sentence Classification using Convolutional Neural Networks, Dialogue Generation with LSTMs

TEXT BOOKS:

1. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.
2. The Elements of Statistical Learning by T. Hastie, R. Tibshirani, and J. Friedman, Springer.
3. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.

REFERENCES:

1. Bishop, C, M., Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
3. Golub, G.,H., and Van Loan, C.,F., Matrix Computations, JHU Press,2013.
4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

Online Resources:

1. http://www.deeplearning.net
2. https://www.deeplearningbook.org/
3. https://developers.google.com/machine-learning/crash-course/ml-intro
4. https://www.cs.toronto.edu/~fritz/absps/imagenet.pdf
5. http://neuralnetworksanddeeplearning.com/

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GEN AI

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PC2102CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introduce the foundations, evolution, and core concepts of AI, ML, DL, NLP, and Generative AI. 2. To develop an understanding of advanced neural architectures and generative models such as GANs, VAEs, and Transformers. 3. To explore Large Language Models, prompt engineering, and their real-world applications. 4. To familiarize learners with frameworks, multimodal applications, and ethical considerations in Generative AI.	1. Demonstrate knowledge of AI foundations, generative models, and advanced neural architectures. 2. Apply generative AI techniques to create solutions for text, image, video, and multimodal tasks. 3. Design, fine-tune, and optimize Large Language Models for specific applications. 4. Evaluate ethical, social, and legal implications of Generative AI deployment and propose mitigation strategies

UNIT-I

Foundations of AI and Generative Models

Introduction and historical evolution of Artificial Intelligence (AI), Machine Learning (ML), Natural Language Processing (NLP) and Deep Learning (DL), Structure of Artificial Neural Networks (ANNs), Mathematical and computational foundations of generative modeling, Overview of generative models and their applications across various domains; Importance of Generative AI in modern applications, Transfer learning and in advancing Generative AI

UNIT-II

Advanced Neural Architectures for Generative AI

Variational Autoencoders (VAEs): principles and applications, Generative Adversarial Networks (GANs): architecture and working principles; Transformer architecture and attention mechanisms (in detail); Long Short-Term Memory Networks (LSTMs) and the limitations of traditional RNNs/LSTMs, Advanced Transformer architectures and techniques, Pre-training and transfer learning strategies for generative models

UNIT-III

Large Language Models and Prompt Engineering

Overview of Large Language Models (LLMs), GPT architecture, variants, and working principles, Pre-training and fine-tuning GPT models for applications (e.g., chatbots, text generation), Case study: GPT-based customer support chatbot, BERT architecture, pre-training objectives, and fine-tuning, Prompt Engineering: Designing effective prompts, controlling model behavior, and improving output quality, Fine-tuning language models for creative writing and chatbot development

UNIT-IV

Multi-Agent Systems and Generative AI Applications

Introduction to Multi-Agent Systems (MAS), Types of agents: reactive, deliberative, hybrid, and learning agents, Multi-agent collaboration and orchestration for generative tasks, Use cases: autonomous research assistants, cooperative creative generation, distributed problem-solving, Frameworks and tools: AutoGen, CrewAI and HuggingGPT for LLM-powered multi-agent systems, Generative AI applications: Art, Creativity, Image/Video generation, Music composition, Healthcare, Finance, Real-world case studies and deployment challenges

UNIT-V

Frameworks, Multimodal Applications, and Ethics

LangChain framework: components and LLM application development, Retrieval-Augmented Generation (RAG), Embeddings, Indexing techniques, and Vector Databases, Generative AI across modalities: Text, Code, Image, and Video generation, Image and Video generation using GANs and VAEs, Multimodal Generative AI: integration and training strategies, Ethical considerations: bias, fairness, trust, and responsible AI deployment, Social and legal implications of Generative AI, Risk mitigation strategies and real-world ethical case studies

TEXT BOOKS

1. Altaf Rehmani, Generative AI for Everyone: Understanding the Essentials and Applications of This Breakthrough Technology.
2. Charu C. Aggarwal, Neural Networks and Deep Learning: A Textbook. Joseph Babcock, Raghav Bali, Generative AI with Python and TensorFlow 2, 2024.

REFERENCE BOOKS

1. Josh Kalin, Generative Adversarial Networks Cookbook.
2. Jesse Sprinter, Generative AI in Software Development: Beyond the Limitations of Traditional Coding, 2024.

ONLINE REFERENCES

1. Fabian Gloeckle et al., Better & Faster Large Language Models via Multi-token Prediction, arXiv:2404.19737v1, 2024.
2. Vaswani et al., Attention Is All You Need, NeurIPS 2017.
3. Lewis et al., Retrieval-Augmented Generation (RAG).

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

DATABASE PROGRAMMING WITH PL/SQL (PE-I)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2101CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand the significance of SQL fundamentals. 2. Evaluate functions and triggers of PL/SQL 3. To understand PL/SQL control structures, packages and applications	1. Understand the fundamentals of PL/SQL programming. 2. Implement functions and procedures using PL/SQL 3. Understand the importance of triggers in database

Unit-I

PL/SQL Basics

Block Structure, Behavior of Variables in Blocks, Basic Scalar and Composite Data Types, Control Structures, Exceptions, Bulk Operations, Functions, Procedures, and Packages, Transaction Scope

Unit-II

Language Fundamentals & Control Structures

Lexical Units, Variables and Data Types, Conditional Statements, Iterative Statements, Cursor Structures, Bulk Statements, Introduction to Collections, Object Types: Varray and Table Collections, Associative Arrays, Oracle Collection API

Unit-III

Functions and Procedures

Function and Procedure Architecture, Transaction Scope, Calling Subroutines, Positional Notation, Named Notation, Mixed Notation, Exclusionary Notation, SQL Call Notation, Functions, Function Model Choices, Creation Options, Pass-by-Value Functions, Pass-by-Reference Functions, Procedures, Pass-by-Value Procedures, Pass-by-Reference Procedures, Supporting Scripts.

Unit-IV

Packages

Package Architecture, Package Specification, Prototype Features, Serially Reusable Precompiler Directive, Variables, Types, Components: Functions and Procedures, Package Body, Variables, Types, Components: Functions and Procedures, Definer vs. Invoker Rights Mechanics, Managing Packages in the Database Catalog, Finding, Validating, and Describing Packages, Checking Dependencies, Comparing Validation Methods: Timestamp vs. Signature.

Unit-V

Triggers

Introduction to Triggers, Database Trigger Architecture, Data Definition Language Triggers, Event Attribute Functions, Building DDL Triggers, Data Manipulation Language Triggers, Statement-Level Triggers, Row-Level Triggers, Compound Triggers, INSTEAD OF Triggers, System and Database Event Triggers, Trigger Restrictions, Maximum Trigger Size, SQL Statements, LONG and LONG RAW Data Types.

TEXT BOOKS:

1. Oracle Database 19c PL/SQL Programming Michael McLaughlin, McGraw Hill Education.

REFERENCES:

1. Benjamin Rosenzweig, Elena Silvestrova Rakhimov, *Oracle PL/SQL by example* Fifth Edition.
2. Dr. P. S. Deshpande, *SQL & PL / SQL for Oracle 11g Black Book.*

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2102CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introduce the fundamentals of discrete mathematics for computer science and engineering. 2. To provide knowledge of formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.	1. Demonstrate the ability to understand and construct precise mathematical proofs. 2. Ability to use logic and set theory to formulate precise statements. 3. Ability to analyze and solve counting problems on finite and discrete structures. 4. Ability to describe and manipulate sequences. 5. Ability to apply graph theory in solving computing problems.

UNIT-I

The Foundations Logic and Proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

UNIT-II

Basic Structures, Sets, Functions, Sequences, Sums, Matrices and Relations: Sets, Functions, Sequences & Summations, Cardinality of Sets, Matrices and Relations, Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

UNIT-III

Algorithms, Induction and Recursion: Algorithms, The Growth of Functions, Complexity of Algorithms. Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness.

UNIT-IV

Discrete Probability and Advanced Counting Techniques:

An Introduction to Discrete Probability. Probability Theory, Bayes' Theorem, Expected Value and Variance. Advanced Counting Techniques:

Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion-Exclusion, Applications of Inclusion-Exclusion.

UNIT-V

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.

Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees.

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, , 1st ed, McGraw-Hill.
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham Kandel, Theodore P. Baker, 2nd ed, Prentice Hall of India

REFERENCE:

1. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimaldi, 5th edition, Pearson education.
2. Discrete Mathematical Structures: Thomas Koshy, Tata McGraw Hill.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

NATURAL LANGUAGE PROCESSING (PE-I)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2103CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introduce the major problems and solutions in NLP and their relation to linguistics and statistics.	1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars. 2. Apply experimental methodologies for training and evaluating NLP systems 3. Apply probabilistic models over strings and trees, and estimate parameters using supervised and unsupervised training methods. 4. Design, implement, and analyze NLP algorithms. 5. Design different language modeling Techniques.

UNIT-I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT-II

Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT-III

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT-IV

Predicate-Argument Structure, Meaning Representation Systems, Software, Semantic Role Labeling, Frame Semantics, AMR.

UNIT-V

Discourse Processing: Cohesion, Reference Resolution, Discourse Cohesion and Structure Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross Lingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

REFERENCES:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H. Martin, Pearson Publications.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

ADVANCED UNIX PROGRAMMING (PE-I)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2104CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand and make effective use of Linux utilities and Shell scripting language (bash) to solve problems. 2. To implement in C some standard Linux utilities such as ls, mv, cp etc. using system calls. 3. To develop the skills necessary for systems programming including file system programming, process and signal management, and Inter Process Communication. 4. To develop the basic skills required to write network programs using socket programming.	1. Work confidently in Linux environment. 2. Work with shell script to automate different tasks as Linux administration. 3. Implement Unix System Calls 4. Develop IPC applications. 5. Develop socket-based client server applications

UNIT- I

Linux Utilities - File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities.

Shell programming with Bourne again Shell (Bash) - Introduction, shell responsibilities, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell metacharacters, filename substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

UNIT- II

Files and Directories - File Concept, File types, File System Structure, file metadata-Inodes, kernel support for files, system calls for file I/O operations- open, creat, read, write, close, lseek, dup2, file status information-stat family, file and record locking- fcntl function, file permissions - chmod, fchmod, file ownership-chown, lchown, fchown, links-soft links and hard links – symlink, link, unlink.

Directories

- Creating, removing and changing Directories- mkdir, rmdir, chdir, obtaining current working directory-getcwd, Directory contents, Scanning Directories-opendir, readdir, closedir, rewinddir functions.

UNIT- III

Process – Process concept, Layout of a C program image in main memory, Process environment-environment list, environment variables, getenv, setenv, Kernel support for process, process identification, process control - process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process, system call interface for process management-fork, vfork, exit, wait, waitpid, exec family, Process Groups, Sessions and Controlling Terminal, Differences between threads and processes.

Signals – Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.

UNIT- IV

Interprocess Communication - Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pipes-creation, IPC between related processes using unnamed pipes, FIFOs-creation, IPC between unrelated processes using FIFOs (Named pipes), differences between unnamed and named pipes, popen and pclose library functions. **Message Queues** - Kernel support for messages, APIs for message queues, client/server example. **Semaphores** - Kernel support for semaphores, APIs for semaphores, file locking with semaphores.

UNIT- V

Shared Memory - Kernel support for shared memory, APIs for shared memory, shared memory example. **Sockets** - Introduction to Berkeley Sockets, IPC over a network, Client- Server model, Socket address structures (Unix domain and Internet domain), Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs-Single Server-Client connection, Multiple simultaneous clients, Socket options- setsockopt and fcntl system calls, Comparison of IPC mechanisms.

TEXT BOOKS:

1. Unix System Programming using C++, T. Chan, PHI.
2. Advanced Programming in the Unix Environment, 2nd edition, W. R. Stevens and S. A. Rago, Pearson Education.
3. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.
4. Unix Network Programming, W. R. Stevens, PHI.

REFERENCE BOOKS:

1. C Programming Language, Kernighan and Ritchie, PHI.
2. Beginning Linux Programming, 4th Edition, N. Matthew, R. Stones, Wrox, Wiley India Edition.
3. Unix for Programmers and Users, 3rd Edition, Graham Glass, King Ables, Pearson.
4. System Programming with C and Unix, A. Hoover, Pearson.
5. Unix System Programming, Communication, Concurrency and Threads, K. A. Robbins and S. Robbins, Pearson Education.

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An Autonomous Institution

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

APPLIED CRYPTOGRAPHY (PE-II)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2105CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand the significance of cryptographic protocols and symmetric and public key algorithms	1. Understand the various cryptographic protocols 2. Analyze key length and algorithm types and modes 3. Illustrate different public key algorithms in cryptosystems 4. Analyze advanced cryptographic protocols and their real world applications.

Unit-I Foundations:

Terminology, Steganography, Substitution Ciphers and Transposition Ciphers, Simple XOR, One-Time Pads, Computer Algorithms, Large Numbers,

Cryptographic Protocols: Protocol Building Blocks

Introduction to Protocols, Communications Using Symmetric Cryptography, One-Way Functions, One-Way Hash Functions, Communications Using Public-Key Cryptography, Digital Signatures, Digital Signatures with Encryption, Random and Pseudo-Random-Sequence Generation

Unit-II Cryptographic Techniques

Key length: Symmetric Key length, Public key length, comparing symmetric and public key length. **Algorithm types and modes:** Electronic Codebook Mode, Block Replay, Cipher Block Chaining Mode, Stream Cipher, Self-Synchronizing Stream Ciphers, Cipher-Feedback Mode, Synchronous Stream Ciphers, Output-Feedback Mode, Counter Mode, Other Block-Cipher Modes.

Unit-III Public-Key Algorithms

Background, Knapsack Algorithms, RSA, Pohlig-Hellman, Rabin, ElGamal, McEliece, Elliptic Curve Cryptosystems, LUC, Finite Automaton Public-Key Cryptosystems

Public-Key Digital Signature Algorithms: Digital Signature Algorithm (DSA), DSA Variants, Gost Digital Signature Algorithm, Discrete Logarithm Signature Schemes, Ong-Schnorr-Shamir, ESIGN

Unit-IV Special Algorithms for Protocols

Multiple-Key Public-Key Cryptography, Secret-Sharing Algorithms, Subliminal Channel, Undeniable Digital Signatures, Designated Confirmer Signatures, Computing with Encrypted Data, Fair Coin Flips, One-Way Accumulators, All-or-Nothing Disclosure of Secrets, Fair and Failsafe Cryptosystems, Zero-Knowledge Proofs of Knowledge, Blind Signatures, Oblivious Transfer, Secure Multiparty Computation, Probabilistic Encryption, Quantum Cryptography

Unit-V Real World Approaches

IBM Secret key management protocol, ISDN, Kerberos, KryptoKnight, Privacy enhanced mail (PEM), Message security protocol (MSP), PGP, Public-Key Cryptography Standards (PKCS), Universal Electronic Payment System (UEPS).

TEXT BOOKS:

1. Bruce Schneier, Applied Cryptography, Second Edition: Protocols, Algorithms, and Source Code in C (cloth).

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

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An Autonomous Institution

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

SOFTWARE QUALITY ENGINEERING (PE-II)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2106CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand Software Quality, Quality assurance, Quality engineering.	1. Understand software quality and its perspectives 2. Analyze defect prevention and defect reduction in software quality assurance 3. Evaluate software quality engineering activities and processes

Unit-I

Software Quality

Quality: perspectives and expectations, Quality frameworks and ISO-9126, correctness and defects: Definitions, properties and Measurements, A historical perspective of quality, software quality.

Unit-II

Quality Assurance

Classification: QA as dealing with defects, Defect prevention- Education and training, Formal methods, Other defect prevention techniques, Defect Reduction - Inspection: Direct fault detection and removal, Testing: Failure observation and fault removal, other techniques and risk identification, Defect Containment- software fault tolerance, safety assurance and failure containment

Unit-III

Quality Engineering: Activities and process, Quality planning: Goal setting and Strategy formation, Quality assessment and Improvement, Quality engineering in software process.

Unit-IV

Test Activities, Management and Automation

Test planning and preparation, Test execution, Result checking and measurement, Analysis and follow-up, Activities, People and Management, Test Automation.

Unit-V

Coverage and Usage Testing based on checklist and partitions

Checklist based testing and its limitations, Testing for partition Coverage, Usage Based Statistical testing with Musa's operational profiles, Constructing Operational Profiles

Case Study: OP for the cartridge Support Software

TEXT BOOKS:

1. Jeff Tian, Software Quality Engineering, Testing, Quality Assurance, and Quantifiable improvement
2. Richard N. Taylor, Software Architecture: Foundations, Theory, and Practice

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

MINING MASSIVE DATASETS (PE-II)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2107CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand practical algorithms for mining massive datasets. 2. To understand parallel algorithmic techniques for processing large-scale datasets. 3. To apply stream processing, PageRank, recommendation systems, and online advertising algorithms.	1. Handle massive data using MapReduce. 2. Develop and implement algorithms for massive data sets and methodologies in the context of data mining. 3. Understand the algorithms for extracting models and information from large datasets 4. Design and implement recommendation systems using collaborative and content-based filtering techniques. 5. Gain experience in matching various algorithms for particular classes of problems.

UNIT-I

Data Mining-Introduction-Definition of Data Mining-Statistical Limits on Data Mining,
MapReduce and the New Software Stack-Distributed File Systems, MapReduce, Algorithms Using MapReduce.

UNIT-II

Similarity Search: Finding Similar Items-Applications of Near-Neighbor Search, Shingling of Documents, Similarity-Preserving Summaries of Sets, Distance Measures.
Streaming Data: Mining Data Streams-The Stream Data Model , Sampling Data in a Stream, Filtering Streams

UNIT-III

Link Analysis-PageRank, Efficient Computation of PageRank, Link Spam
Frequent Itemsets-Handling Larger Datasets in Main Memory, Limited-Pass Algorithms, Counting Frequent Items in a Stream.
Clustering-The CURE Algorithm, Clustering in Non-Euclidean Spaces, Clustering for Streams and Parallelism

UNIT-IV

Advertising on the Web-Issues in On-Line Advertising, On-Line Algorithms, The Matching Problem, The Adwords Problem, Adwords Implementation.
Recommendation Systems-A Model for Recommendation Systems, Content-Based Recommendations, Collaborative Filtering, Dimensionality Reduction, The NetFlix Challenge.

UNIT-V

Mining Social-Network Graphs-Social Networks as Graphs, Clustering of Social-Network Graphs, Partitioning of Graphs, Simrank, Counting Triangles

TEXT BOOKS:

1. Jure Leskovec, Anand Rajaraman, Jeff Ullman, Mining of Massive Datasets, 3rd Edition.

REFERENCE BOOKS:

1. Jiawei Han & Micheline Kamber, Data Mining – Concepts and Techniques 3rd Edition Elsevier.
2. Margaret H Dunham, Data Mining:Introductory and Advanced topics, Pearson.
3. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

ADVANCED DATA STRUCTURES (PE-II)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2108CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand heap-based data structures such as leftist trees, binomial heaps, Fibonacci and min-max heaps. 2. To analyze advanced search and indexing data structures such as disjoint sets, hash tables, search and digital search structures.	1. Ability to select the data structures that efficiently model the information in a problem. 2. Ability to understand how the choice of data structures impact the performance of programs. 3. Design efficient programs using advanced data structures, including hash tables, search structures and digital search structures.

UNIT-I

Heap Structures

Introduction, Min-Max Heaps, Leftist trees, Binomial Heaps, Fibonacci heaps.

UNIT-II

Hashing and Collisions

Introduction, Hash Tables, Hash Functions, Different Hash Functions:- Division Method, Multiplication Method, Mid-Square Method, Folding Method, Collisions

UNIT-III

Search Structures

OBST, AVL trees, Red-Black trees, Splay trees,

Multiway Search Trees

B-trees, 2-3 trees

UNIT-IV

Digital Search Structures

Digital Search trees, Binary tries and Patricia trees, Multiway Tries, Suffix trees, Standard Tries, Compressed Tries

UNIT-V

Pattern matching

Introduction, Brute force, the Boyer –Moore algorithm, Knuth-Morris-Pratt algorithm, Naïve String, Harspool, Rabin Karp

TEXT BOOKS:

1. Fundamentals of data structures in C++ Sahni, Horowitz, Mehta, Universities Press.
2. Introduction to Algorithms, TH Cormen, PHI

REFERENCES:

1. Design methods and analysis of Algorithms, SK Basu, PHI.
2. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education.
3. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

DEEP LEARNING LAB (LAB - I)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):0:0:3	SEE Marks : 60	Course Code: 26PC2151CS
Credits : 1.5	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To Build the Foundation of Deep Learning. 2. To Understand How to Build the Neural Network. 3. To enable students to develop successful machine learning concepts.	1. Learn the Fundamental Principles of Deep Learning. 2. Identify the Deep Learning Algorithms for Various Types of Learning Tasks in various domains. 3. Implement Deep Learning Algorithms and Solve Real-world problems.

LIST OF EXPERIMENTS:

1. Setting up the Spyder IDE Environment and Executing a Python Program
2. Installing Keras, Tensorflow and Pytorch libraries and making use of them
3. Applying the Convolution Neural Network on computer vision problems
4. Image classification on MNIST dataset (CNN model with Fully connected layer)
5. Applying the Deep Learning Models in the field of Natural Language Processing
6. Train a sentiment analysis model on IMDB dataset, use RNN layers with LSTM/GRU notes
7. Applying the Autoencoder algorithms for encoding the real-world data
8. Applying Generative Adversial Networks for image generation and unsupervised tasks.

TEXT BOOKS:

1. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.
2. The Elements of Statistical Learning by T. Hastie, R. Tibshirani, and J. Friedman, Springer.
3. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.

REFERENCES:

1. Bishop, C, M., Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
3. Golub, G.,H., and Van Loan, C.,F., Matrix Computations, JHU Press,2013.
4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

Extensive Reading:

1. http://www.deeplearning.net
2. https://www.deeplearningbook.org/
3. https://developers.google.com/machine-learning/crash-course/ml-intro
4. http://www.cs.toronto.edu/~fritz/absps/imagenet.pdf
5. http://neuralnetworksanddeeplearning.com/

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(SULTAN-UL-ULOOM EDUCATION SOCIETY)

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

GEN AI LAB (LAB - II)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):0:0:3	SEE Marks : 60	Course Code: 26PC2152CS
Credits : 1.5	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand and use modern Generative AI development environments. 2. Develop applications using Large Language Models and prompt engineering. 3. Build Retrieval-Augmented Generation (RAG) applications using vector databases. 4. Design intelligent AI assistants and multi-agent applications. 5. Develop and deploy Generative AI applications following ethical AI practices.	**CO1:** Configure Generative AI development environments and access foundation model APIs. **CO2:** Develop applications using prompt engineering and Large Language Models. **CO3:** Build intelligent applications using embeddings, vector databases, and Retrieval-Augmented Generation (RAG). **CO4:** Develop multi-agent AI applications using modern orchestration frameworks. **CO5:** Design, evaluate, and deploy Generative AI applications while considering ethical and responsible AI principles.

List of Experiments

1. Installation and configuration of Python, Jupyter Notebook, VS Code, Git, Hugging Face, OpenAI/Gemini APIs, and Generative AI development environment.
2. Implement prompt engineering techniques including Zero-shot, One-shot, Few-shot, Chain-of-Thought, and Role Prompting using an LLM.
3. Develop a conversational chatbot using an LLM API with conversational memory.
4. Generate and summarize text using transformer-based language models (GPT/Llama/Gemma).
5. Develop a document Question Answering system using embeddings and Retrieval-Augmented Generation (RAG).
6. Implement semantic search using vector databases such as FAISS or ChromaDB.
7. Generate images using diffusion models (Stable Diffusion/DALL·E) and compare with GAN-based image generation.
8. Fine-tune a pre-trained transformer model (or implement parameter-efficient fine-tuning using LoRA/PEFT) for text classification or domain adaptation.
9. Develop an AI agent with tool-calling capability using LangChain or LangGraph.
10. Design and implement a multi-agent collaborative system using CrewAI, AutoGen, or LangGraph for task planning and execution.
11. Build a multimodal Generative AI application integrating text with image or document inputs (e.g., image captioning, visual question answering, or document understanding).
12 (Mini Project).Design, develop, and deploy an end-to-end Generative AI application using LLMs, RAG, vector databases, and agent frameworks for a real-world problem such as:

- AI Tutor
- Customer Support Chatbot
- Smart Document Assistant
- Healthcare Information Assistant
- Code Generation Assistant
- Research Assistant

Software Requirements

- Python 3.12+
- Visual Studio Code
- Jupyter Notebook
- Git & GitHub
- Hugging Face Transformers
- PyTorch or TensorFlow
- LangChain
- LangGraph
- CrewAI or AutoGen
- FAISS / ChromaDB
- OpenAI API / Google Gemini API
- Streamlit or Gradio
- FastAPI (optional)

Recommended References

1. Chip Huyen, *AI Engineering*, O'Reilly, 2025.
2. Delip Rao and Brian McMahan, *Natural Language Processing with PyTorch*, O'Reilly.
3. Lewis Tunstall, Leandro von Werra, and Thomas Wolf, *Natural Language Processing with Transformers*, O'Reilly.
4. Hugging Face Documentation.
5. LangChain and LangGraph Documentation.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

SEMINAR

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):0:0:3	SEE Marks : --	Course Code: 26PW2154CS
Credits : 1.5	CIE Marks : 50	Duration of SEE : ---

COURSE OBJECTIVES	COURSE OUTCOMES
1. Develop the ability to conduct a comprehensive literature review by referring to research journals and other scholarly resources. 2. Analyze and summarize research papers to identify key contributions, research gaps, and potential future scope in the chosen domain. 3. Enhance technical communication skills through effective seminar presentations and the preparation of well-structured technical reports following standard documentation practices.	1. Develop the habit of referring to research journals for literature review. 2. Understand the gist of the research paper. 3. Identify research gaps and further scope. 4. Present research work effectively using appropriate technical communication skills. 5. Prepare technical reports in the prescribed format.

Seminar topics may be chosen by the students with advice from the faculty members and the student shall read further relevant articles in the domain.

The seminar must be clearly structured and the PowerPoint presentation shall include following aspects:

1. Introduction to the field
2. Literature survey
3. Consolidation of available information
4. Summary and Conclusions
5. References

Each student is required to:

1. Deliver the seminar for a maximum duration of 30 minutes, where the presentation should be for 20 minutes in PowerPoint, followed by Question and Answer session for 10 minutes.
2. Submit the detailed report of the seminar in spiral-bound in a prescribed format as suggested by the Department.

Guidelines for awarding CIE marks (40)		
S. No.	**Description**	**Max. Marks**
1	Contents and relevance	10
2	Presentation skills	10
3	Preparation of PPT slides	05
4	Question and Answers	05
5	Report in a prescribed format	10

The Semester End Examination (SEE) shall be conducted by a Departmental Examination Committee consisting of Internal Examiners appointed by the Head of the Department.

The student shall:

- Present the seminar for **20 minutes** using PowerPoint.
- Participate in a **10-minute viva-voce/question-answer session**.
- Submit a **spiral-bound seminar report** in the prescribed format before the examination.
- Demonstrate thorough understanding of the selected research topic and future research directions.

Distribution of SEE Marks (60)

S. No.	Evaluation Component	Marks
1	Technical content and understanding of the selected topic	15
2	Literature survey, critical analysis and identification of research gap	10
3	Organization of presentation, communication skills and PPT quality	10
4	Ability to answer questions during viva-voce	10
5	Seminar report (technical quality, formatting, references and plagiarism compliance)	10
6	Novelty, future scope and overall assessment	5
	Total	**60**

Rules for Conducting SEE

1. The Semester End Examination shall consist of a **20-minute seminar presentation** followed by a **10-minute viva-voce**.
2. The student shall submit the seminar report at least **one week before** the commencement of the SEE.
3. The seminar topic shall preferably be selected from **recent research areas** related to the specialization, in consultation with the faculty supervisor.
4. The seminar shall be based on **at least five recent research papers** published in peer-reviewed/SCI/Scopus/Web of Science/UGC-CARE indexed journals or reputed international conferences.
5. The presentation shall include:
   - Introduction and Motivation
   - Literature Review
   - Comparative Analysis
   - Research Gap Identification
   - Proposed Scope/Future Directions
   - Conclusions
   - References
6. The seminar report shall contain:
   - Abstract
   - Introduction
   - Literature Review
   - Comparative Study
   - Research Gap
   - Discussion
   - Future Scope
   - Conclusions
   - References (IEEE/APA format)
7. Similarity (plagiarism) in the seminar report shall comply with the **UGC Plagiarism Regulations** and the institute's academic integrity policy.
8. The student shall answer questions posed by the examination committee to demonstrate conceptual understanding and critical thinking.
9. The evaluation shall be carried out by **at least two examiners**, preferably one internal and one external examiner. If an external examiner is not available, two senior internal faculty members nominated by the Head of the Department may conduct the evaluation.
10. The award of SEE marks shall be based on the student's presentation, technical knowledge, analytical ability, seminar report, and performance in the viva-voce.
11. A student who fails to appear for the SEE shall be treated as absent and shall reappear as per the university regulations.
12. The decision of the Examination Committee regarding evaluation shall be final.

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

(SULTAN-UL-ULOOM EDUCATION SOCIETY)

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

ADVANCED ALGORITHMS

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PC2103CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand the advanced methods of designing and analyzing algorithms. 2. To develop the ability to identify, select, and apply appropriate algorithms to solve specific computational problems. 3. To familiarize students with basic paradigms and data structures used to solve advanced algorithmic problems. 4. To understand different classes of problems concerning their computation difficulties. 5. To introduce the students to recent developments in the area of algorithmic design.	1. Analyze the complexity /performance of different algorithms. 2. Determine the appropriate data structure for solving a particular set of problems. 3. Categorize the different problems in various classes according to their complexity.

UNIT-I

Sorting:

Review of various sorting algorithms, topological sorting

Graph:

Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkstra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

UNIT-II

Matroids:

Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST.

Graph Matching:

Algorithm to compute maximum matching, Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.

UNIT-III

Flow-Networks:

Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

Matrix Computations:

Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.

UNIT-IV

Shortest Path in Graphs:

Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming.

Modulo Representation of integers/polynomials:
Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Extension to polynomials. Application: Interpolation problem.

Discrete Fourier Transform (DFT):
In complex field, DFT in modulo ring. Fast Fourier Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm.

UNIT-V
Linear Programming: Geometry of the feasibility region and Simplex algorithm
NP-completeness: Examples, proof of NP-hardness and NP-completeness.
Recent Trends in problem solving paradigms using advanced searching and sorting techniques by applying emerging data structures.

REFERENCES:
1.Cormen, Leiserson, Rivest, Stein, "Introduction to Algorithms".
2.Aho, Hopcroft and Ullman "The Design and Analysis of Computer Algorithms".
3.Kleinberg and Tardos."Algorithm Design".

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

AGENTIC AI ENGINEERING

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PC2104CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand the fundamentals of Agentic AI and intelligent autonomous systems. 2. Learn the architecture and working of AI agents powered by Large Language Models (LLMs). 3. Design AI agents capable of reasoning, planning, memory management, and tool utilization. 4. Explore Retrieval-Augmented Generation (RAG), multi-agent systems, and Model Context Protocol (MCP). 5. Evaluate, deploy, and secure production-ready Agentic AI applications.	**CO1:** Explain the concepts, architecture, and applications of Agentic AI systems. **CO2:** Design intelligent AI agents using LLMs, prompting techniques, and agent frameworks. **CO3:** Apply Retrieval-Augmented Generation (RAG), vector databases, and memory mechanisms to develop knowledge-driven AI agents. **CO4:** Develop multi-agent systems with tool integration, MCP, and workflow orchestration. **CO5:** Evaluate, deploy, monitor, and secure enterprise-scale Agentic AI applications following responsible AI principles.

UNIT-I:

Introduction to Agentic AI: Evolution of Artificial Intelligence, Generative AI vs. Agentic AI, Characteristics of Intelligent Agents, AI Agent Architecture, Agent Environment, Agent Perception and Action, Types of Intelligent Agents, Reactive Agents, Goal-Based Agents, Utility-Based Agents, Learning Agents, Autonomous Decision Making, Applications of Agentic AI

UNIT-II:

Large Language Models and Agent Design: Fundamentals of Large Language Models (LLMs), Prompt Engineering, Chain-of-Thought Prompting, ReAct Framework, Function Calling, Structured Outputs, Tool Calling, AI Agent Workflow, Planner, Executor, Reflection, Critic, Agent Development Frameworks, LangChain, LangGraph, CrewAI, Semantic Kernel (Overview)

UNIT-III:

Retrieval-Augmented Generation and Memory: Knowledge-Augmented AI, Retrieval-Augmented Generation (RAG), Embeddings, Vector Databases, Similarity Search, Chunking Techniques, Context Engineering, Long-Term Memory, Short-Term Memory, Episodic and Semantic Memory, Hybrid Search, Hallucination Reduction Techniques

UNIT-IV:

Tool-Using Agents and Multi-Agent Systems: API Integration, Tool Selection, Workflow Automation, Model Context Protocol (MCP), Agent-to-Agent Communication, Multi-Agent Collaboration, Task Planning, Orchestration, Human-in-the-Loop AI, Event-Driven Agents, Enterprise AI Agent Applications

UNIT-V:

Deployment, Security and Responsible AI: Evaluation of Agentic Systems, AI Agent Benchmarks, Monitoring and Observability, Guardrails, Prompt Injection Attacks, Tool Misuse, AI Safety, Responsible AI, Ethics and Governance, Privacy and Security, Cloud Deployment, Future Trends in Agentic AI

Recommended Text Books

1. Chip Huyen, *AI Engineering*, O'Reilly, 2025.
2. Russell & Norvig, *Artificial Intelligence: A Modern Approach*, 4th Edition, Pearson.
3. Emmanuel Ameisen, *Building LLM Applications for Production*, O'Reilly, 2025.
4. Harrison Chase, *LangChain in Action*, Manning Publications, 2025.

Reference Books

1. Chip Huyen, *Designing Machine Learning Systems*, O'Reilly.
2. *Hands-On Large Language Models*, O'Reilly.
3. Recent research papers on Agentic AI, RAG, MCP, and Multi-Agent Systems.

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

(SULTAN-UL-ULOOM EDUCATION SOCIETY)

An Autonomous Institution

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

ENTERPRISE CLOUD CONCEPTS (PE-III)

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2109CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1.To understand the significance of cloud computing and its fundamental concepts and models.	1. Understand the importance of cloud architecture 2. Illustrate the fundamental concepts of cloud security 3. Analyze various cloud computing mechanisms 4. Understanding the architecture and working of cloud computing.

Unit-I

Understanding Cloud Computing: Origins and influences, Basic Concepts and Terminology, Goals and Benefits, Risks and Challenges.

Fundamental Concepts and Models: Roles and Boundaries, Cloud Characteristics, Cloud Delivery Models, Cloud Deployment Models.

Unit-II

Cloud-Enabling Technology: Broadband Networks and Internet Architecture, Data Center Technology, Virtualization Technology

Cloud Computing Mechanisms: Cloud Infrastructure Mechanisms: Logical Network Perimeter, Virtual Server, Cloud Storage Device, Cloud Usage Monitor, Resource Replication

Unit-III

Cloud Management Mechanisms: Remote Administration System, Resource Management System, SLA Management System, Billing Management System, Case Study Example

Cloud Computing Architecture

Fundamental Cloud Architectures: Workload Distribution Architecture, Resource Pooling Architecture, Dynamic Scalability Architecture, Elastic Resource Capacity Architecture, Service Load Balancing Architecture, Cloud Bursting Architecture, Elastic Disk Provisioning Architecture, Redundant Storage Architecture, Case Study Example

Unit-IV

Cloud-Enabled Smart Enterprises: Introduction, Revisiting the Enterprise Journey, Service-Oriented Enterprises, Cloud Enterprises, Smart Enterprises, The Enabling Mechanisms of Smart Enterprises

Cloud-Inspired Enterprise Transformations: Introduction, The Cloud Scheme for Enterprise Success, Elucidating the Evolving Cloud Idea, Implications of the Cloud on Enterprise Strategy, Establishing a Cloud-Incorporated Business Strategy

Unit-V

Transitioning to Cloud-Centric Enterprises: The Tuning Methodology, Contract Management in the Cloud

Cloud-Instigated IT Transformations: Introduction, Explaining Cloud Infrastructures, A Briefing on Next-Generation Services, Service Infrastructures, Cloud Infrastructures, Cloud Infrastructure Solutions, Clouds for Business Continuity, The Relevance of Private Clouds, The Emergence of Enterprise Clouds

TEXT BOOKS:

1. Erl Thomas, Puttini Ricardo, Mahmood Zaigham, Cloud Computing: Concepts, Technology & Architecture 1st Edition,
2. Pethuru Raj, Cloud Enterprise Architecture, CRC Press

REFERENCE:

1. James Bond, The Enterprise Cloud, O'Reilly Media, Inc.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

CYBER SECURITY (PE-III)

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2110CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand various types of cyber-attacks and cyber-crimes 2. To learn threats and risks within the context of the cyber security 3. To have an overview of the cyber laws & concepts of cyber forensics 4. To study the defensive techniques against these attacks	1. Analyze and evaluate the cyber security needs of an organization. 2. Understand Cyber Security Regulations and Roles of International Law 3.Design and develop a security architecture for an organization. 4. Understand fundamental concepts of data privacy attacks

UNIT -I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, Motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy.

Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics

UNIT - III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations

UNIT - V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc

Cybercrime: Examples and Mini-Cases

Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.

Mini-Cases: The Indian Case of Online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B.B. Gupta, D.P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335,2018.

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(John) Wu,J. David Irwin, CRC Press T&FGroup.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

PARALLEL COMPUTING (PE-III)

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2111CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introduce the foundations of parallel Computing 2. To learn various parallel computing architectures and programming models 3. To gain knowledge of writing efficient parallel programs	1. To understand the concepts of parallel architectures 2. To select the data structures that efficiently model the information in a problem. 3. To develop an efficient parallel algorithm to solve it. 4. To implement an efficient and correct code to solve it, analyse its performance

Unit-I

Parallel Computing: Introduction, Motivation and scope - Parallel Programming Platforms – Basic Communication Operations

Unit-II

Principles of Parallel Algorithm Design - Analytical Modelling of Parallel Programs

Unit-III

Programming using Message Passing Paradigm (MPI) – Programming Shared Address Space Platforms (PThreads)

Unit-IV

Dense Matrix Algorithms (Matrix-Vector Multiplication, Matrix-Matrix Multiplication) – Sorting Algorithms (Issues, Bubble Sort, Quick Sort, Bucket Sort, Enumeration Sort, Radix Sort)

Unit-V

Graph Algorithms (Minimum Spanning Tree: Prim's Algorithm - Single-Source Shortest Paths: Dijkstra's Algorithm) Search Algorithms (DFS, BFS)

TEXT BOOK:

1. Introduction to Parallel Computing, Second Edition, Ananth Grama, George Karypis, Vipin Kumar, Anshul Gupta, Addison-Wesley, 2003, ISBN: 0201648652

REFERENCES:

1. Parallel Computing – Theory and Practice, Second Edition, Michael J. Quinn, Tata McGraw-Hill Edition.
2. Parallel Computers – Architectures and Programming, V. Rajaraman, C. Siva Ram Murthy, PHI.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

LARGE LANGUAGE MODELS (PE-III)

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2112CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introduce the foundations of transformer architectures and their evolution into LLMs. 2. To equip students with skills to train, fine-tune, and deploy LLMs for various tasks. 3. To explore ethical, legal, and societal implications of LLMs in real-world applications. 4. To expose students to state-of-the-art LLM frameworks, evaluation techniques, and research trends.	1. Understand the architecture and inner workings of transformer-based LLMs. 2. Apply prompt engineering and fine-tuning techniques for domain-specific tasks. 3. Evaluate LLM performance using standard metrics and benchmarks. 4. Identify challenges in LLM training, deployment, and scaling. 5. Analyze ethical, legal, and societal implications of LLM usage.

Unit-I

Foundations of Large Language Models

Introduction to LLMs: Definition, scope, and historical evolution from statistical NLP to transformers. The Transformer architecture: Attention mechanisms, self-attention, multi-head attention. Pretraining objectives: Masked language modeling (MLM), Causal language modeling (CLM). Evolution of LLMs: BERT, GPT series, T5, LLaMA, Mistral.

Unit-II

Training and Fine-Tuning LLMs

Pretraining datasets and tokenization: BPE, SentencePiece, WordPiece. Fine-tuning approaches: Full fine-tuning, LoRA, adapters, instruction tuning. Domain adaptation and few-shot/zero-shot learning. Data augmentation for LLMs and prompt-based tuning.

Unit-III

Prompt Engineering and Applications

Principles of prompt design: Zero-shot, few-shot, and chain-of-thought prompting. System prompts, role prompting, and context length optimization.

Use cases: Text generation, summarization, code generation, question answering, chatbots. Tools & frameworks: LangChain, Llama Index, Hugging Face Transformers.

Unit-IV

Evaluation and Deployment of LLMs

Evaluation metrics: Perplexity, BLEU, ROUGE, METEOR, human evaluation. Benchmark datasets: GLUE, SuperGLUE, HELM, BIG-bench.

Deployment strategies: API-based deployment, on-prem deployment, inference optimization. Scaling and latency considerations; quantization and pruning for LLMs.

Unit-V

Ethics, Safety, and Future Directions

Bias, fairness, and toxicity in LLMs. Hallucination problem and mitigation techniques. Legal and regulatory issues: Copyright, data privacy, AI Act. Trends in LLM research: Multimodal LLMs, retrieval-augmented generation (RAG), open-source LLM ecosystems.

TEXT BOOKS:

1. Vaswani, A. et al. (2017) *Attention Is All You Need* – NIPS Conference Paper.
2. Lewis, P. et al. (2021) *Language Models are Few-Shot Learners* – OpenAI Research Paper.
3. Tunstall, L., von Werra, L., & Wolf, T. (2022) *Natural Language Processing with Transformers* – O'Reilly Media.

REFERENCE BOOKS:

1. Bommasani, R. et al. (2021) *On the Opportunities and Risks of Foundation Models* – Stanford CRFM.
2. Jurafsky, D., & Martin, J. H. (2023) *Speech and Language Processing* (3rd Edition draft) – Pearson.
3. Mollick, E., & Mollick, L. (2024) *Co-Intelligence: Living and Working with AI* – Little, Brown Spark.
4. Hugging Face Documentation – *https://huggingface.co/docs/*

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

ADVANCED OPERATING SYSTEMS (PE-IV)

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2113CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand advanced operating system architecture and design.	1. Analyze advanced OS architectures and kernel designs.
2. Analyze synchronization and scheduling in multicore systems.	2. Design synchronization and scheduling algorithms for parallel systems.
3. Study distributed operating systems and cloud-based resource management.	3. Evaluate distributed operating system services and fault tolerance.
4. Explore virtualization, containers, and modern storage systems.	4. Apply virtualization and container technologies.
5. Analyze current research papers in operating systems.	5. Analyze current research problems in operating systems.

Unit-I

Advanced Operating System Design

Evolution of Operating Systems, Monolithic, Layered, Microkernel and Hybrid Architectures, Kernel Modules, System Calls and Kernel Services, Process and Thread Management, Kernel Synchronization

Unit-II

Multicore and Parallel Operating Systems

Multithreading Models, Multiprocessor Scheduling, NUMA Architecture, Synchronization Mechanisms, Deadlock Handling, Real-Time Scheduling, GPU and Heterogeneous Computing Support

Unit-III

Distributed Operating Systems

Distributed System Models, Distributed File Systems, RPC, Distributed Shared Memory, Clock Synchronization, Mutual Exclusion Algorithms, Fault Tolerance and Recovery, Consensus Algorithms (Introduction)

Unit-IV

Virtualization and Cloud Systems

Virtual Machines, Hypervisors, Docker, Kubernetes Basics, Resource Isolation, Cloud Operating Systems, Security in Virtualized Environments

Unit-V

Storage Systems and Current Trends

Advanced File Systems, RAID, Log-Structured File Systems, SSD-aware Storage Management, Memory Management, Operating System Security, Energy-aware Operating Systems, Linux Kernel, eBPF, Serverless and Edge Computing

Text Books

1. Operating System Concepts – Silberschatz et al.
2. Modern Operating Systems – Tanenbaum & Bos
3. Advanced Concepts in Operating Systems – Singhal & Shivaratri

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

AD-HOC SENSOR NETWORKS (PE-IV)

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2114CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand the challenges of routing in ad-hoc and sensor networks 2. To understand various broadcast, multicast and geocasting protocols in ad hoc and sensor networks 3.To understand basics of Wireless sensors, and Lower Layer Issues and Upper Layer Issues of WSN	1. Understand the concepts of sensor networks and applications 2. Analyze and compare the MAC and routing protocols for adhoc networks 3. Understand the transport protocols of sensor networks

Unit-I

Introduction to Ad Hoc Networks

Characteristics of MANETs, Applications of MANETs and Challenges of MANETs. Routing in MANETs

Criteria for classification, Taxonomy of MANETs routing algorithms, *Topology-based* routing algorithms-Proactive: DSDV, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; *Position-based* routing algorithms-Location Services-DREAM, Quorum-based, GLS; Forwarding Strategies

Greedy Packet, Restricted Directional Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR.

Unit-II

Data Transmission

Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbour Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR.

Unit-III

Geocasting

Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR**.**

TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

Unit-IV

Basics of Wireless Sensors and Lower Layer Issues

Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

Unit-V

Upper Layer Issues of WSN

Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

TEXT BOOKS:

1. Ad Hoc and Sensor Networks – Theory and Applications, *Carlos Corderio and Dharma P..Aggarwal,* World Scientific Publications, March 2006, ISBN – 981-256-681-3
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman)

REFERENCES:

1. C. Siva Ram Murthy, B.S. ManojAd Hoc Wireless Networks: Architectures and Protocols
2. Taieb Znati Kazem Sohraby, Daniel Minoli, Wireless Sensor Networks: Technology, Protocols and Applications, Wiley.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

QUANTUM COMPUTING (PE-IV)

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2115CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand the mathematical foundations and physical principles that form the basis of quantum computing.	1. Apply linear algebra, complex numbers, and quantum physics principles to model and analyze quantum systems.
2. Gain knowledge of fundamental computer science concepts, information theory, and quantum mechanics relevant to quantum information processing.	2. Explain the foundations of computer science, information theory, and quantum mechanics relevant to quantum computing.
3. Explore quantum architectures, qubits, quantum gates, circuits, and hardware technologies used in quantum computers.	3. Analyze quantum architectures, qubits, quantum gates, circuits, and hardware technologies.
4.Study and analyze major quantum algorithms and their advantages over classical computational methods.	4. Evaluate and apply fundamental quantum algorithms to solve computational problems efficiently.
5. Examine the impact of quantum computing on modern cryptographic systems and understand emerging quantum-resistant security techniques.	5. Assess the impact of quantum computing on modern cryptography and emerging quantum-safe security solutions.

Unit-I

Linear Algebra Basics: Basic Algebra, Matrix Math, Vectors and Vector Spaces, Complex Numbers: Definition of Complex Numbers, Algebra of Complex Numbers, Complex Numbers Graphically, Vector Representations of Complex Numbers, Pauli Matrices, Transcendental Numbers.

Basic Physics for Quantum Computing: Quantum Physics Essentials, Basic Atomic Structure, Hilbert Spaces, Uncertainty, Quantum States, Entanglement.

Unit-II

Computer Science for Quantum Computing: Computational Complexity, Coding Theory, Logic Gates, Information Theory: Basic Probability, Set Theory, Information Theory, Quantum Information.

Quantum Theory: Quantum Mechanics, Quantum Decoherence, Quantum Electrodynamics, Quantum Chromodynamics, Feynman Diagram, Quantum Entanglement and QKD.

Unit-III

Quantum Architecture: Qubits, Quantum Gates, quantum logic, Quantum Circuits, The D-Wave Quantum Architecture.

Quantum Hardware: Addressing Decoherence, Topological Quantum Computing, Quantum Essentials, Quantum Networking.

Unit-IV

Quantum Algorithms: Deutsch's Algorithm, Deutsch-Jozsa Algorithm, Bernstein- Vazirani Algorithm, Simon's Algorithm, Shor's Algorithm, Grover's Algorithm.

Unit-V

Quantum Computing and Cryptography: Current Asymmetric Algorithms, RSA, Diffie-Hellman, Elliptic Curve. The Impact of Quantum Computing on Cryptography: Asymmetric Cryptography, Specific Algorithms and Applications.

Suggested Readings:

1. Dr. Chuck Easttom, Quantum Computing Fundamentals, Pearson.

References:

1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge University Press
2. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
3. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. Basic Concepts. Vol. Basic Tools and Special Topics, World Scientific.
4. Pittenger A. O., An Introduction to Quantum Computing Algorithms.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

ADVANCED COMPUTER ARCHITECTURE (PE-IV)

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26PE2116CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To impart the concepts and principles of parallel and advanced computer architectures. 2. To develop the design techniques of Scalable and multithreaded Architectures. 3. To apply the concepts and techniques of parallel and advanced computer architectures to design modern computer systems	1. Explain Computational models and Computer Architectures. 2. Concepts of parallel computer models. 3. Scalable Architectures, Pipelining, Superscalar processors

Unit-I

Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors and Multicomputers, Multivector and SIMD Computers, PRAM and VLSI models, Architectural development tracks, Program and network properties, Conditions of parallelism, Program partitioning and Scheduling, Program flow Mechanisms, System interconnect Architectures.

Unit-II

Principles of Scalable performance, Performance metrics and measures, Parallel Processing applications, Speed up performance laws, Scalability Analysis and Approaches, Hardware Technologies, Processes and Memory Hierarchy, Advanced Processor Technology, Superscalar and Vector Processors

Unit-III

Shared-Memory Organizations, Sequential and weak consistency models, Pipelining and superscalar techniques, Linear Pipeline Processors, Non-Linear Pipeline Processors, Instruction Pipeline design, Arithmetic pipeline design, superscalar pipeline design.

Unit-IV

Parallel and Scalable Architectures, Multiprocessors and Multicomputers, Multiprocessor system interconnects, cache coherence and synchronization mechanism, Three Generations of Multicomputers, Message-passing Mechanisms, Multivetor and SIMD computers.

Unit-V

Vector Processing Principles, Multivector Multiprocessors, Compound Vector processing, SIMD computer Organizations, The connection machine CM-5.

TEXT BOOK:

1. Advanced Computer Architecture, Kai Hwang, 2nd Edition, Tata McGraw Hill Publishers.

REFERENCES:

1. Computer Architecture, J.L. Hennessy and D.A. Patterson, 4th Edition, ELSEVIER.
2. Advanced Computer Architectures, S.G.Shiva, Special Indian edition, CRC, Taylor &Francis.
3. Introduction to High Performance Computing for Scientists and Engineers, G. Hager and G. Wellein, CRC Press, Taylor & Francis Group.
4. Advanced Computer Architecture, D. Sima, T. Fountain, P. Kacsuk, Pearson education.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

RESEARCH METHODOLOGY & IPR

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks: 60	Course Code: 26SD5125ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand the research problem 2. To know the literature studies, plagiarism and ethics 3. To get the knowledge about technical writing 4. To analyze the nature of intellectual property rights and new developments 5. To know the patent rights	1. Understand research problem formulation. 2. Analyze research related information 3. Follow research ethics 4. Explain the role of Intellectual Property Rights in innovation and technological development. 5. Analyze the importance of IPR in engineering research and innovation. 6. Evaluate the impact of IPR protection on research, innovation, and technology transfer.

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

Unit-III

Effective technical writing, how to write report, Paper, Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Unit-IV

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

Unit-V

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

TEXT BOOKS:

1.Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"
2.C.R. Kothari, Research Methodology, methods & techniques, 2nd edition, New age International publishers

REFERENCES:

1.Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
2.Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
3.Mayall, "Industrial Design", McGraw Hill, 1992.
4.Niebel, "Product Design", McGraw Hill, 1974.
5.Asimov, "Introduction to Design", Prentice Hall, 1962.
6.Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
7.T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

AGENTIC AI ENGINEERING LAB

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):0:0:3	SEE Marks : 60	Course Code: 26PC2153CS
Credits : 1.5	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Build AI agents using modern LLM APIs and agent development frameworks. 2. Develop RAG-based intelligent applications using vector databases. 3. Design autonomous and multi-agent systems for real-world tasks. 4. Integrate external tools, APIs, and Model Context Protocol (MCP) into AI agents. 5. Deploy, evaluate, and monitor Agentic AI applications.	**CO1:** Configure and use modern Agentic AI development environments and LLM APIs. **CO2:** Develop AI agents with memory, reasoning, and tool-calling capabilities. **CO3:** Build Retrieval-Augmented Generation (RAG) applications using vector databases. **CO4:** Design and implement multi-agent collaborative systems integrated with external tools and MCP. **CO5:** Deploy and evaluate end-to-end Agentic AI applications for real-world use cases.

List of Experiments

1. Installation and configuration of Python, VS Code, Jupyter Notebook, Git, and Agentic AI development environment.
2. Explore Prompt Engineering techniques using OpenAI/Gemini/Hugging Face APIs.
3. Build a conversational AI assistant using LangChain.
4. Develop an AI chatbot with conversational memory.
5. Implement Retrieval-Augmented Generation (RAG) using ChromaDB/FAISS.
6. Create an AI agent capable of tool calling and API integration.
7. Develop a document question-answering system using RAG.
8. Build an autonomous planning agent using LangGraph.
9. Implement a multi-agent collaborative application using CrewAI or LangGraph.
10. Develop an MCP-enabled AI assistant with external tool integration.
11. Evaluate AI agent performance using guardrails, monitoring, and prompt security testing.
12. **Mini Project:** Design, develop, and deploy an Agentic AI application (e.g., Smart Campus Assistant, Personal AI Tutor, Healthcare Assistant, Research Assistant, Customer Support Agent, or Code Assistant).

Software Requirements

- Python 3.12+
- Visual Studio Code
- Jupyter Notebook
- Git & GitHub
- LangChain
- LangGraph
- CrewAI
- Semantic Kernel (optional)
- ChromaDB / FAISS

- OpenAI API / Azure OpenAI / Google Gemini API
- FastAPI
- Streamlit / Gradio
- Docker (optional)

Recommended Reference Manuals

1. LangChain Documentation.
2. LangGraph Documentation.
3. CrewAI Documentation.
4. OpenAI API Documentation.
5. Google Gemini API Documentation.
6. Hugging Face Documentation.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

ENGLISH FOR RESEARCH PAPER WRITING (AUDIT COURSE-I)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):2:0:0	SEE Marks :	Course Code: 26AD9001HS
Credits : -	CIE Marks : 50	Duration of SEE : -

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand how to improve writing skills and readability 2. Understand the nuances of language and vocabulary in writing a Research Paper. 3. Develop the content, structure and format of writing a research paper. 4. Produce original, plagiarism-free research papers.	1. Interpret the nuances of research paper writing. 2. Differentiate the research paper format and citation of sources. 3. Review research papers critically in a scientific manner. 4. Apply ethical writing practices and avoid plagiarism while presenting research findings. 5. Create a research paper and acquire the knowledge of how and where to publish their original research papers.

Unit - I

Academic Writing: Meaning & Definition of a research paper– Purpose of a research paper – Scope – Benefits, Limitations – Outcomes.

Unit - II

Research Paper Format: Title – Abstract – Introduction – Discussion – Findings, Conclusion – Style of Indentation – Font size/Font types – Indexing – Citation of sources.

Unit - III

Research Methodology: Methods (Qualitative – Quantitative) Review of Literature. Criticizing, Paraphrasing & Plagiarism.

Unit - IV

Process of writing a research paper: Choosing a topic - Thesis Statement – Outline – Organizing notes - Language of Research – Word order, Paragraphs – Writing first draft –Revising/Editing - The final draft and proofreading.

Unit - V

Research Paper Publication: Reputed Journals – National/International – ISSN No, No. of volumes, Scopus Index/UGC Journals – Free publications - Paid journal publications – Advantages/Benefits

Presentation Skills: Developing Persuasive Presentations, Structure of Presentation, Presentation Slides, Presentation Delivery, Role of the Audience, what to search and cite, how to establish credibility.

Suggested Readings:

1. C. R Kothari, Gaurav, Garg, ―Research Methodology Methods and Techniques, 4/e, New Age International Publishers.
2. Day R, ―How to Write and Publish a Scientific Paper**",** Cambridge University Press, 2006
3. MLA Handbook for writers of Research Papers, 7/e, East West Press Pvt. Ltd, New Delhi
4. Lauri Rozakis, Schaum's, Quick Guide to Writing Great Research Papers, Tata McGraw- Hill Pvt. Ltd, New Delhi.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

DISASTER MANAGEMENT (AUDIT COURSE-I)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):2:0:0	SEE Marks : -	Course Code: 26AD9002CE
Credits : -	CIE Marks : 50	Duration of SEE : -

COURSE OBJECTIVES	COURSE OUTCOMES
1. To impart knowledge in students about the nature, causes, consequences and mitigation measures of the various natural disasters 2. To enable the students to understand risks, vulnerabilities and human errors associated with human induced disasters 3. To enable the students to understand and assimilate the impacts of any disaster on the affected area depending on its position/ location, environmental conditions, demographic, etc.	1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response. 2. Critically evaluate disaster risk reduction and humanitarian response policy and Practice from multiple perspectives. 3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations. 4. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.

Unit-I

Introduction: Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

Unit-II

Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem.

Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

Unit-III

Disasters Prone Areas in India: Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

Unit-IV

Disaster Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.

Unit-V

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival. Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

Suggested Readings:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies", New Royal Book Company.
2. Sahni, Pardeep (Eds.), "Disaster Mitigation Experiences and Reflections", PHI, New Delhi.
3. Goel S. L., "Disaster Administration and Management Text and Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

SANSKRIT FOR TECHNICAL KNOWLEDGE (AUDIT COURSE-I)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):2:0:0	SEE Marks : -	Course Code: 26AD9003HS
Credits : -	CIE Marks : 50	Duration of SEE : -

COURSE OBJECTIVES	COURSE OUTCOMES
1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world 2. To make the novice Learn the Sanskrit to develop the logic in mathematics, science & other subjects 3. To explore the huge knowledge from ancient Indian literature	1. Develop passion towards Sanskrit language 2. Decipher the latent engineering principles from Sanskrit literature 3. Correlates the technological concepts with the ancient Sanskrit history. 4. Develop knowledge for the technological progress 5. Explore the avenue for research in engineering with aid of Sanskrit

Unit-I

Introduction to Sanskrit Language: Sanskrit Alphabets-vowels-consonants- significance of Amarakosa- parts of Speech-Morphology-creation of new words-significance of synonyms-sandhi-samasa-sutras-active and passive Voice-Past/Present/Future Tense-Syntax-Simple Sentences (elementary treatment only)

Unit-II

Role of Sanskrit in Basic Sciences: Brahmagupthas lemmas (second degree indeterminate equations), sum of squares of n-terms of AP- sulba, sutram or baudhayana theorem (origination of Pythagoras theorem)-value of pie-Madhava's sine and cosine theory (origination of Taylor's series).
The measurement system-time-mass-length-temp, Matter elasticity-optics-speed of light (origination of Michaelson and Morley theory).

Unit-III

Role of Sanskrit in Engineering-I (Civil, Mechanical, Electrical and Electronics Engineering):
Building construction-soil testing-mortar-town planning-Machine definition-crucible-furnace-air blower- Generation of electricity in a cell-magnetism-Solar system-Sun: The source of energy, the earth-Pingala chandasutram (origination of digital logic system)

Unit-IV

Role of Sanskrit in Engineering-II (Computer Science Engineering & Information Technology):
Computer languages and the Sanskrit languages-computer command words and the vedic command words- analogy of pramana in memamsa with operators in computer language-sanskrit analogy of physical sequence and logical sequence, programming.

UNIT-V

Role of Sanskrit in Engineering-III (Bio-technology and Chemical Engineering): Classification of plants- plants, the living-plants have senses-classification of living creatures, Chemical laboratory location and layout- equipment-distillation vessel-kosthi yanthram

Suggested Readings:

1. M Krishnamachariar, History of Classical Sanskrit Literature, TTD Press, 1937.
2. M.R. Kale, A Higher Sanskrit Grammar: For the Use of School and College Students, Motilal Banarsidass Publishers, 2015.
3. Kapail Kapoor, Language, Linguistics and Literature: The Indian Perspective, ISBN- 10: 8171880649, 1994.
4. Pride of India, Samskrita Bharati Publisher, ISBN: 81-87276 27-4, 2007.
5. Shri Rama Verma, Vedas the source of ultimate science, Nag publishers, 2005.

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

(SULTAN-UL-ULOOM EDUCATION SOCIETY)

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

VALUE EDUCATION (AUDIT COURSE-I)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):2:0:0	SEE Marks : -	Course Code: 26AD9004HS
Credits : -	CIE Marks : 50	Duration of SEE : -

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand the need and importance of Values for self-development and for National development. 2. Imbibe good human values and Morals 3. Cultivate individual and National character.	1. Gain necessary Knowledge for self-development 2. Learn the importance of Human values and their application in day to day professional life. 3. Appreciate the need and importance of interpersonal skills for successful career and social life 4. Emphasize the role of personal and social responsibility of an individual for all-round growth. 5. Develop a perspective based on spiritual outlook and respect women, other religious practices, equality, non-violence and universal brotherhood.

Unit-I

Human Values, Ethics and Morals: Concept of Values, Indian concept of humanism, human values; Values for self-development, Social values, individual attitudes; Work ethics, moral and non-moral behaviour, standards and principles based on religion, culture and tradition.

Unit-II

Value Cultivation, and Self-management: Need and Importance of cultivation of values such as Sense-of Duty, Devotion to work, Self-reliance, Confidence, Concentration, Integrity & discipline, and Truthfulness.

Unit-III

Spiritual outlook and social values: Personality and Behavior, Scientific attitude and Spiritual (soul) outlook; Cultivation of Social Values Such as Positive Thinking, Punctuality, Love & Kindness, avoiding fault finding in others, Reduction of anger, forgiveness, Dignity of labour, True friendship, Universal brotherhood and religious tolerance.

Unit-IV

Values in Holy Books: Self-management and Good health; internal & external cleanliness, Holy books versus Blind faith, Character and Competence, Equality, Nonviolence, Humility, Role of Women.

Unit-V

Dharma, Karma and Guna: Concept of soul; Science of Reincarnation, Character and Conduct, Concept of Dharma; Cause and Effect based Karma Theory; The qualities of Devine and Devilish; Satwic, Rajasic and Tamasic gunas.

Suggested Readings:

1. Chakroborty, S.K., Values & Ethics for organizations Theory and practice, Oxford University Press, New Delhi, 1998.

2. Jaya Dayal Goyandaka, Srimad Bhagavad Gita with Sanskrit Text, Word Meaning and Prose Meaning, Gita Press, Gorakhpur, 2017.

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

(SULTAN-UL-ULOOM EDUCATION SOCIETY)

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

CONSTITUTION OF INDIA AND FUNDAMENTAL RIGHTS (AUDIT COURSE -II)

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):2:0:0	SEE Marks:-	Course Code: 26AD9011HS
Credits : -	CIE Marks : 50	Duration of SEE : -

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective and to address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.	1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics. 2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India. 3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution. 4. Discuss the passage of the Hindu Code Bill of 1956.

Unit-I

History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working) Philosophy of the Indian Constitution: Preamble, Salient Features.

Unit-II

Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

Unit-III

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications. Powers and Functions.

Unit-IV

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Panchayat raj: Introduction, PRI: Zilla Panchayat, Elected officials and their roles, CEO Zilla Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

Unit-V

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Suggested Readings:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

(SULTAN-UL-ULOOM EDUCATION SOCIETY)

An Autonomous Institution

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

PEDAGOGY STUDIES (AUDIT COURSE -II)

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):2:0:0	SEE Marks : -	Course Code: 26AD9012HS
Credits : -	CIE Marks : 50	Duration of SEE : -

COURSE OBJECTIVES	COURSE OUTCOMES
1. To present the basic concepts of design and policies of pedagogy studies. 2. To provide understanding of the abilities and dispositions with regard to teaching techniques, curriculum design and assessment practices. 3. To familiarize various theories of learning and their connection to teaching practice. 4. To create awareness about the practices followed by DFID, other agencies and other researchers. 5. To provide understanding of critical evidence gaps that guides the professional development	1. Illustrate the pedagogical practices followed by teachers in developing countries both in formal and informal classrooms. 2. Examine the effectiveness of pedagogical practices. 3. Understand the concept, characteristics and types of educational research and perspectives of research. 4. Describe the role of classroom practices, curriculum and barriers to learning. 5. Understand Research gaps and learn the future directions.

Unit-I

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology - Theories of learning, Curriculum, Teacher education - Conceptual framework, Research questions, Overview of methodology and Searching.

Unit-II

Thematic Overview: Pedagogical practices followed by teachers in formal and informal classrooms in developing countries - Curriculum, Teacher education

Unit-III

Evidence on the Effectiveness of Pedagogical Practices: Methodology for the in-depth stage: quality assessment of included studies - How can teacher education (curriculum and practicum) and the school curriculum and guidance material best support effective pedagogy? - Theory of change - Strength and nature of the body of evidence for effective pedagogical practices - Pedagogic theory and pedagogical approaches – Teachers attitudes and beliefs and pedagogic strategies.

Unit-IV

Professional Development: alignment with classroom practices and follow up support - Support from the head teacher and the community – Curriculum and assessment - Barriers to learning: Limited resources and large class sizes.

Unit-V

Research Gaps and Future Directions: Research design – Contexts – Pedagogy - Teacher education - Curriculum and assessment – Dissemination and research impact.

Suggested Readings:

1. Ackers J, Hardman F, Classroom Interaction in Kenyan Primary Schools, Compare‖, 31 (2): 245 – 261, 2001.
2. Agarwal M, Curricular Reform in Schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361 – 379, 2004.
3. Akyeampong K, Teacher Training in Ghana – does it count? Multisite teacher education research project (MUSTER), Country Report 1. London: DFID, 2003.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J, Improving teaching and learning of Basic Maths and Reading in Africa: Does teacher Preparation count? International Journal Educational Development, 33 (3): 272- 282, 2013.
5. Alexander R J, Culture and Pedagogy: International Comparisons in Primary Education, Oxford and Boston: Blackwell, 2001.
6. Chavan M, Read India: A mass scale, rapid, learning to read campaign, 2003.

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

(SULTAN-UL-ULOOM EDUCATION SOCIETY)

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

STRESS MANAGEMENT BY YOGA (AUDIT COURSE -II)

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):2:0:0	SEE Marks : -	Course Code: 26AD9013HS
Credits : -	CIE Marks : 50	Duration of SEE : -

COURSE OBJECTIVES	COURSE OUTCOMES
1. Creating awareness about different types of stress and the role of yoga in the management of stress. 2. Promotion of positive health and overall wellbeing (Physical, mental, emotional, social and spiritual). 3. Prevention of stress related health problems by yoga practice.	1. Understand yoga and its benefits. 2. Enhance Physical strength and flexibility. 3. Learn to relax and focus. 4. Relieve physical and mental tension through asanas. 5. Improve work performance and efficiency.

Unit-I

Meaning and Definition of Yoga - Historical perspective of Yoga - Principles of Astanga Yoga by Patanjali.

Unit-II

Meaning and Definition of Stress - Types of stress - Eustress and Distress. Anticipatory Anxiety and Intense Anxiety and depression. Meaning of Management- Stress Management.

Unit-III

Concept of Stress According to Yoga - Stress assessment methods - Role of Asana, Pranayama and Meditation in the management of stress

Unit - IV

Asanas- (5 Asanas in each posture) - Warm up - Standing Asanas - Sitting Asanas - Prone Asanas - Supine asanas - Surya Namaskar.

Unit - V

Pranayama- Anulom and Vilom Pranayama - Nadishudhi Pranayama - Kapalabhati Pranayama - Bhramari Pranayama - Nadanusandhana Pranayama.

Meditation Techniques: Om Meditation - Cyclic meditation: Instant Relaxation technique (QRT), Quick Relaxation Technique (QRT), Deep Relaxation Technique (DRT)

Suggested Readings:

1. "Yogic Asanas for Group Training - Part-I", Janardhan Swami Yogabhyasi Mandal, Nagpur.
2. Swami Vivekananda, "Rajayoga or Conquering the Internal Nature", Advaita Ashrama (Publication Department), Kolkata.
3. Nagendra H.R and Nagaratna R, "Yoga Perspective in Stress Management", Swami Vivekananda Yoga Prakashan, Bangalore.

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

(SULTAN-UL-ULOOM EDUCATION SOCIETY)

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

(AUDIT COURSE -II)

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):2:0:0	SEE Marks : -	Course Code: 26AD9014HS
Credits : -	CIE Marks : 50	Duration of SEE : -

COURSE OBJECTIVES	COURSE OUTCOMES
1. To learn to achieve the highest goal happily 2. To become a person with stable mind, pleasing personality and determination 3. To awaken wisdom in students	1. Develop their personality and achieve their highest goal of life. 2. Lead the nation and mankind to peace and prosperity. 3. Practice emotional self-regulation. 4. Develop a positive approach to work and duties. 5. Develop a versatile personality.

Unit-I

Neetisatakam – Holistic Development of Personality - Verses 19, 20, 21, 22 (Wisdom) - Verses 29, 31, 32 (Pride and Heroism) - Verses 26,28,63,65 (Virtue)

Unit-II

Neetisatakam – Holistic Development of Personality (cont'd) - Verses 52, 53, 59 (don'ts) - Verses 71,73,75 & 78 (do's) - Approach to day to day works and duties.

Unit-III

Introduction to Bhagavadgeetha for Personality Development - Shrimad Bhagavadgeetha: Chapter 2 – Verses 41, 47, 48 - Chapter 3 – Verses 13,21,27,35 - Chapter 6 – Verses 5,13,17,23,35 - Chapter 18 –Verses
45, 46, 48 Chapter – 6: Verses 5, 13, 17, 23, 35; Chapter – 18: Verses 45, 46, 48

Unit-IV

Statements of Basic Knowledge - Shrimad Bhagavadgeetha: Chapter 2- Verses 56, 62,68 - Chapter 12 – Verses 13, 14, 15, 16, 17, 18 - Personality of Role model from Shrimad Bhagawat Geeta.

Unit-V

Role of Bhagavadgeetha in the Present Scenario - Chapter 2 – Verses 17 - Chapter 3 – Verses 36, 37, 42 - Chapter 4 – Verses 18, 38, 39 - Chapter 18 – Verses 37, 38, 63.

Suggested Readings:

1. Srimad Bhagavad Gita, Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya), P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

(SULTAN-UL-ULOOM EDUCATION SOCIETY)

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

MINI PROJECT WITH SEMINAR

SYLLABUS FOR M.Tech (CSE) II-SEMESTER

L:T:P (Hrs./week):0:0:6	SEE Marks : 60	Course Code: 26PW2155CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To identify, formulate, and solve a research or industry-oriented problem by applying appropriate engineering concepts, methodologies, and tools. 2. To design, implement, analyze, and validate a solution through experimental investigation, simulation, or prototype development, and document the outcomes in a professional technical report. 3. To develop effective technical communication and presentation skills by presenting the project work, defending the methodology and results, and responding to technical queries.	1. Formulate a specific problem and give solution 2. Develop model/models either theoretical /practical /numerical form 3. Solve, interpret/correlate the results and discussions 4. Conclude the results obtained 5. Write the documentation in standard format

Guidelines:

- As part of the curriculum in the II- semester of the programme each student shall do a mini project, generally comprising about three to four weeks of prior reading, twelve weeks of active research, and finally a presentation of their work for assessment.
- Each student will be allotted to a faculty supervisor for mentoring.
- Mini projects should present students with an accessible challenge on which to demonstrate competence in research techniques, plus the opportunity to contribute something more original.
- Mini projects shall have inter-disciplinary/ industry relevance.
- The students can select a mathematical modeling based on Experimental investigations or numerical modeling
- All the investigations should be clearly stated and documented with the reasons/explanations.
- The mini-project shall contain a clear statement of the research objectives, background of work, literature review, techniques used, prospective deliverables, and detailed discussion on results, conclusions and reference

Departmental committee: Supervisor and a minimum of two faculty members

Guidelines for awarding marks in CIE (Continuous Internal Evaluation): Max. Marks: 40		
Evaluation by	Evaluation Criteria / Parameter	Max. Marks
Supervisor	Progress and Review	10
	Report	05
Departmental Committee	Relevance of the Topic	05
	PPT Preparation	05
	Presentation	05
	Question and Answers	05
	Report Preparation	05

Guidelines for Conducting Semester End Examination (SEE):

The student shall:

- Present the mini project for **20 minutes** using PowerPoint, highlighting the problem statement, objectives, methodology, implementation, results, and conclusions.
- Participate in a **10-minute viva-voce/question-answer session** conducted by the examination committee.
- Submit a **hard-bound/spiral-bound mini project report** in the prescribed department format at least **one week before** the commencement of the SEE.
- Demonstrate thorough understanding of the selected problem, literature survey, methodology adopted, implementation details, experimental results, and future scope.
- Demonstrate the originality, technical depth, and practical relevance of the work undertaken.

Guidelines for awarding marks in SEE (Semester End Examination): Max. Marks: 60		
S. No.	**Evaluation Component**	**Marks**
1	Technical content, problem formulation, methodology and implementation	15
2	Results, analysis, validation and originality of the work	10
3	Presentation skills, organization of PPT and communication	10
4	Viva-Voce (understanding of concepts and ability to answer questions)	10
5	Mini Project Report (technical quality, documentation, formatting and references)	10
6	Industrial relevance, innovation, future scope and overall assessment	5
	Total	60

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

(SULTAN-UL-ULOOM EDUCATION SOCIETY)

An Autonomous Institution

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

DISSERTATION-I

SYLLABUS FOR M.Tech (CSE) III-SEMESTER

L:T:P (Hrs./week):0:0:20	SEE Marks : 60	Course Code: 26PW2156CS
Credits : 10	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Identify and formulate a research problem through an extensive literature survey and develop appropriate research objectives and methodology. 2. Conduct independent research by applying suitable experimental, computational, analytical, or simulation techniques and document the research progress in a professional manner. 3. Develop technical writing, presentation, and research communication skills by presenting and defending the proposed research work before an expert committee.	1. Exposed to self-learning various topics. 2. Learn to survey the literature such as books, journals and contact resource persons for the selected topic of research. 3. Learn to write technical reports. 4. Develop oral and written communication skills to present. 5. Defend their work in front of technically qualified audience

Guidelines:

- The Project work will preferably be a problem with research potential and should involve scientific research, design, generation/collection and analysis of data, determining solution and must preferably bring out the individual contribution.
- Seminar should be based on the area in which the candidate has undertaken the dissertation work.
- The CIE shall include reviews and the preparation of report consisting of a detailed problem statement and a literature review.
- The preliminary results (if available) of the problem may also be discussed in the report.
- The candidate has to be in regular contact with his supervisor and the topic of dissertation must be mutually decided by the guide and student.

Guidelines for awarding marks in CIE (Continuous Internal Evaluation): Max. Marks: 40		
Evaluation by	**Evaluation Criteria / Parameter**	**Max. Marks**
Supervisor	Project Status / Review(s)	10
	Report	5
Departmental Committee (Supervisor & Project coordinator from the respective department of the institution)	Relevance of the Topic	5
	PPT Preparation	5
	Presentation	5
	Question and Answers	5
	Report Preparation	5

Note: The Supervisor has to assess the progress of the student regularly.

Guidelines for Conducting Semester End Examination (SEE):

The student shall:

- Present the dissertation progress for **20 minutes** using PowerPoint, highlighting the research problem, objectives, literature review, methodology, progress achieved, preliminary results (if any), and future work.
- Participate in a **10-minute viva-voce** conducted by the examination committee.
- Submit a **spiral-bound dissertation progress report** in the prescribed department format at least **one week before** the commencement of the Semester End Examination.
- Demonstrate a clear understanding of the selected research problem, research methodology, literature review, implementation plan, and expected research contributions.
- Present the progress made during the semester along with the proposed work plan for Dissertation-II.

Distribution of SEE Marks (60)

S. No.	Evaluation Component	Marks
1	Problem formulation, research objectives, and literature survey	15
2	Research methodology, work completed, and preliminary results	10
3	Technical presentation, organization of PPT, and communication skills	10
4	Viva-Voce (technical understanding, methodology, and research plan)	10
5	Dissertation progress report (technical quality, documentation, formatting, references, and plagiarism compliance)	10
6	Novelty, feasibility, research planning, and future work	5
	Total	**60**

The Semester End Examination shall be conducted by a **Departmental Examination Committee** consisting of:

- Head of the Department (or Nominee)
- Project Supervisor
- Project Coordinator
- External Examiner (where applicable)

A student who fails to appear for the Semester End Examination shall be treated as **absent** and shall reappear as per the regulations.

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

(SULTAN-UL-ULOOM EDUCATION SOCIETY)

An Autonomous Institution

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

DISSERTATION-II

SYLLABUS FOR M.Tech (CSE) IV-SEMESTER

L:T:P (Hrs./week):0:0:32	SEE Marks : 150	Course Code: 26PW2157CS
Credits : 16	CIE Marks : 50	Duration of SEE : -

COURSE OBJECTIVES	COURSE OUTCOMES
1. To carry out independent research by designing, implementing, validating, and evaluating a solution to a research problem using appropriate experimental, computational, or analytical techniques. 2. To analyze and interpret the research outcomes, prepare a high-quality dissertation, and demonstrate originality, innovation, and professional ethics in research. 3. To effectively communicate and defend the research work through technical reports, presentations, publications, and viva-voce before an expert examination committee.	1. Use different experimental techniques and will be able to use different software/ computational /analytical tools. 2. Design and develop an experimental set up/ equipment/test rig. 3. Conduct tests on existing set ups/equipment's and draw logical conclusions from the results after analysing them. 4. Either work in a research environment or in an industrial environment. 5. Conversant with technical report writing and will be able to present and convince their topic of study to the engineering community.

Guidelines:

- Dissertation-II is a continuation of Dissertation-I undertaken in the III Semester.
- The student shall complete the proposed research work and submit a dissertation embodying the research findings in the prescribed department format.
- The dissertation shall demonstrate originality, technical depth, and significant individual contribution towards solving the selected research problem.
- The dissertation shall include a comprehensive literature review, problem formulation, objectives, methodology, implementation, experimental results, analysis, conclusions, and future scope.
- Wherever applicable, the student shall demonstrate the developed software, prototype, model, or experimental setup during the evaluation.
- The student shall maintain regular interaction with the Supervisor/Co-Supervisor throughout the semester.
- The dissertation shall comply with the UGC Plagiarism Regulations and the institute's academic integrity policy. The similarity index shall be within the permissible limits prescribed by the institution**.**
- The work has to be presented in front of the examiners panel consisting of an approved external examiner and Supervisor from the Institute.
- The candidate has to be in regular contact with his/her Supervisor / Co- Supervisor

Guidelines for awarding marks in CIE (Continuous Internal Evaluation): Max. Marks: 50		
Evaluation by	**Evaluation Criteria / Parameter**	**Max. Marks**
Supervisor	Regularity, Progress and Periodic Reviews	10
	Quality of Research Work and Implementation	10
	Analytical / Programming / Experimental Skills	5
	Dissertation Documentation and Report Writing	5
Departmental Evaluation Committee *(Head of the Department/ Nominee, Project Coordinator and Supervisor)*	Technical Progress and Achievement of Research Objectives	5
	Technical Presentation and Communication Skills	5
	Technical Discussion and Viva-Voce	5
	Overall Assessment (Originality, Publications/Research Contribution and Readiness for Final Submission)	5

Guidelines for Conducting Semester End Examination (SEE)

The student shall:

- Present the completed dissertation work for **30 minutes** using PowerPoint, highlighting the research problem, objectives, methodology, implementation, results, research contributions, publications (if any), conclusions, and future scope.
- Participate in a **15–20 minute viva-voce examination** conducted by the examination committee.
- Submit the final dissertation report in the prescribed department format at least **one week before** the commencement of the Semester End Examination.
- Demonstrate the implementation, software, prototype, experimental setup, or research outcomes wherever applicable.
- Defend the originality, technical contribution, and significance of the research work before the examination committee.

Distribution of SEE Marks (150)

Evaluation by	**Evaluation Criteria / Parameter**	**Max. Marks**
Supervisor	Regularity, Progress and Professional Conduct	**10**
	Quality of Research Work Completed	**10**
	Technical Contribution, Innovation and Research Quality	**10**
	Analytical / Programming / Experimental Skills	**10**
	Dissertation Report Preparation and Documentation	**10**
External Examination Committee *(External Examiner, and Head of the Department/Nominee)*	Technical Presentation and Communication Skills	**20**
	Quality of Dissertation, Research Methodology and Technical Evaluation	**40**
	Publications, Novelty, Industrial/Societal Relevance and Future Scope	**10**
	Demonstration / Implementation (where applicable)	**10**
	Viva-Voce and Technical Discussion	**20**
	Total	**150**

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

(SULTAN-UL-ULOOM EDUCATION SOCIETY)

An Autonomous Institution

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

COST MANAGEMENT OF ENGINEERING PROJECTS (Open Elective)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26OE9101CE
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To apply modern software packages to conduct analysis of real world data. 2. To understand the technical underpinning of engineering economic analysis. 3. The ability to apply the appropriate analytical techniques to a wide variety of real world problems and data sets. 4. To summarize and present the analysis results in a clear and coherent manner.	1. Students should be able to learn the cost concepts in decision making 2. Student should be able to do cost planning and Marginal Costing 3. Students should be able to create a database for operational control and decision making.

UNIT-I

Introduction and Overview of the Strategic Cost Management Process: Cost concepts in decision- making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision- Making.

UNIT-II

Project: meaning, Different types, why to manage, cost overruns centers, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non-technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process.

UNIT-III

Cost Behavior and Profit Planning Marginal Costing: Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis.

Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in- time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints.

UNIT-IV

Activity-Based Cost Management: Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

UNIT-V

Quantitative techniques for cost management: Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

Suggested Readings:

1. Cost Accounting – A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting

MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY

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An Autonomous Institution

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

**BUSINESS ANALYTICS (Open Elective)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26OE9102CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand the role of business analytics within an organization 2. Analyse data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization 3. To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making 4. To become familiar with processes needed to develop, report, and analyse business data 5. Use decision-making tools/Operations research techniques 6. Mange business process using analytical and management tools 7. Analyse and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc. 8. Student will able to understand the basic rules of research formulation and procedure for obtaining patent rights	1. Students will demonstrate knowledge of data analytics 2. Students will demonstrate the ability of think critically in making decisions based on data and deep analytics 3. Students will demonstrate the ability to use technical skills in predicative and prescriptive modelling to support business decision-making 4. Students will demonstrate the ability to translate data into clear, actionable insights

UNIT-I

Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics.

Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

UNIT-II

Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

UNIT-III

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

UNIT-IV

Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models.

Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New- Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

UNIT-V

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without 8 Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.

Recent Trends in Embedded and collaborative business intelligence, Visual data 4 recovery, Data Storytelling and Data journalism.

Suggested Readings:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

EMBEDDED SYSTEM DESIGN (Open Elective)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26OE9103EC
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Detailed overview of important concepts of Embedded system 2. Analyse PIC microcontroller, its features and programming 3. Describe ARM Microcontroller architectural details and instruction set 4. Understand ARM Memory management 5. Learn the techniques to develop an embedded system and case studies	1. Understand the fundamentals of the embedded system design 2. Enumerate the instruction set of ARM Processor by studying the architecture of ARM core 3. Acquire knowledge on the serial, parallel and network communication protocols. 4. Learn the embedded system design life cycle and co-design issues. 5. List the various embedded software development tools used in the design of embedded system for various applications.

UNIT I

Introduction to Embedded Systems: Overview of Embedded System Architecture, Challenges & Trends of Embedded Systems, Hardware Architecture, Software Architecture. Application areas of Embedded Systems and Categories of Embedded Systems. Embedded System Design and Co-Design issues and Design Cycle Process

UNIT II

PIC 18: Family Overview, Architecture, Instruction Set, Addressing modes. Timers, interrupts of PIC 18, Capture/Compare and PWM modules of PIC 18

UNIT III

ARM Architecture: ARM Design Philosophy, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families. Instruction Set: Data Processing Instructions, Addressing Modes, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

UNIT IV

ARM Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instruction Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions. Exception and interrupt handling.

ARM Memory Management: Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation Access Permissions, Context Switch.

UNIT V

Embedded Software Development Tools, Host and Target Machines, Linkers/Locators for Embedded Software, Getting Embedded Software into the Target System. Debugging Techniques.

Case Studies: Design of Embedded Systems using Microcontrollers – for applications in the area of communications and automotives. (GSM/GPRS, CAN, Zigbee)

Suggested Readings:

1. Raj Kamal, Embedded Systems – Architecture, Programming and Design, 2nd Edition, TMH, 2008.
2. Andrew N. Sloss, Dominic Symes, Chris Wright, ARM Systems Developer's Guides – Designing & Optimizing System Software, Elsevier, 2008.
3. Mazidi, MCKinlay and Danny Causey, PIC Microcontrollers and Embedded Systems, Pearson Education, 2007
4. David.E. Simon, An Embedded Software Primer, 1st Edition, Pearson Education, 1999
5. Jonathan W. Valvano, Embedded Microcomputer Systems, Real Time Interfacing, Thomas Learning, 1999.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

WASTE TO ENERGY (Open Elective)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26OE9104EE
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To enable students to aware about the generation of energy from the waste.	1. Students should able to learn the Classification of waste as a fuel. 2. Students should able to learn the Manufacture of charcoal. 3. Students should able to carry out the designing of gasifiers and biomass stoves. 4. Student should able to learn the Biogas plant technology.

UNIT I

Introduction to Embedded Systems: Overview of Embedded System Architecture, Challenges & Trends of Embedded Systems, Hardware Architecture, Software Architecture. Application areas of Embedded Systems and Categories of Embedded Systems. Embedded System Design and Co-Design issues and Design Cycle Process

UNIT II

PIC 18: Family Overview, Architecture, Instruction Set, Addressing modes. Timers, interrupts of PIC 18, Capture/Compare and PWM modules of PIC 18

UNIT III

ARM Architecture: ARM Design Philosophy, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families. Instruction Set: Data Processing Instructions, Addressing Modes, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

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ARM Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instruction Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions. Exception and interrupt handling.

ARM Memory Management: Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation Access Permissions, Context Switch.

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1. Raj Kamal, Embedded Systems – Architecture, Programming and Design, 2nd Edition, TMH, 2008.
2. Andrew N. Sloss, Dominic Symes, Chris Wright, ARM Systems Developer's Guides – Designing & Optimizing System Software, Elsevier, 2008.
3. Mazidi, MCKinlay and Danny Causey, PIC Microcontrollers and Embedded Systems, Pearson Education, 2007
4. David.E. Simon, An Embedded Software Primer, 1st Edition, Pearson Education, 1999
5. Jonathan W. Valvano, Embedded Microcomputer Systems, Real Time Interfacing, Thomas Learning, 1999.

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COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

INDUSTRIAL SAFETY (Open Elective)

SYLLABUS FOR M.Tech (CSE) I-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks : 60	Course Code: 26OE9105ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Causes for industrial accidents and preventive steps to be taken. 2. Fundamental concepts of Maintenance Engineering. 3. About wear and corrosion along with preventive steps to be taken 4. The basic concepts and importance of fault tracing. 5. The steps involved in carrying out periodic and preventive maintenance of various equipments used in industry	1. Identify the causes for industrial accidents and suggest preventive measures. 2. Identify the basic tools and requirements of different maintenance procedures. 3. Apply different techniques to reduce and prevent Wear and corrosion in Industry. 4. Identify different types of faults present in various equipments like machine tools, IC Engines, boilers etc. 5. Apply periodic and preventive maintenance techniques as required for industrial equipments like motors, pumps and air compressors and machine tools etc.

UNIT-I

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc., Safety colour codes. Fire prevention and firefighting, equipment and methods.

UNIT-II

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT-III

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT-IV

Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Aircompressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT-V

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance.

Suggested Readings:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, McGraw Hill Publication
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London