SCHEME OF STUDIES & EXAMINATION

AND

SYLLABUS

FOR

THE DEGREE

OF

MASTER OF TECHNOLOGY

(2 Years Post Graduate Programme)

IN

COMPUTER SCIENCE AND ENGINEERING

(w.e.f. Session 2018-19)

Faculty of Information Technology & Computer Science

Deenbandhu Chhotu Ram University of Science & Technology
Murthal (Sonepat)-131039, Haryana, India
June 2018
Program Outcomes of CSE (M.Tech.) program:

The main outcomes of the CSE (M.Tech.) program are given here. At the end of the program a student is expected to have:

1. An understanding of the theoretical foundations and the limits of computing.
2. An ability to adapt existing models, techniques, algorithms, data structures, etc. for efficiently solving problems.
3. An ability to design, develop and evaluate new computer based systems for novel applications which meet the desired needs of industry and society.
4. Understanding and ability to use advanced computing techniques and tools.
5. An ability to undertake original research at the cutting edge of computer science & its related areas.
6. An ability to function effectively individually or as a part of a team to accomplish a stated goal.
7. An understanding of professional and ethical responsibility.
8. An ability to communicate effectively with a wide range of audience.
9. An ability to learn independently and engage in life-long learning.
10. An understanding of the impact of IT related solutions in an economic, social and environment context.
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Deenbandhu Chhotu Ram University of Science & Technology, Murthal(Sonepat)

SCHEME OF STUDIES & EXAMINATIONS

M.TECH. 1ST Year 2nd Semester (Computer Science & Engineering)

Choice Based Credit System Scheme w.e.f. 2018-19

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**Elective III**
- MTCSE522C Data Preparation and Analysis
- MTCSE524C Secure Software Design & Enterprise Computing
- MTCSE526C Computer Vision
- MTCSE528C Sensor Networks and IoT
- MTCSE530C Cloud Computing

**Elective IV**
- MTCSE542C GPU Computing
- MTCSE544C Human and Computer Interaction
- MTCSE546C Architecture of High Performance Computer Systems
- MTCSE548C Network Security

**Elective III Lab**
- MTCSE562C Data Preparation and Analysis Lab
- MTCSE566C Computer Vision Lab
- MTCSE570C Cloud Computing Lab

**Audit Course 2**
- AUD531C ENGLISH FOR RESEARCH PAPER WRITING
- AUD533C DISASTER MANAGEMENT
- AUD535C SANSKRIT FOR TECHNICAL KNOWLEDGE
- AUD537C VALUE EDUCATION
- AUD539C CONSTITUTION OF INDIA
- AUD541C PEDAGOGICAL STUDIES
- AUD543C STRESS MANAGEMENT BY YOGA
- AUD545C PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS
**Deenbandhu Chhotu Ram University of Science & Technology, Murthal(Sonepat)**

**SCHEME OF STUDIES & EXAMINATIONS**

**M.TECH. 2nd Year 3rd Semester (Computer Science & Engineering)**

Choice Based Credit System Scheme w.e.f. 2019-20

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**Elective V**

- MTCSE601C Mobile Applications and Services
- MTCSE603C Compiler for HPC
- MTCSE605C Optimization Techniques
- MTCSE607C Digital Forensics

**Open Electives**

- MTOE657C COST MANAGEMENT OF ENGINEERING PROJECTS
- MTOE659C COMPOSITE MATERIALS
- MTOE661C WASTE TO ENERGY

**Deenbandhu Chhotu Ram University of Science & Technology, Murthal(Sonepat)**

**SCHEME OF STUDIES & EXAMINATIONS**

**M.TECH. 2nd Year 4th Semester (Computer Science & Engineering)**

Choice Based Credit System Scheme w.e.f. 2019-20

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Students going for Industrial Project/Thesis in III sem. will complete these courses through MOOCs.
Syllabus, course objective and course outcomes for M.Tech. (CSE)

MTCSE501C: MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE
M.Tech. Semester-I (Computer Science and Engineering)

Pre-Requisites | Class Work | Credits | Exam Type | Duration |
---|---|---|---|---|
Discrete Mathematics | Examination | 03 | 75 Marks | 03 Hrs. |

COURSE OBJECTIVE

- To understand the mathematical fundamentals that are prerequisites for a variety of courses like Data mining, Computer Networks, Computer security etc.
- To develop the understanding of the mathematical and logical basis to many modern techniques in information technology like machine learning, programming language design, and concurrency.
- To study various sampling and classification problems.

LECTURE WITH BREAKUP

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<td><strong>Unit 1</strong></td>
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<td>Probability mass, density, and cumulative distribution functions, Parametric families of distributions, Expected value, variance, conditional expectation, Applications of the univariate and multivariate Central Limit Theorem, Probabilistic inequalities, Markov chains</td>
<td><strong>Unit 2</strong></td>
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<tr>
<td>Random samples, sampling distributions of estimators, Methods of Moments and Maximum Likelihood,</td>
<td><strong>Unit 3</strong></td>
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<td><strong>Unit 3</strong></td>
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<tr>
<td>Statistical inference, Introduction to multivariate statistical models: regression and classification problems, principal components analysis, The problem of overfitting model assessment,</td>
<td><strong>Unit 4</strong></td>
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<td><strong>Unit 4</strong></td>
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<tr>
<td>Graph Theory: Isomorphism, Planar Graphs, Graph colouring, Hamilton circuits and Euler cycles. Permutations and combinations with and without repetition.</td>
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COURSE OUTCOMES

After completion of course, students would be able to:

- To understand the basic notions of discrete and continuous probability.
- To understand the methods of statistical inference, and the role that sampling distributions play in those methods.
- To be able to perform correct and meaningful statistical analyses of simple to moderate complexity.

References:

4. Alan Tucker, Applied Combinatorics, Wiley

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE503C: ADVANCED DATA STRUCTURES
M.Tech. Semester-I (Computer Science and Engineering)

Pre-Requisites: Data Structures (UG level)
Lectures: 03
Practical: -
Credits: 03

Class Work: 25 Marks
Examination: 75 Marks
Total: 100 Marks
Duration of Exam: 03 Hrs.

COURSE OBJECTIVE
- The student should be able to choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem.
- Students should be able to understand the necessary mathematical abstraction to solve problems.
- To familiarize students with advanced paradigms and data structure used to solve algorithmic problems.
- Student should be able to come up with analysis of efficiency and proofs of correctness.

LECTURE WITH BREAKUP

Unit 1
Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries.

Unit 2
Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists
Recent Trends in Hashing, Trees, and various computational geometry methods for efficiently solving the new evolving problem

Unit 3

Unit 4
Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quad-trees, k-D Trees.

COURSE OUTCOMES
After completion of course, students would be able to:
1. Understand the implementation of symbol table using hashing techniques.
2. Develop and analyze algorithms for red-black trees, B-trees and Splay trees.
3. Develop algorithms for text processing applications.
4. Identify suitable data structures and develop algorithms for computational geometry problems.

References:

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE521C: MACHINE LEARNING
M.Tech. Semester-I (Computer Science and Engineering)

Pre-Requisites - Class Work 25 Marks
Lectures 03 Examination 75 Marks
Practical - Total 100 Marks
Credits 03 Duration of Exam 03 Hrs.

COURSE OBJECTIVE
- To learn the concept of how to learn patterns and concepts from data without being explicitly programmed in various IOT nodes.
- To design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
- Explore supervised and unsupervised learning paradigms of machine learning.
- To explore Deep learning technique and various feature extraction strategies.

LECTURE WITH BREAKUP

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<td>Supervised Learning: Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes, Linear Regression, Logistic Regression, Generalized Linear Models</td>
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<tr>
<td>Support Vector Machines, Nonlinearity and Kernel Methods, Beyond Binary Classification: Multi-class/Structured Outputs, Ranking</td>
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<td>Unsupervised Learning: Clustering: K-means/Kernel K-means</td>
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<td>Dimensionality Reduction: PCA and kernel PCA, Matrix Factorization and Matrix Completion, Generative Models (mixture models and latent factor models)</td>
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<td></td>
</tr>
<tr>
<td>Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning</td>
<td></td>
</tr>
</tbody>
</table>

COURSE OUTCOMES
After completion of course, students would be able to:
- Extract features that can be used for a particular machine learning approach in various IOT applications.
- To compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.
- To mathematically analyse various machine learning approaches and paradigms.

References:
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE523C: WIRELESS SENSOR NETWORKS
M.Tech. Semester-I (Computer Science and Engineering)

<table>
<thead>
<tr>
<th>Pre-Requisites</th>
<th>Class Work</th>
<th>25 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>Examination</td>
<td>75 Marks</td>
</tr>
<tr>
<td>Practical</td>
<td>Total</td>
<td>100 Marks</td>
</tr>
<tr>
<td>Credits</td>
<td>Duration of Exam</td>
<td>03 Hrs.</td>
</tr>
</tbody>
</table>

COURSE OBJECTIVE

- Architect sensor networks for various application setups.
- Devise appropriate data dissemination protocols and model links cost.
- Understanding of the fundamental concepts of wireless sensor networks and have a basic knowledge of the various protocols at various layers.
- Evaluate the performance of sensor networks and identify bottlenecks.

LECTURE WITH BREAKUP

**Unit 1**
Network Architecture: Traditional layered stack, Cross-layer designs, Sensor Network Architecture, Hardware Platforms: Motes, Hardware parameters
Recent development in WSN standards

**Unit 2**

**Unit 3**
Security: Possible attacks, countermeasures, SPINS, Static and dynamic key Distribution

**Unit 4**

COURSE OUTCOMES

After completion of course, students would be able to:
- Describe and explain radio standards and communication protocols for wireless sensor networks.
- Explain the function of the node architecture and use of sensors for various applications.
- Be familiar with architectures, functions and performance of wireless sensor networks systems and platforms.

References:

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE525C: INTRODUCTION TO INTELLIGENT SYSTEMS
M.Tech. Semester-I (Computer Science and Engineering)

Pre-Requisites | Data Structures and Data Management | Class Work | 25 Marks
Lectures | 03 | Examination | 75 Marks
Practical | - | Total | 100 Marks
Credits | 03 | Duration of Exam | 03 Hrs.

COURSE OBJECTIVE

- The aim of the course is to introduce to the field of Artificial Intelligence (AI) with emphasis on its use to solve real world problems for which solutions are difficult to express using the traditional algorithmic approach.
- It explores the essential theory behind methodologies for developing systems that demonstrate intelligent behaviour including dealing with uncertainty, learning from experience and following problem solving strategies found in nature.

LECTURE WITH BREAKUP

| NO. OF LECT. |
| 11 |
| Unit 2 | Search Methods Basic concepts of graph and tree search. Three simple search methods: breadth-first search, depth-first search, iterative deepening search. Heuristic search methods: best-first search, admissible evaluation functions, hill-climbing search. Optimization and search such as stochastic annealing and genetic algorithm. |
| 10 |
| Unit 3 | Knowledge representation and logical inference Issues in knowledge representation. Structured representation, such as frames, and scripts, semantic networks and conceptual graphs. Formal logic and logical inference. Knowledge-based systems structures, its basic components, Knowledge Representation |
| 10 |
| Unit 4 | Reasoning under uncertainty and Learning Techniques on uncertainty reasoning such as Bayesian reasoning, Certainty factors and Dempster-Shafer Theory of Evidential reasoning, A study of different learning and evolutionary algorithms, such as statistical learning and induction learning. |
| 9 |

COURSE OUTCOMES

After completion of course, students would be:

- Able to demonstrate knowledge of the fundamental principles of intelligent systems and would be able to analyze and compare the relative merits of a variety of AI problem solving techniques.

References:


Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE527C: DIGITAL IMAGE ANALYSIS
M.Tech. Semester-I (Computer Science and Engineering)

Pre-Requisites  Basic Electronics  Class Work  25 Marks
Lectures        03          Examination  75 Marks
Practical       -           Total        100 Marks
Credits         03          Duration of Exam  03 Hrs.

COURSE OBJECTIVE
- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.

LECTURE WITH BREAKUP


UNIT 4  Applications of Image Processing: Image Classification, Image Recognition, Image Understanding, Video Motion Analysis, Image Fusion, Steganography, Digital Composting, Mosaics, Colour Image Processing.

COURSE OUTCOMES
After completion of course, students would be:
- Able to review the fundamental concepts of a digital image processing system.
- Analyze images in the frequency domain using various transforms and evaluate the techniques for image enhancement and image restoration.
- Categorize various compression techniques, interpret Image compression standards.
- Interpret image segmentation and representation techniques.

References

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE529C: STEGANOGRAPHY AND DIGITAL WATERMARKING
M.Tech. Semester-I (Computer Science and Engineering)

Pre-Requisites
Image and Video Processing, Linear Algebra

Lectures
03
Examination
75 Marks

Practical
- 
Total
100 Marks

Credits
03
Duration of Exam
03 Hrs.

COURSE OBJECTIVE
- The objective of course is to provide a insight to steganography techniques. Watermarking techniques along with attacks on data hiding and integrity of data is included in this course.

LECTURE WITH BREAKUP

NO. OF LECT.

Unit 1
Cryptography, Introduction, Plain Text and Cypher Text, Cryptographic Techniques, Symmetric and Asymmetric keys, DSA 9

Unit 2

Unit 3
LSB Embedding, Steganography algorithms, Algorithm of 6th and 7th bit, Digital Logic technique algorithm 8

Unit 4
Digital Watermarking: Introduction, Difference between Watermarking and Steganography, History, Classification (Characteristics and Applications), Types and techniques (Spatial-domain, Frequency-domain), Recent trends in Steganography and digital watermarking techniques. 12

COURSE OUTCOMES
After completion of course, students would:
- Learn the concept of information hiding.
- Survey of current techniques of steganography and learn how to detect and extract hidden information.
- Learn watermarking techniques and through examples understand the concept.

References:

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE541C: DATA SCIENCE
M.Tech. Semester-I (Computer Science and Engineering)

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<th>Pre-Requisites</th>
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<td>25 Marks</td>
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<tr>
<td>Lectures</td>
<td>Examination</td>
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<tr>
<td>Practical</td>
<td>Total</td>
<td>100 Marks</td>
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<tr>
<td>Credits</td>
<td>Duration of Exam</td>
<td>03 Hrs.</td>
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</table>

COURSE OBJECTIVE
● Provide with the knowledge and expertise to become a proficient data scientist.
● Demonstrate an understanding of statistics and machine learning concepts that are vital for data science;
● Produce Python code to statistically analyze a dataset;
● Critically evaluate data visualizations based on their design and use for communicating stories from data;

LECTURE WITH BREAKUP

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<thead>
<tr>
<th>Unit</th>
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<td>11</td>
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<td>4</td>
<td>12</td>
</tr>
</tbody>
</table>

Unit 1
Introduction to core concepts and technologies: Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications.

Unit 2
Data collection and management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources

Unit 3
Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.

Unit 4
Data visualization: Introduction, Types of data visualization, Data for visualization: Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings.

COURSE OUTCOMES
On completion of the course the student should be able to
● Explain how data is collected, managed and stored for data science;
● Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists;

References:

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
# MTCSE543C: DISTRIBUTED SYSTEMS

M.Tech. Semester-I (Computer Science and Engineering)

<table>
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<tbody>
<tr>
<td>Lectures</td>
<td>Examination</td>
<td>75 Marks</td>
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<tr>
<td>Practical</td>
<td>Total</td>
<td>100 Marks</td>
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<tr>
<td>Credits</td>
<td>Duration of Exam</td>
<td>03 Hrs.</td>
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</table>

## COURSE OBJECTIVE
- To introduce the fundamental concepts and issues of managing large volume of shared data in a parallel and distributed environment, and to provide insight into related research problems.

## LECTURE WITH BREAKUP

### Unit 1
Distributed data processing; What is a DDBS; Advantages and disadvantages of DDBS; Problem areas; Overview of database and computer network concepts Distributed Database Management System Architecture; Transparencies in a distributed DBMS; Distributed DBMS architecture; Global directory issues

### Unit 2
Distributed Database Design: Alternative design strategies; Distributed design issues; Fragmentation; Data allocation, Semantics Data Control: View management; Data security; Semantic Integrity Control, Query Processing Issues: Objectives of query processing; Characterization of query processors; Layers of query processing; Query decomposition; Localization of distributed data

### Unit 3
Distributed Query Optimization: Factors governing query optimization; Centralized query optimization; Ordering of fragment queries; Distributed query optimization algorithms; Transaction Management: The transaction concept; Goals of transaction management; Characteristics of transactions; Taxonomy of transaction models; Concurrency Control: Concurrency control in centralized database systems; Concurrency control in DDBSs; Distributed concurrency control algorithms; Deadlock management

### Unit 4
Reliability: Reliability issues in DDBSs; Types of failures; Reliability techniques; Commit protocols; Recovery protocols, Mobile Databases, Distributed Object Management, Multi-databases

## COURSE OUTCOMES

After completion of course, students would be:
- Design trends in distributed systems.
- Apply network virtualization.
- Apply remote method invocation and objects.

## References:

**Note:** In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE545C: ADVANCED WIRELESS AND MOBILE NETWORKS  
M.Tech. Semester-I (Computer Science and Engineering)

<table>
<thead>
<tr>
<th>Pre-Requisites</th>
<th>Class Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Networks</td>
<td>25 Marks</td>
<td>03</td>
</tr>
<tr>
<td>Examination</td>
<td>75 Marks</td>
<td></td>
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<tr>
<td>Total</td>
<td>100 Marks</td>
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<tr>
<td>Duration of Exam</td>
<td>03 Hrs.</td>
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</tbody>
</table>

COURSE OBJECTIVE

- The students should get familiar with the wireless/mobile market and the future needs and challenges.
- To get familiar with key concepts of wireless networks, standards, technologies and their basic operations
- To learn how to design and analyse various medium access
- To learn how to evaluate MAC and network protocols using network simulation software tools.
- The students should get familiar with the wireless/mobile market and the future needs and challenges.

LECTURE WITH BREAKUP

**Unit 1**

**Unit 2**

**Unit 3**
WiMAX (Physical layer, Media access control, Mobility and Networking), IEEE 802.22

**Unit 4**

COURSE OUTCOMES

After completion of course, students would be:

- Demonstrate advanced knowledge of networking and wireless networking and understand various types of wireless networks, standards, operations and use cases.
- Be able to design WLAN, WPAN, WWAN, Cellular based upon underlying propagation and performance analysis.
- Demonstrate knowledge of protocols used in wireless networks and learn simulating wireless networks.
- Design wireless networks exploring trade-offs between wire line and wireless links.
• Develop mobile applications to solve some of the real world problems.

References:

1. Schiller J., Mobile Communications, Addison Wesley 2000
2. Stallings W., Wireless Communications and Networks, Pearson Education 2005
5. Pandya Raj, Mobile and Personal Communications Systems and Services, PHI 200

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE547C: EMULATION AND SIMULATION METHODOLOGIES
M.Tech. Semester-I (Computer Science and Engineering)

Pre-Requisites: Probability Theory, Computer Networks

Class Work: 25 Marks

Lectures: 03
Examination: 75 Marks

Practical: -
Total: 100 Marks

Credits: 03
Duration of Exam: 03 Hrs.

COURSE OBJECTIVE
- This module teaches the fundamentals of simulation and emulation methodologies providing guidance on how to design a performance evaluation campaign,
- Set up a test scenario, select the appropriate models, level of granularity
- Metrics for statistical correctness, and discuss the differences between simulation and emulation platforms and how to use them for accurate performance evaluation of communications.

LECTURE WITH BREAKUP

<table>
<thead>
<tr>
<th>Unit</th>
<th>NO. OF LECT.</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Fundamentals of Discrete Event Simulations (DES)</td>
<td></td>
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<tr>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Model-based representation for DES, from communication and networking, to mobility and data traffic.</td>
<td></td>
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<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Application-based Granularity Requirements: from bit-level, packet-level, to system-level evaluation, and their appropriate selection as a function of the application requirements.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Fundamentals on Random Numbers, Fundamentals on Statistical Tools for Performance Evaluation, Simulation vs. Emulations, Recent trends in simulation and emulation for IOT</td>
<td></td>
</tr>
</tbody>
</table>

COURSE OUTCOMES

On completion of the course the student should be able to
- Key concepts, tools and approaches for pattern recognition on complex data sets
- Kernel methods for handling high dimensional and non-linear patterns
- State-of-the-art algorithms such as Support Vector Machines and Bayesian networks
- Theoretical concepts and the motivations behind different learning frameworks
- Be able to solve real-world machine learning tasks: from data to inference

References:

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE549C: BIOMETRICS
M.Tech. Semester-I (Computer Science and Engineering)

Pre-Requisites: Image Processing  Class Work: 25 Marks
Lectures: 03  Examination: 75 Marks
Practical: -  Total: 100 Marks
Credits: 03  Duration of Exam: 03 Hrs.

COURSE OBJECTIVE
- The objective of this course is to introduce Bio-metric and traditional authentication methods. Application of bio-metric systems in government sector and various face recognition and finger print recognition methods are included.

LECTURE WITH BREAKUP

<table>
<thead>
<tr>
<th>Unit</th>
<th>Title</th>
<th>NO. OF LECT.</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction and Definitions of bio-metrics, Traditional authenticated methods and technologies. DNA Matching</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Bio-metric technologies: Fingerprint, Face, Iris, Hand Geometry, Gait Recognition, Ear, Voice, Palm print, On-Line Signature Verification, 3D Face Recognition, Dental Identification and DNA.</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>The Law and the use of multi bio-metrics systems, Recent trends in Bio-metric technologies and applications in various domains. Bio-metric System Vulnerabilities.</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Statistical measurement of Bio-metric. Bio-metrics in Government Sector and Commercial Sector.</td>
<td>9</td>
</tr>
</tbody>
</table>

COURSE OUTCOMES
After completion of course, students would be:
- Perform R&D on bio-metrics methods and systems.
- A good understanding of the various modules constituting a bio-metric system.
- Familiarity with different bio-metric traits and to appreciate their relative significance.
- A good knowledge of the feature sets used to represent some of the popular bio-metric traits.
- Evaluate and design security systems incorporating bio-metrics.
- Recognize the challenges and limitations associated with bio-metrics.

References:

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE505C: RESEARCH METHODOLOGY AND IPR
M.Tech. Semester-I (Computer Science and Engineering)

Pre-Requisites -
Lectures 02
Practical -
Credits 02

COURSE OBJECTIVE

- The objective of this course is to introduce the overall process of designing research study from its inception to its report. Further, it is to make students aware of their rights for the protection of their invention done in their project work.

LECTURE WITH BREAKUP

<table>
<thead>
<tr>
<th>Unit</th>
<th>NO. OF LECT.</th>
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<tbody>
<tr>
<td>Unit 1</td>
<td>9</td>
</tr>
<tr>
<td>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</td>
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</tr>
<tr>
<td>Unit 2</td>
<td>10</td>
</tr>
<tr>
<td>Effective literature studies approaches, analysis, Plagiarism, Research ethics, Effective technical writing, how to write report, Paper, Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee</td>
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<tr>
<td>Unit 3</td>
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<td>Unit 4</td>
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</tbody>
</table>

Course Outcomes:
At the end of this course, students will be able to

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today’s world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.
References:

2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE511C: ADVANCED DATA STRUCTURES LAB
M.Tech. Semester-I (Computer Science and Engineering)

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Class Work</th>
<th>25 Marks</th>
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<tbody>
<tr>
<td>Practical</td>
<td>Examination</td>
<td>75 Marks</td>
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<td>Credits</td>
<td>Total</td>
<td>100 Marks</td>
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</table>

The students will be required to carry out 10 to 12 experiments covering the theory course

MTCSE501C: ADVANCED DATA STRUCTURES
### MTCSE561C: MACHINE LEARNING LAB
M.Tech. Semester-I (Computer Science and Engineering)

<table>
<thead>
<tr>
<th>Lectures</th>
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<tbody>
<tr>
<td>Practical</td>
<td>Examination</td>
<td>75 Marks</td>
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<tr>
<td>Credits</td>
<td>Total</td>
<td>100 Marks</td>
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</table>

The students will be required to carry out 10 to 12 experiments covering the respective theory course.

### MTCSE563C: WIRELESS SENSOR NETWORKS LAB
M.Tech. Semester-I (Computer Science and Engineering)

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<tr>
<th>Lectures</th>
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<tbody>
<tr>
<td>Practical</td>
<td>Examination</td>
<td>75 Marks</td>
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<tr>
<td>Credits</td>
<td>Total</td>
<td>100 Marks</td>
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</table>

The students will be required to carry out 10 to 12 experiments covering the respective theory course.

### MTCSE565C: INTELLIGENT SYSTEMS LAB
M.Tech. Semester-I (Computer Science and Engineering)

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Class Work</th>
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<tr>
<td>Practical</td>
<td>Examination</td>
<td>75 Marks</td>
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<td>Credits</td>
<td>Total</td>
<td>100 Marks</td>
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</table>

The students will be required to carry out 10 to 12 experiments covering the respective theory course.

### MTCSE567C: DIGITAL IMAGE ANALYSIS LAB
M.Tech. Semester-I (Computer Science and Engineering)

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<th>Lectures</th>
<th>Class Work</th>
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<tr>
<td>Practical</td>
<td>Examination</td>
<td>75 Marks</td>
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<td>Credits</td>
<td>Total</td>
<td>100 Marks</td>
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</table>

The students will be required to carry out 10 to 12 experiments covering the respective theory course.

### MTCSE569C: STEGANOGRAPHY AND DIGITAL Watermarking LAB
M.Tech. Semester-I (Computer Science and Engineering)

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<th>Lectures</th>
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<tr>
<td>Practical</td>
<td>Examination</td>
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<td>Credits</td>
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</table>

The students will be required to carry out 10 to 12 experiments covering the respective theory course.
AUD531C: ENGLISH FOR RESEARCH PAPER WRITING
M. Tech. Semester – I/II (Common to all Branches)

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<th>Class Work</th>
<th>Examination</th>
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<th>Duration of Examination</th>
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<td>2</td>
<td>--</td>
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<td>25Marks</td>
<td>75 Marks</td>
<td>100 Marks</td>
<td>3 Hours</td>
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</tbody>
</table>

**Course Objectives:**

Students will be able to:

1. Understand that how to improve your writing skills and level of readability,
2. Learn about what to write in each section,
3. Understand the skills needed when writing a Title, and
4. Ensure the good quality of paper at very first-time submission

**Course Outcomes:**

The Students will become conscious citizens of India aware of their duties, rights and functions of various bodies of governance and welfare; thereby well equipped to contribute to India.

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**UNIT I:** Basics of Writing Skills:

Subject Verb Agreements; Parallelism; Structuring Paragraphs and Sentences; Being Concise and Removing Redundancy; Avoiding Ambiguity and Vagueness; Dangling Modifiers

**UNIT II:** Reviewing and Citation:

Clarifying Who Did What; Highlighting Your Findings from Literature; Hedging and Critiquing; Paraphrasing; Avoiding Plagiarism; Formatting and Citation (Publication Manual of the American Psychological Association)

**UNIT III:** Sections of a Research Paper:

Writing Effective and Impressive Abstract; Writing Introduction; Review of Literature; Defining Objectives of the Study; Methodology Adopted; Results Obtained; Discussion and Conclusion; Editing and Proof Reading to Ensure Quality of paper

**UNIT IV:** Oral Presentation for Academic Purposes:

Oral Presentation for Seminars, Conferences and Symposia; Poster Presentation; Choosing Appropriate Medium; Interaction and Persuasion

**TEXT / REFERENCE BOOKS:**

London, 2011


NOTE:

1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD533C: DISASTER MANAGEMENT
M. Tech. Semester – I/II (Common for all Branches)

<table>
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<th>L</th>
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<th>Credits</th>
<th>Class Work</th>
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<td>25Marks</td>
<td>75 Marks</td>
<td>100 Marks</td>
<td>3 Hours</td>
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Course Objectives:

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 different aspects of disaster management

Course Outcomes:

A student will be able to:

1. Know the significance of disaster management,
2. Study the occurrences, reasons and mechanism of various types of disaster
3. Learn the preventive measures as Civil Engineer with latest codal provisions
4. Apply the latest technology in mitigation of disasters

UNIT I: Introduction to Disaster Management: Definitions: Disaster, Emergency, Hazard, Mitigation, Disaster Prevention, Preparedness and Rehabilitation, Risk and Vulnerability, Classification of Disaster, Natural and Man made Disasters, Disaster Management Act 2005, Role of NDMA, NDRF, NIDM

Risk and Vulnerability to disaster mitigation and management options: Concept and Elements, Risk Assessment, Vulnerability, Warning and Forecasting.

UNIT II: Hydro-meteorological based disasters I: Tropical Cyclones, Floods, droughts, mechanism, Causes, role of Indian Metrological Department, Central Water Commission, structure and their impacts, classifications, vulnerability, Early Warning System, Forecasting, Flood Warning System, Drought Indicators, recurrence and declaration, Structural and Non-structural Measures.

Hydro-meteorological based disasters II: Desertification Zones, causes and impacts of desertification, Characteristics, Vulnerability to India and Steps taken to combat desertification, Prevention.

UNIT III: Geological based disasters: Earthquake, Reasons, Direct and Indirect Impact of Earthquake; Seismic Zones in India, Factors, Prevention and Preparedness for Earthquake, Tsunamis, Landslides and avalanches; Definition, causes and structure; past lesson learnt and measures taken; their Characteristic features, Impact and prevention, structural and non-structural measures.

UNIT IV: Manmade Disasters I: Chemical Industrial hazards; causes and factors, pre- and post disaster measures; control ; Indian Standard Guidelines and Compliance; Oil Slicks and Spills, Outbreak of Disease and Epidemics, Traffic accidents; classification and impact, War and Conflicts; Fire risk assessment; Escape routes; fire fighting equipment;

Use of remote sensing and GIS in disaster mitigation and management.
TEXT / REFERENCE BOOKS:

5. Savindra Singh and Jeetendra Singh, Disaster Management, Pravalika Publications, Allahabad
7. Selected Resources Published by the National Disaster Management Institute of Home Affairs, Govt. of India, New Delhi.

NOTE:

1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD535C: SANSKRIT FOR TECHNICAL KNOWLEDGE
M. Tech. Semester – I/II (Common for all Branches Engineering)

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<th>L</th>
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<td>25 Marks</td>
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</table>

**Course Objectives:**

1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2. Learning of Sanskrit to improve brain functioning
3. Learning of Sanskrit to develop the logic in Mathematics, Science & other subjects
4. Enhancing the memory power

**Course Outcomes:**

Students will be able to

1. Understand basic Sanskrit language
2. Understand Ancient Sanskrit literature about science and technology
3. Get equipped with Sanskrit and explore the huge knowledge from ancient literature

**TEXT / REFERENCE BOOKS:**

1. “Abhyaspustakam” – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. “Teach Yourself Sanskrit” Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication

**NOTE:**

1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All
questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD537C: VALUE EDUCATION
M. Tech. Semester – I/II (Common for all Branches)

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<th>L</th>
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<td>25Marks</td>
<td>75 Marks</td>
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</table>

Course Objectives:
The students will be able to

1. Understand value of education and self-development
2. Imbibe good values in students
3. Let the should know about the importance of character

Course Outcomes:
The students will be able to

1. Knowledge of self-development
2. Learn the importance of Human values
3. Developing the overall personality
4. Strengthen the “EQ”

Syllabus contents:

Unit I: Hierarchy and Classification of values,
Values and Belief Systems, Competence in professional ethics,
Value judgment based on cultural, tradition and interdependence.

Unit II: Need for value education
Sense of duty, Devotion, Self-reliance.
Honesty, Humanity, trust, Patriotism and national Unity.
Harmony in the nature and realization of coexistence
Vision of better India

Unit III: Understanding the meaning and realizing the effect of the following:
Aware of self-destructive habits, Knowledge, Acceptance, Love, Situations, happiness, Bliss,
Peace, Power, Purity, Realization, Assertiveness, Regard, Respect, Sensitive, Divinity, emotions,
Repentance, hurt, Ego, Attachment, worry, Resentment, Fear, Anxiety, Greed, Criticism, Tension,
Frustration, Expectation, Irritation, Anger, Guilt, Jealous, Peer Pressure, True Friendship,
Cooperation - Coordination - competition.
Enhancing self esteem and personality.
Unit IV: Hinduism, Jainism, Buddhism, Christianity, Islam, Sikhism.

Self-management and Good health (Role, Responsibility, Relation, Routine, Requirements, Resources)

My True self and Original qualities. Supreme-soul - source of values.

What Scientists say about super power?

TEXT / REFERENCE BOOKS:

3. Value Education in Spirituality - Course-I, course -II by Brahma Kumaris Education Wing, Rajyoga Education & Research Foundation, Mount Abu, Rajasthan.

NOTE:

1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD539C: CONSTITUTION OF INDIA  
M. Tech. Semester – I/II (Common for all Branches)

<table>
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<tr>
<th>L</th>
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</table>

Course Objectives:

Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. 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.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes:

The Students will become conscious citizens of India aware of their duties, rights and functions of various bodies of governance and welfare; thereby well equipped to contribute to India.

Syllabus contents:

Unit I: Making of the Indian Constitution and its Philosophy
Sources of Indian Constitution, its Preamble and Salient Features.

Unit II: 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
Fundamental Duties

Unit III: Organs of Governance
Legislature: Parliament and its Composition; Qualifications and Disqualifications of Its members
Executive: President, Governor and Council of Ministers
Judiciary: Appointments, Qualifications, Powers and Functions of judges

Unit IV: Local Administration and institutes for welfare
District Administration Head: Role and Importance; Municipalities: Introduction, Mayor and role of Elected Representative
Panchayati Raj Institutions: Introduction, Gram Panchayat, Panchayat Samiti and Zila Panchayat Institutes and Bodies for the welfare of SC/ST/OBC and women
TEXT / REFERENCE BOOKS:
1. The Constitution of India, 1950 (Bare Act), Government Publication.

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD541C: PEDAGOGICAL STUDIES  
M. Tech. Semester – I/II (Common for all Branches)

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<td>25Marks</td>
<td>75 Marks</td>
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<td>3 Hours</td>
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Course Objectives:
The course will enable the student teachers:
1. To understand the concept of pedagogy and conceptual framework.
2. To gain insight on the meaning and nature of different pedagogies.
3. To determine aims and strategies of teaching- learning.
4. To understand the principals, maxims of successful teaching and the different methods of teaching.
5. Comprehend the need and importance of various devices of teaching and learning and their relationship between the two.
6. Point out and illustrate the difference between teaching and learning and their relationship between the two.
7. To appreciate that science/ engineering is a dynamic and expanding body of knowledge.

Course Outcomes:
Students will be able to understand:
1. It will improve teaching effectiveness of prospective teachers.
2. A prospective teacher will be able to design curriculum and assess the curriculum of their discipline in an effective way by understanding the needs of the learners.
3. How can teacher education, school curriculum and guidance support effective pedagogy?
4. It will be functional for professional development among teachers.

Syllabus contents:

Unit I: Introduction and Methodology
- Aims and Rationale, Conceptual Framework, Terminology related to Pedagogy
- Contexts, Research Questions
- Theories of Learning, Curriculum, Scope of Pedagogy

Unit II: Teaching
- Meaning and importance of Behavioral Objectives
- Writing of Objectives in Behavioral Terms
- Phases and Variables of Teaching
- Principles, levels and maxims off teaching
- Relationship between Teaching and Learning

Unit III: Methods of Teaching
- Methods: Inductive, Deductive, Project, Analytic, Synthetic, Brain Storming, Case Discussion
- Concept and Significance of Individualized and Cooperative Teaching-Language Laboratory, Tutorials, Keller’s Plan (PSI), Computer Supporting Collaborative Learning
- Mastery Learning: Concept, Basic Elements, Components and Types of Mastery Learning Strategies
Unit IV: Evaluation Strategies

- Evaluation in Teaching: Concept of Evaluation, Relationship between Teaching and Evaluation, Types of Evaluation (Formative and Summative)
- Methods of Evaluation through Essay Type. Objective Type and Oral Method, Comparative merits and demerits of evaluation methods
- Latest Trends in Evaluation

TEXT / REFERENCE BOOKS:


NOTE:

1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD543C: STRESS MANAGEMENT BY YOGA
M. Tech. Semester – I/II (Common for all Branches)

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<td>75 Marks</td>
<td>100 Marks</td>
<td>3 Hours</td>
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Course Objectives:
1. To achieve overall health of body and mind
2. To overcome stress

Course Outcomes:
Students will be able to:
1. Develop healthy mind and healthy body thus improving social health also
2. Improve efficiency
3. Improving “SQ”

Syllabus contents:

Unit I:
2. Difference and relation b/w Yog and Yoga,
3. benefits of meditation and Yoga,
4. Rules and Regulation of Yog and Yoga.
5. Empowerment of Soul and fitness of body.

Unit II:
1. Do’s and Don’t’s in life.
2. How to be and not to be?
3. Understanding spirituality and materials.
4. Impact of: Truth at mouth/ Truth in thoughts
   Non Violence outside / Compassion in thoughts, Celibacy (kamnayn- desire), purity of mind , non-covetousness, Cleanliness, satisfaction, self study and surrender to almighty, Austerity, Penance

Unit III:
Role of Meditation in reducing Stress.
Role of Yoga in reducing Stress.
Pranyama: AnulomVilom ,Ujjai, Costal Breathing, Abdominal Breathing, Sunyak, Kumbhak

Unit IV:

TEXT / REFERENCE BOOKS:
1. ‘Yogic Asanas for Group Tarining-Part-I” : Janardan Swami Yogabhyasi  Mandal, Nagpur
2. “Rajayoga or conquering the Internal Nature” by Swami Vivekananda, Advaita Ashrama, (Publication Department), Kolkata
3. “Value Education in Spirituality- Course-IV” by Brahma Kumaries Education Wing, Rajyoga Education Research Foundation, Mount Abu, Rajasthan.
4. “Stress Management for Dummies” by Allen Elkin, IDG Books India (P) Ltd.
5. “Yoga Courses for All” by Dr Hansraj Yadav, BhartyaVidyaBhawan, Mumbai

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD545C: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS
M. Tech. Semester – I/II (Common for all Branches)

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<td>75 Marks</td>
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<td>3 Hours</td>
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Course Objectives:

Students will be able to:

1. To learn and achieve the highest goal happily
2. To become a person with stable mind, pleasing personality and determination
3. To awaken wisdom in students

Course Outcomes:

1. The study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life.
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity.
3. Study of Neetishatakam will help in developing versatile personality of students.

Syllabus contents:

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

**Unit II:** Approach to Day to Day Work and Duties
Shrimad BhagwadGeeta: Chapter 2 (Verses- 41, 47, 48), Chapter 3 (Verses- 13, 21, 27, 35), Chapter 6 (Verses- 05, 13, 17, 23, 35), Chapter 18 (Verses- 45, 46, 48)

**Unit III:** Statements of Basic Knowledge
Shrimad BhagwadGeeta: Chapter 2 (Verses- 56, 62,68), Chapter 12 (Verses- 13, 14, 15, 16, 17, 18)

**Unit IV:** Personality of a Role Model
Shrimad BhagwadGeeta: Chapter 2 (Verses- 17), Chapter 3 (Verses 36, 37, 42), Chapter 4 (Verses 18, 38, 39), Chapter 18 ( Verses 37, 38 63)

TEXT / REFERENCE BOOKS:

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

NOTE:

1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange
of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
MTCSE502C: ADVANCED ALGORITHMS
M.Tech. Semester-II (Computer Science and Engineering)

Pre-Requisites: UG level course in Algorithm Design and Analysis

<table>
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<tr>
<th>Lectures</th>
<th>Class Work</th>
<th>Total</th>
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<tr>
<td>03</td>
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COURSE OBJECTIVE
- Introduce students to the advanced methods of designing and analyzing algorithms.
- The student should be able to choose appropriate algorithms and use it for a specific problem.
- To familiarize students with basic paradigms and data structures used to solve advanced algorithmic problems.
- Students should be able to understand different classes of problems concerning their computation difficulties.
- To introduce the students to recent developments in the area of algorithmic design.

LECTURE WITH BREAKUP

Unit 1
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.
Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures.

Unit 2
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 3
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 4
Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming.
COURSE OUTCOMES
After completion of course, students would be able to:

- Analyze the complexity/performance of different algorithms.
- Determine the appropriate data structure for solving a particular set of problems.
- Categorize the different problems in various classes according to their complexity.
- Students should have an insight of recent activities in the field of the advanced data structure.

References:
1. "Introduction to Algorithms" by Cormen, Leiserson, Rivest, Stein.

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE504C: SOFT COMPUTING
M.Tech. Semester-II (Computer Science and Engineering)

Pre-Requisites Basic knowledge of mathematics
Lectures 03
Practical -
Credits 03

Class Work 25 Marks
Examination 75 Marks
Total 100 Marks
Duration of Exam 03 Hrs.

COURSE OBJECTIVE
- To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.
- To implement soft computing based solutions for real-world problems.
- To give students knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms.
- To provide student an hand-on experience on MATLAB to implement various strategies.

LECTURE WITH BREAKUP

Unit 1 11
Introduction to Soft Computing and Neural Networks: Evolution of Computing:
Soft Computing Constituents, From Conventional AI to Computational
Intelligence: Machine Learning Basics, Introduction to Deep Learning

Unit 2 9
Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership
Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy

Unit 3 11
Neural Networks: Machine Learning Using Neural Network, Adaptive Networks,
Feed forward Networks, Supervised Learning Neural Networks, Radial Basis
Function Networks : Reinforcement Learning, Unsupervised Learning Neural
Networks, Adaptive Resonance architectures, Advances in Neural networks

Unit 4 9
Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of
GA in Machine Learning: Machine Learning Approach to Knowledge Acquisition.

COURSE OUTCOMES
After completion of course, students would be able to:
- Identify and describe soft computing techniques and their roles in building intelligent machines
- Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.
- Apply genetic algorithms to combinatorial optimization problems.
- Evaluate and compare solutions by various soft computing approaches for a given problem.

References:
1. Jyh:Shing Roger Jang, Chuen:Tsai Sun, EijiMizutani, Neuro:Fuzzy and Soft
2. George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic:Theory and Applications ,
3. MATLAB Toolkit Manual

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.

41
MTCSE522C: DATA PREPARATION AND ANALYSIS  
M.Tech. Semester-II (Computer Science and Engineering)

Pre-Requisites: DBMS  
Lectures: 03  
Practical: -  
Credits: 03  

Class Work: 25 Marks  
Examination: 75 Marks  
Total: 100 Marks  
Duration of Exam: 03 Hrs.

COURSE OBJECTIVE

- To prepare the data for analysis and develop meaningful Data Visualizations

LECTURE WITH BREAKUP

<table>
<thead>
<tr>
<th>Unit</th>
<th>No. of Lectures</th>
<th>Lectures</th>
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<tbody>
<tr>
<td>Unit1</td>
<td>9</td>
<td>Data Gathering and Preparation: Data formats, parsing and transformation, Scalability and real-time issues</td>
</tr>
<tr>
<td>Unit2</td>
<td>10</td>
<td>Data Cleaning: Consistency checking, Heterogeneous and missing data, Data Transformation and segmentation</td>
</tr>
<tr>
<td>Unit3</td>
<td>10</td>
<td>Exploratory Analysis: Descriptive and comparative statistics, Clustering and association, Hypothesis generation</td>
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<tr>
<td>Unit4</td>
<td>11</td>
<td>Visualization: Designing visualizations, Time series, Geolocated data, Correlations and connections, Hierarchies and networks, interactivity</td>
</tr>
</tbody>
</table>

COURSE OUTCOMES

After completion of course, students would be:
- Able to extract the data for performing the Analysis.

References:

1. Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, by Glenn J. Myatt

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE524C: SECURE SOFTWARE DESIGN AND ENTERPRISE COMPUTING
M.Tech. Semester-II (Computer Science and Engineering)

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<th>Pre-Requisites</th>
<th>Class Work</th>
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<td>Credits</td>
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COURSE OBJECTIVE

- To fix software flaws and bugs in various software.
- To make students aware of various issues like weak random number generation, information leakage, poor usability, and weak or no encryption on data traffic.
- Techniques for successfully implementing and supporting network services on an enterprise scale and heterogeneous systems environment.
- Methodologies and tools to design and develop secure software containing minimum vulnerabilities.

LECTURE WITH BREAKUP

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>No. of Lectures</th>
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<tbody>
<tr>
<td>Unit 1</td>
<td>Secure Software Design: Identify software vulnerabilities and perform software security analysis, Master security programming practices, Master fundamental software security design concepts,</td>
<td>9</td>
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<tr>
<td>Unit 2</td>
<td>Enterprise Application Development: Describe the nature and scope of enterprise software applications, Design distributed N-tier software application, Research technologies available for the presentation, business and data tiers of an enterprise software application, Design and build a database using an enterprise database system, Develop components at the different tiers in an enterprise system, Design and develop a multi-tier solution to a problem using technologies used in enterprise system, Present software solution.</td>
<td>11</td>
</tr>
<tr>
<td>Unit 3</td>
<td>Enterprise Systems Administration: Design, implement and maintain a directory-based server infrastructure in a heterogeneous systems environment, Monitor server resource utilization for system reliability and availability, Install and administer network services (DNS/DHCP/Terminal Services/Clustering/Web/Email).</td>
<td>9</td>
</tr>
<tr>
<td>Unit 4</td>
<td>Software containing minimum vulnerabilities and flaws, Perform security testing and quality assurance. Managing software quality in an organization, software configuration management, software measurement and metrics,</td>
<td>11</td>
</tr>
</tbody>
</table>

COURSE OUTCOMES

After completion of course, students would be able to:

- Differentiate between various software vulnerabilities.
- Software process vulnerabilities for an organization.
- Monitor resources consumption in a software.
• Interrelate security and software development process.

References:
1. Theodor Richardson, Charles N Thies, Secure Software Design, Jones & Bartlett

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE526C: COMPUTER VISION
M.Tech. Semester-II (Computer Science and Engineering)

Pre-Requisites
Linear algebra, vector calculus, Data structures and Programming

Class Work 25 Marks

Lectures 03
Examination 75 Marks
Practical -
Total 100 Marks
Credits 03
Duration of Exam 03 Hrs.

COURSE OBJECTIVE

- Be familiar with both the theoretical and practical aspects of computing with images.
- Have described the foundation of image formation, measurement, and analysis.
- Understand the geometric relationships between 2D images and the 3D world.
- Grasp the principles of state-of-the-art deep neural networks.

LECTURE WITH BREAKUP

<table>
<thead>
<tr>
<th>Unit</th>
<th>Lectures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview, computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis</td>
<td>10</td>
</tr>
<tr>
<td>Edge detection, Edge detection performance, Hough transform, corner detection Segmentation, Morphological filtering, Fourier transform</td>
<td>10</td>
</tr>
<tr>
<td>Feature extraction, shape, histogram, color, spectral, texture, Feature analysis, feature vectors, distance /similarity measures, data pre-processing</td>
<td>9</td>
</tr>
</tbody>
</table>

COURSE OUTCOMES

After completion of course, students would be able to:

- Developed the practical skills necessary to build computer vision applications.
- To have gained exposure to object and scene recognition and categorization from images.

References:


Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE528C: SENSOR NETWORKS AND INTERNET OF THINGS
M.Tech. Semester-II (Computer Science and Engineering)

Pre-Requisites  Wireless Networks  Class Work  25 Marks
Lectures  03  Examination  75 Marks
Practical  -  Total  100 Marks
Credits  03  Duration of Exam  03 Hrs.

COURSE OBJECTIVE
- The course gives an overview of various topics related to wireless sensor networks, which are expected to be the basis for the emerging internet-of-things.
- The course covers topics with relation to various sub-disciplines of computer science such as hardware, operating systems, distributed systems, networking, security and databases.
- Able to understand wireless sensor network (WSN) specific issues such as localization, time synchronization, and topology control are addressed as well.

LECTURE WITH BREAKUP

<table>
<thead>
<tr>
<th>Unit</th>
<th>NO. OF LECT.</th>
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<tbody>
<tr>
<td><strong>Unit 1</strong></td>
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<tr>
<td><strong>Unit 2</strong></td>
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<tr>
<td><strong>Unit 3</strong></td>
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</tr>
<tr>
<td><strong>Unit 4:</strong> Hardware Platforms and Energy Consumption, Operating Systems, Time Synchronization, Positioning and Localization, Medium Access Control, Topology and Coverage Control, Routing: Transport Protocols, Network Security, Middleware, Databases</td>
<td>10</td>
</tr>
</tbody>
</table>

COURSE OUTCOMES
On completion of the course the student should be able to
- identify requirements from emerging WSN applications on WSN platforms, communication systems, protocols and middleware
- understand, compare and evaluate communication and network protocols used in WSNs
- discuss and evaluate mechanisms and algorithms for time synchronization and localization in WSNs
- understand and discuss requirements for the design of security mechanisms and middleware systems to be used in WSNs
References:

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
Pre-Requisites - Class Work 25 Marks
Lectures 03 Examination 75 Marks
Practical - Total 100 Marks
Credits 03 Duration of Exam 03 Hrs.

COURSE OBJECTIVE
- The student will also learn how to apply trust-based security model to real-world security problems.
- An overview of the concepts, processes, and best practices needed to successfully secure information within Cloud infrastructures.
- Students will learn the basic Cloud types and delivery models and develop an understanding of the risk and compliance responsibilities and Challenges for each Cloud type and service delivery model.

LECTURE WITH BREAKUP

<table>
<thead>
<tr>
<th>Unit</th>
<th>NO. OF LECT.</th>
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</thead>
<tbody>
<tr>
<td>Unit 1</td>
<td>Introduction to Cloud Computing: Online Social Networks and Applications, Cloud introduction and overview, Different clouds, Risks, Novel applications of cloud computing, Services provided by the cloud, Introduction to Hybrid cloud</td>
</tr>
</tbody>
</table>

COURSE OUTCOMES
After completion of course, students would be able to:
- Identify security aspects of each cloud model
- Develop a risk-management strategy for moving to the Cloud
- Implement a public cloud instance using a public cloud service provider
- Apply trust-based security model to different layer
References:


Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE542C: GPU COMPUTING
M.Tech. Semester-II (Computer Science and Engineering)

Pre-Requisites OS, COA
Lectures 03
Practical -
Credits 03

**Class Work** 25 Marks
**Examination** 75 Marks
**Total** 100 Marks
**Duration of Exam** 03 Hrs.

**COURSE OBJECTIVE**
- To learn parallel programming with Graphics Processing Units (GPUs).

**LECTURE WITH BREAKUP**

**Unit 1**
Introduction: History, Graphics Processors, Graphics Processing Units, GPGPUs. Clock speeds, CPU / GPU comparisons, Heterogeneity, Accelerators, Parallel programming, CUDA OpenCL / OpenACC, Hello World Computation Kernels, Launch parameters, Thread hierarchy, Warps / Wavefronts, Thread blocks / Workgroups, Streaming multiprocessors, 1D / 2D / 3D thread mapping, Device properties, Simple Programs

**NO. OF LECT.** 12

**Unit 2**
Memory: Memory hierarchy, DRAM / global, local / shared, private / local, textures, Constant Memory, Pointers, Parameter Passing, Arrays and dynamic Memory, Multi-dimensional Arrays, Memory Allocation, Memory copying across devices, Programs with matrices, Performance evaluation with different memories

**NO. OF LECT.** 8

**Unit 3**
Synchronization: Memory Consistency, Barriers (local versus global), Atomics, Memory fence. Prefix sum, Reduction. Programs for concurrent Data Structures such as Worklists, Linked-lists. Synchronization across CPU and GPU Support: Debugging GPU Programs. Profiling, Profile tools, Performance aspects

**NO. OF LECT.** 11

**Unit 4:**
Case Studies: Image Processing, Graph algorithms, Simulations, Deep Learning Advanced topics: Dynamic parallelism, Unified Virtual Memory, Multi-GPU processing, Peer access, Heterogeneous processing

**NO. OF LECT.** 9

**COURSE OUTCOMES**
**After completion of course, students would be:**
- Students would learn concepts in parallel programming, implementation of programs on GPUs, debugging and profiling parallel programs.

**References:**
2. CUDA Programming: A Developer's Guide to Parallel Computing with GPUs; Shane Cook; Morgan Kaufman; 2012 (ISBN: 978-0124159334)

**Note:** In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE544C: HUMAN AND COMPUTER INTERACTION
M.Tech. Semester-II (Computer Science and Engineering)

Pre-Requisites: OS, COA
Lectures: 03
Practical: -
Credits: 03
Class Work: 25 Marks
Examination: 75 Marks
Total: 100 Marks
Duration of Exam: 03 Hrs.

COURSE OBJECTIVE

- Learn the foundations of Human Computer Interaction
- Be familiar with the design technologies for individuals and persons with disabilities
- Be aware of mobile Human Computer interaction.
- Learn the guidelines for user interface.

LECTURE WITH BREAKUP

Unit 1
Human: I/O channels, Memory, Reasoning and problem solving; The computer: Devices, Memory, processing and networks; Interaction: Models, frameworks, Ergonomics, styles, elements, interactivity, Paradigms.

Unit 2

Unit 3
Web Interfaces – Drag & Drop, Direct Selection, Communication and collaboration models-Hypertext, Multimedia and WWW.

Unit 4

COURSE OUTCOMES

After completion of course, students would be:

- Understand the structure of models and theories of human computer interaction and vision.
- Design an interactive web interface on the basis of models studied.

References:

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
COURSE OBJECTIVE

- To provide students with a broad understanding of current and emerging trends in computer architecture
- To study architecture exploiting instruction level parallelism and multi processors and multi computers
- To inculcate knowledge about the latest commercial processors

LECTURE WITH BREAKUP

Unit 1
Introduction: review of basic computer architecture, quantitative techniques in computer design, measuring and reporting performance. CISC and RISC processors.  

Unit 2
Pipelining: Basic concepts, instruction and arithmetic pipeline, data hazards, control hazards, and structural hazards, techniques for handling hazards. Exception handling. Pipeline optimization techniques. Compiler techniques for improving performance.  

Unit 3
Hierarchical memory technology: Inclusion, Coherence and locality properties; Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, mapping and management techniques, memory replacement policies. Instruction-level parallelism: basic concepts, techniques for increasing ILP, superscalar, super-pipelined and VLIW processor architectures. Array and vector processors.  

Unit 4

COURSE OUTCOMES

After completion of course, students would be able to:
- Demonstrate the advanced concepts of computer architecture
- Investigate modern design structures of Pipelined and Multiprocessor Systems
- Understand the interaction amongst architecture, applications and technology

References:

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE548C: NETWORK SECURITY
M.Tech. Semester-II (Computer Science and Engineering)

<table>
<thead>
<tr>
<th>Pre-Requisites</th>
<th>Class Work</th>
<th>25 Marks</th>
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<tbody>
<tr>
<td>Lectures</td>
<td>Examination</td>
<td>75 Marks</td>
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<tr>
<td>Practical</td>
<td>Total</td>
<td>100 Marks</td>
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<tr>
<td>Credits</td>
<td>Duration of Exam</td>
<td>03 Hrs.</td>
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</tbody>
</table>

**COURSE OBJECTIVE**
- To learn the basics of security and various types of security issues.
- To study different cryptography techniques available and various security attacks.
- Explore network security and how they are implemented in real world.
- To get an insight of various issues of Web security and biometric authentication.

**LECTURE WITH BREAKUP**

<table>
<thead>
<tr>
<th>Unit</th>
<th>NO. OF LECT.</th>
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</thead>
<tbody>
<tr>
<td>Unit 1</td>
<td>Data security: Review of cryptography, Public key vs. Private key. Examples RSA, DES, AES, Diffie Hellman</td>
</tr>
<tr>
<td>Unit 2</td>
<td>Authentication, Authentication basics, Authentication Tokens, Passwords, Certificate based Authentication</td>
</tr>
<tr>
<td>Unit 3</td>
<td>Network security: Firewalls, Proxy-Servers, Network intrusion detection, IDS, IPS</td>
</tr>
<tr>
<td>Unit 4</td>
<td>Access Control, Biometric authentication, Secure E-Commerce (ex. SET), Smart Cards, Recent trends in Security</td>
</tr>
</tbody>
</table>

**COURSE OUTCOMES**
After completion of course, students would be able to:
- To have an understanding of basics of security and issues related to it.
- Understanding of biometric techniques available and how they are used in today’s world.
- Security issues in web and how to tackle them.
- Learn mechanisms for transport and network security

**References:**

**Note:** In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
### MTCSE512C: SOFT COMPUTING LAB
**M.Tech. Semester-II (Computer Science and Engineering)**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Class Work</th>
<th>Practical</th>
<th>Examination</th>
<th>Credits</th>
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<td>25 Marks</td>
<td>04</td>
<td>75 Marks</td>
<td>02</td>
<td>100 Marks</td>
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</tbody>
</table>

The students will be required to carry out 10 to 12 experiments covering the respective theory course.

### MTCSE562C: DATA PREPARATION AND ANALYSIS LAB
**M.Tech. Semester-II (Computer Science and Engineering)**

<table>
<thead>
<tr>
<th>Lectures</th>
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<th>Credits</th>
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<td>25 Marks</td>
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<td>75 Marks</td>
<td>02</td>
<td>100 Marks</td>
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</tbody>
</table>

The students will be required to carry out 10 to 12 experiments covering the respective theory course.

### MTCSE564C: SECURE SOFTWARE DESIGN & ENTERPRISE COMPUTING LAB
**M.Tech. Semester-II (Computer Science and Engineering)**

<table>
<thead>
<tr>
<th>Lectures</th>
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<td>25 Marks</td>
<td>04</td>
<td>75 Marks</td>
<td>02</td>
<td>100 Marks</td>
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</tbody>
</table>

The students will be required to carry out 10 to 12 experiments covering the respective theory course.

### MTCSE566C: COMPUTER VISION LAB
**M.Tech. Semester-II (Computer Science and Engineering)**

<table>
<thead>
<tr>
<th>Lectures</th>
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<th>Credits</th>
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<td>25 Marks</td>
<td>04</td>
<td>75 Marks</td>
<td>02</td>
<td>100 Marks</td>
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</tbody>
</table>

The students will be required to carry out 10 to 12 experiments covering the respective theory course.

### MTCSE568C: SENSOR NETWORKS AND IOT LAB
**M.Tech. Semester-II (Computer Science and Engineering)**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Class Work</th>
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<tbody>
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<td>25 Marks</td>
<td>04</td>
<td>75 Marks</td>
<td>02</td>
<td>100 Marks</td>
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</table>

The students will be required to carry out 10 to 12 experiments covering the respective theory course.

### MTCSE570C: CLOUD COMPUTING LAB
**M.Tech. Semester-II (Computer Science and Engineering)**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Class Work</th>
<th>Practical</th>
<th>Examination</th>
<th>Credits</th>
<th>Total</th>
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<tbody>
<tr>
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<td>25 Marks</td>
<td>04</td>
<td>75 Marks</td>
<td>02</td>
<td>100 Marks</td>
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</tbody>
</table>

The students will be required to carry out 10 to 12 experiments covering the respective theory course.
The objective of mini project is to develop in students the professional quality of synthesis employing technical knowledge obtained in the field of Engineering & Technology through a project work involving design / analysis augmented with creativity, innovation and ingenuity.

The student shall take up investigative study on a topic in the broad relevant field of engineering, involving hardware or software or both hardware & software, to be assigned by the department on an individual basis, under the guidance of a supervisor from the department. This is expected to provide a good initiation for the student(s) in R&D work.

The activities under mini project may normally include:
1. Literature survey on an assigned topic.
2. Working out a preliminary approach to the problem relating to the assigned topic.
4. Compilation of the work and presenting it in two seminar talks in the semester, before a committee having M.Tech. coordinator and supervisor(s).
5. Submit a written spiral-bound report on the work undertaken to the M.Tech. Coordinator.

Internal evaluation of Mini Project will be done at the end of the semester through a seminar by the committee consisting of the following:
1. Chairperson/Head of Department/ Nominee : Chairperson
2. M.Tech. Coordinator : Member-Secretary
3. Respective Project Supervisor(s) : Member(s)

Final exam. will be conducted by the internal examiner (M.Tech. Coordinator / faculty nominated by Chairperson) and external examiner to be appointed by Controller of Examinations from a Panel of Examiners submitted by the Dept.

M.Tech. coordinator will be assigned a load of 1 hour per week excluding his/ her own guiding load. Project supervisor (guiding teacher) will be assigned a load of 1 hour per week per student subject to a maximum load of 2 hours.
AUD513C: ENGLISH FOR RESEARCH PAPER WRITING
M. Tech. Semester – I/II (Common to all Branches)

Ł P Credits
2 -- --

Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks

Duration of Examination : 3 Hours

Course Objectives:
Students will be able to:
1. Understand that how to improve your writing skills and level of readability,
2. Learn about what to write in each section,
3. Understand the skills needed when writing a Title, and
4. Ensure the good quality of paper at very first-time submission

Course Outcomes:
The Students will become conscious citizens of India aware of their duties, rights and functions of various bodies of governance and welfare; thereby well equipped to contribute to India.

UNIT I: Basics of Writing Skills:
Subject Verb Agreements; Parallelism; Structuring Paragraphs and Sentences; Being Concise and Removing Redundancy; Avoiding Ambiguity and Vagueness; Dangling Modifiers

UNIT II: Reviewing and Citation:
Clarifying Who Did What; Highlighting Your Findings from Literature; Hedging and Critiquing; Paraphrasing; Avoiding Plagiarism; Formatting and Citation (Publication Manual of the American Psychological Association)

UNIT III: Sections of a Research Paper:
Writing Effective and Impressive Abstract; Writing Introduction; Review of Literature; Defining Objectives of the Study; Methodology Adopted; Results Obtained; Discussion and Conclusion; Editing and Proof Reading to Ensure Quality of paper

UNIT IV: Oral Presentation for Academic Purposes:
Oral Presentation for Seminars, Conferences and Symposia; Poster Presentation; Choosing Appropriate Medium; Interaction and Persuasion

TEXT / REFERENCE BOOKS:
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM.

NOTE:

1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD533C: DISASTER MANAGEMENT
M. Tech. Semester – I/II (Common for all Branches)

Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks
Duration of Examination : 3 Hours

Course Objectives:

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 different aspects of disaster management

Course Outcomes:

A student will be able to:

1. Know the significance of disaster management,
2. Study the occurrences, reasons and mechanism of various types of disaster
3. Learn the preventive measures as Civil Engineer with latest codal provisions
4. Apply the latest technology in mitigation of disasters

UNIT I: Introduction to Disaster Management: Definitions: Disaster, Emergency, Hazard, Mitigation, Disaster Prevention, Preparedness and Rehabilitation, Risk and Vulnerability, Classification of Disaster, Natural and Man made Disasters, Disaster Management Act 2005, Role of NDMA, NDRF, NIDM
Risk and Vulnerability to disaster mitigation and management options: Concept and Elements, Risk Assessment, Vulnerability, Warning and Forecasting.

UNIT II: Hydro-meteorological based disasters I: Tropical Cyclones, Floods, droughts, mechanism, Causes, role of Indian Metrological Department, Central Water Commission, structure and their impacts, classifications, vulnerability, Early Warning System, Forecasting, Flood Warning System, Drought Indicators, recurrence and declaration, Structural and Non-structural Measures.
Hydro-meteorological based disasters II: Desertification Zones, causes and impacts of desertification, Characteristics, Vulnerability to India and Steps taken to combat desertification, Prevention.

UNIT III: Geological based disasters: Earthquake, Reasons, Direct and Indirect Impact of Earthquake; Seismic Zones in India, Factors, Prevention and Preparedness for Earthquake; Tsunamis, Landslides and avalanches: Definition, causes and structure; past lesson learnt and measures taken; their Characteristic features, Impact and prevention, structural and non-structural measures.
UNIT IV:  **Manmade Disasters I:** Chemical Industrial hazards; causes and factors, pre- and post disaster measures; control; Indian Standard Guidelines and Compliance; Oil Slicks and Spills, Outbreak of Disease and Epidemics, Traffic accidents; classification and impact, War and Conflicts; Fire risk assessment; Escape routes; fire fighting equipment; **Use of remote sensing and GIS** in disaster mitigation and management.

**TEXT / REFERENCE BOOKS:**
5. Savindra Singh and Jeetendra Singh, Disaster Management, Pravalika Publications, Allahabad
7. Selected Resources Published by the National Disaster Management Institute of Home Affairs, Govt. of India, New Delhi.

**NOTE:**
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD535C: SANSKRIT FOR TECHNICAL KNOWLEDGE
M. Tech. Semester – I/II (Common for all Branches Engineering)

<table>
<thead>
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<th>L</th>
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<th>Credits</th>
<th>Class Work</th>
<th>Examination</th>
<th>Total</th>
<th>Duration of Examination</th>
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<tr>
<td>2</td>
<td>--</td>
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<td>25 Marks</td>
<td>75 Marks</td>
<td>100 Marks</td>
<td>3 Hours</td>
</tr>
</tbody>
</table>

Course Objectives:
1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2. Learning of Sanskrit to improve brain functioning
3. Learning of Sanskrit to develop the logic in Mathematics, Science & other subjects
4. Enhancing the memory power

Course Outcomes:
Students will be able to
1. Understand basic Sanskrit language
2. Understand Ancient Sanskrit literature about science and technology
3. Get equipped with Sanskrit and explore the huge knowledge from ancient literature

TEXT / REFERENCE BOOKS:
1. “Abhyaspustakam” – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. “Teach Yourself Sanskrit” Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from
each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD537C: VALUE EDUCATION
M. Tech. Semester – I/II (Common for all Branches)

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<tr>
<th>L</th>
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<th>Examination</th>
<th>Total</th>
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<td>25Marks</td>
<td>75 Marks</td>
<td>100 Marks</td>
<td>3 Hours</td>
</tr>
</tbody>
</table>

Course Objectives:
The students will be able to

1. Understand value of education and self-development
2. Imbibe good values in students
3. Let the should know about the importance of character

Course Outcomes:
The students will be able to

1. Knowledge of self-development
2. Learn the importance of Human values
3. Developing the overall personality
4. Strengthen the “EQ”

Syllabus contents:

**Unit I:**
Hierarchy and Classification of values, Values and Belief Systems, Competence in professional ethics, Value judgment based on cultural, tradition and interdependence.

**Unit II:**
Need for value education, Sense of duty, Devotion, Self-reliance.
Honesty, Humanity, trust, Patriotism and national Unity.
Harmony in the nature and realization of coexistence, Vision of better India

**Unit III:**
Understanding the meaning and realizing the effect of the following:
Enhancing self esteem and personality.
Unit IV: Hinduism, Jainism, Buddhism, Christianity, Islam, Sikhism.
Self-management and Good health (Role, Responsibility, Relation, Routine, Requirements, Resources), My True self and Original qualities. Supreme-soul-source of values.
What Scientists say about super power?

TEXT / REFERENCE BOOKS:
3. Value Education in Spirituality- Course-I, course -II by Brahma Kumaris Education Wing, RajyogaEducation & Research Foundation, Mount Abu, Rajasthan.

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD539C: CONSTITUTION OF INDIA
M. Tech. Semester – I/II (Common for all Branches)

<table>
<thead>
<tr>
<th>L</th>
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<th>Examination</th>
<th>Total</th>
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<tbody>
<tr>
<td>2</td>
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<td>25 Marks</td>
<td>75 Marks</td>
<td>100</td>
<td>3 Hours</td>
</tr>
</tbody>
</table>

Course Objectives:

Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. 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.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes:

The Students will become conscious citizens of India aware of their duties, rights and functions of various bodies of governance and welfare; thereby well equipped to contribute to India.

Syllabus contents:

Unit I: Making of the Indian Constitution and its Philosophy
Sources of Indian Constitution, its Preamble and Salient Features.

Unit II: 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
Fundamental Duties

Unit III: Organs of Governance
Legislature: Parliament and its Composition; Qualifications and Disqualifications of Its members
Executive: President, Governor and Council of Ministers
Judiciary: Appointments, Qualifications, Powers and Functions of judges

Unit IV: Local Administration and institutes for welfare
District Administration Head: Role and Importance; Municipalities: Introduction, Mayor and role of Elected Representative
Panchayati Raj Institutions: Introduction, Gram Panchayat, Panchayat Samiti and
TEXT / REFERENCE BOOKS:
1. The Constitution of India, 1950 (Bare Act), Government Publication.

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD541C: PEDAGOGICAL STUDIES
M. Tech. Semester – I/II (Common for all Branches)

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Course Objectives:
The course will enable the student teachers:

1. To understand the concept of pedagogy and conceptual framework.
2. To gain insight on the meaning and nature of different pedagogies.
3. To determine aims and strategies of teaching-learning.
4. To understand the principals, maxims of successful teaching and the different methods of teaching.
5. Comprehend the need and importance of various devices of teaching and learning and their relationship between the two.
6. Point out and illustrate the difference between teaching and learning and their relationship between the two.
7. To appreciate that science/engineering is a dynamic and expanding body of knowledge.

Course Outcomes:
Students will be able to understand:

1. It will improve teaching effectiveness of prospective teachers.
2. A prospective teacher will be able to design curriculum and assess the curriculum of their discipline in an effective way by understating the needs of the learners.
3. How can teacher education, school curriculum and guidance support effective pedagogy?
4. It will be functional for professional development among teachers.

Syllabus contents:

Unit I: Introduction and Methodology
- Aims and Rationale, Conceptual Framework, Terminology related to Pedagogy
- Contexts, Research Questions
- Theories of Learning, Curriculum, Scope of Pedagogy

Unit II: Teaching
- Meaning and importance of Behavioral Objectives
- Writing of Objectives in Behavioral Terms
- Phases and Variables of Teaching
- Principles, levels and maxims off teaching
- Relationship between Teaching and Learning

Unit III: Methods of Teaching
- Methods: Inductive, Deductive, Project, Analytic, Synthetic, Brain Storming, Case Discussion
• Concept and Significance of Individualized and Cooperative Teaching
  Language Laboratory, Tutorials, Keller’s Plan (PSI), Computer Supporting Collaborative Learning
• Mastery Learning: Concept, Basic Elements, Components and Types of Mastery Learning Strategies

Unit IV: Evaluation Strategies
• Evaluation in Teaching: Concept of Evaluation, Relationship between Teaching and Evaluation, Types of Evaluation (Formative and Summative)
• Methods of Evaluation through Essay Type, Objective Type and Oral Method, Comparative merits and demerits of evaluation methods
• Latest Trends in Evaluation

TEXT / REFERENCE BOOKS:


NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD543C: STRESS MANAGEMENT BY YOGA
M. Tech. Semester – I/II (Common for all Branches)

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<td>75 Marks</td>
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Course Objectives:
1. To achieve overall health of body and mind
2. To overcome stress

Course Outcomes:
Students will be able to:
1. Develop healthy mind and healthy body thus improving social health also
2. Improve efficiency
3. Improving “SQ”

Syllabus contents:

**Unit I:**
2. Difference and relation b/w Yog and Yoga,
3. benefits of meditation and Yoga,
4. Rules and Regulation of Yog and Yoga.
5. Empowerment of Soul and fitness of body.

**Unit II:**
1. Do’s and Don’t’s in life.
2. How to be and not to be?
3. Understanding spirituality and materials.
4. Impact of: Truth at mouth/ Truth in thoughts
   Non Violence outside / Compassion in thoughts, Celibacy (kamnayn- desire), purity of mind, non-covetousness, Cleanliness, satisfaction, self study and surrender to almighty, Austerity, Penance

**Unit III:**
Role of Meditation in reducing Stress.
Role of Yoga in reducing Stress.
Pranayama: AnulomVilom ,Ujjai, Costal Breathing, Abdominal Breathing, Sunyak, Kumbhak

**Unit IV:**
Asan: Sukhasana, Vajrasana, Padmasana, Swastik Asana, Ling Mudra,
Gorakshasana, Talasana, Konasana, Trikonasana, Chakrasana, Utkatasana, Dhurva Asana, Garuda Asana, Bhadrasana, Parvatasana, Yoga Mudra, Paschimottasana, Vakrasana, Gomukhasana, Bakasana, Tulasana, Matsyasana, Mayuri Asana, Bhujagasana, DhanurVakrasana, PavanMuktasana, Viprakarani, Makarasana, Shavasana, Dridasana, Yonimudra, Nauli, Dhenu Mudra.

**TEXT / REFERENCE BOOKS:**

1. ‘Yogic Asanas for Group Tarining-Part-I’: Janardan Swami Yogabhyasi Mandal, Nagpur
2. “Rajayoga or conquering the Internal Nature” by Swami Vivekananda, AdvaitaAshrama, (Publication Department), Kolkata
3. “Value Education in Spirituality- Course-IV” by Brahma Kumaries Education Wing, Rajyoga Education Research Foundation, Mount Abu, Rajasthan.
4. “Stress Management for Dummies” by Allen Elkin, IDG Books India (P) Ltd.
5. “Yoga Courses for All” by Dr Hansraj Yadav, BhartyaVidyaBhawan, Mumbai

**NOTE:**

1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
AUD545C: PERSONALITY DEVELOPMENT THROUGH LIFE
ENLIGHTENMENT SKILLS
M. Tech. Semester – I/II (Common for all Branches)

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<td>3 Hours</td>
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Course Objectives:

Students will be able to:

1. To learn and achieve the highest goal happily
2. To become a person with stable mind, pleasing personality and determination
3. To awaken wisdom in students

Course Outcomes:

1. The study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life.
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity.
3. Study of Neetishatakam will help in developing versatile personality of students.

Syllabus contents:

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

Unit II: Approach to Day to Day Work and Duties
Shrimad BhagwadGeeta: Chapter 2 (Verses- 41, 47, 48), Chapter 3 (Verses- 13, 21, 27, 35), Chapter 6 (Verses- 05, 13, 17, 23, 35), Chapter 18 (Verses- 45, 46, 48)

Unit III: Statements of Basic Knowledge
Shrimad BhagwadGeeta: Chapter 2 (Verses- 56, 62,68), Chapter 12 (Verses- 13, 14, 15, 16, 17, 18)

Unit IV: Personality of a Role Model
Shrimad BhagwadGeeta: Chapter 2 (Verses- 17), Chapter 3 (Verses 36, 37, 42), Chapter 4 (Verses 18, 38, 39), Chapter 18 ( Verses 37, 38 63)

TEXT / REFERENCE BOOKS:

1. Srimad Bhagavad Gita by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata
2. Bhartrihari’s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.
NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
MTCSE601C: MOBILE APPLICATIONS AND SERVICES
M.Tech. Semester-III (Computer Science and Engineering)

Pre-Requisites Wireless Communication and Mobile Computing

Class Work 25 Marks
Examination 75 Marks
Total 100 Marks
Duration of Exam 03 Hrs.

COURSE OBJECTIVE

- This course presents the three main mobile platforms and their ecosystems, namely Android, iOS, and PhoneGap/WebOS.
- It explores emerging technologies and tools used to design and implement feature-rich mobile applications for smartphones and tablets.
- It also takes into account both the technical constraints relative to storage capacity, processing capacity, display screen, communication interfaces, and the user interface, context and profile.

LECTURE WITH BREAKUP

Unit 1

Unit 2
More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis. Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Android Storing and Retrieving Data

Unit 3

Unit 4
Putting It All Together: Packaging and Deploying, Performance Best Practices, Android Field Service App, Location Mobility and Location Based Services Android, Mobile App Testing Multimedia: Mobile Agents and Peer-to-Peer Architecture, Android Multimedia

COURSE OUTCOMES

On completion of the course the student should be able to

- Identify the target platform and users and be able to define and sketch a mobile application
- Understand the fundamentals, frameworks, and development lifecycle of mobile application platforms including iOS, Android, and PhoneGap
- Design and develop a mobile application prototype in one of the platform (challenge project)
References:

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE603C: COMPILER FOR HPC  
M.Tech. Semester-III (Computer Science and Engineering)

Pre-Requisites  
Data Structure, Compiler Design, Theory of Computation

Class Work  
25 Marks

Lectures  
03

Examination  
75 Marks

Practical  
-

Total  
100 Marks

Credits  
03

Duration of Exam  
03 Hrs.

COURSE OBJECTIVE

- The objective of this course is to introduce structure of compilers and high performance compiler design for students. Concepts of cache coherence and parallel loops in compilers are included.

LECTURE WITH BREAKUP

Unit 1

Unit 2

Unit 3

Unit 4
Concurrent Analysis: Concurrency from Sequential Loops, Concurrency from Parallel Loops, Nested Loops, Round off Error, Exceptions and Debuggers. Parallel Algorithms: Reduction, Broadcast, Prefix Sums

COURSE OUTCOMES

After completion of course, students would be:

- Familiar with the structure of compiler.
- Parallel loops, data dependency and exception handling and debugging in compiler.

References:

1. Michael Wolfe, High-Performance Compilers for Parallel Computing, Pearson
2. Michael J. Quinn, Parallel Computing: Theory and Practice, TMH

76
Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE605C: OPTIMIZATION TECHNIQUES
M.Tech. Semester-III (Computer Science and Engineering)

Pre-Requisites Linear Algebra and Numerical Methods
Lectures 03
Practical -
Credits 03

Class Work 25 Marks
Examination 75 Marks
Total 100 Marks
Duration of Exam 03 Hrs.

COURSE OBJECTIVE

- The objective of this course is to provide insight to the mathematical formulation of real world problems.
- To optimize these mathematical problems using nature based algorithms. And the solution is useful specially for NP-Hard problems.

LECTURE WITH BREAKUP

Unit 1
Formulation of design problems as mathematical programming problems.
General Structure of Optimization Algorithms, Constraints, The Feasible Region.

Unit 2
Branches of Mathematical Programming: Optimization using calculus, Linear, Quadratic Programming, Integer Programming,

Unit 3
Optimization Algorithms like Genetic Optimization, Particle Swarm Optimization, Ant Colony Optimization etc.

Unit 4
Recent trends: Applications of ant colony optimization, genetics and linear and quadratic programming in real world applications, Engineering application of Optimization

COURSE OUTCOMES

After completion of course, students would be:

- Formulate optimization problems.
- Understand and apply the concept of optimality criteria for various types of optimization problems.
- Solve various constrained and unconstrained problems in Single variable as well as multivariable.
- Apply the methods of optimization in real life situation.

References:
2. Practical Optimization Algorithms and Engineering Applications Andreas Antoniou.
3. An Introduction to Optimization Edwin K., P. Chong & Stanislaw h. Zak.

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
MTCSE607C: DIGITAL FORENSICS
M.Tech. Semester-II (Computer Science and Engineering)

Pre-Requisites  Cybercrime and Information Warfare, Computer Networks
Class Work  25 Marks
Lectures  03
Examination  75 Marks
Practical  -
Total  100 Marks
Credits  03
Duration of Exam  03 Hrs.

COURSE OBJECTIVE

- Provides an in-depth study of the rapidly changing and fascinating field of computer forensics.
- Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes.
- Knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools
- E-evidence collection and preservation, investigating operating systems and file systems, network forensics, art of steganography and mobile device forensics

LECTURE WITH BREAKUP

Unit 1
Digital Forensics Science: Forensics science, digital forensics.
Computer Crime: Criminalistics as it relates to the investigative process, analysis of cyber-criminalistics area, holistic approach to cyber-forensics 9

Unit 2
Cyber Crime Scene Analysis: Discuss the various court orders etc., methods to search and seizure electronic evidence, Discuss the importance of understanding what court documents would be required for a criminal investigation.
Evidence Management & Presentation: Create and manage shared folders using operating system, Define who should be notified of a crime, parts of gathering evidence 11

Unit 3
Computer Forensics: Begin an investigation, Understand computer forensics workstations and software, Conduct an investigation, Complete a case
Network Forensics: open-source security tools for network forensic analysis, requirements for preservation of network data. 11

Unit 4
Mobile Forensics: mobile forensics techniques, mobile forensics tools, Recent trends in mobile forensic technique
Legal Aspects of Digital Forensics: Case study of IT Act 2000, amendment of IT Act 2008. 9

COURSE OUTCOMES
After completion of course, students would be able to:

- Understand relevant legislation and codes of ethics
- Computer forensics and digital detective and various processes, policies and

80
procedures

- E-discovery, guidelines and standards, E-evidence, tools and environment.
- Email and web forensics and network forensics

References:

Note: In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 05 questions selecting at least one question from each unit.
Course Objectives:

The main objective of this course is to give the student a comprehensive understanding of business analytics methods

1. Understand the role of business analytics within an organization.
2. Business Analytics industry sequence is to familiarize the students with the concept of Data Analytics (Big Data) and its applicability in a business environment
3. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
4. To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
5. To become familiar with processes needed to develop, report, and analyze business data.
6. Use decision-making tools/Operations research techniques.
7. Manage business process using analytical and management tools.

Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc

Course Outcomes:

1. At the end of the Fall semester, students should have acquired an understanding of Analytics – the terminology, concepts and familiarity of potential tools and solutions that exist today Students will demonstrate knowledge of data analytics.
2. Students will demonstrate the ability to think critically in making decisions based on data and deep analytics.
3. Students will demonstrate the ability to use technical skills in predictive and prescriptive modeling to support business decision-making.
4. Students will demonstrate the ability to translate data into clear, actionable insights. Student should be better familiar with overall analytics tools/techniques and their use in corporate

Syllabus contents:


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: Decision Analysis: Formulating Decision Problems, Decision Strategies, with the without Outcome Probabilities, Decision Trees, the Value of Information, Utility and Decision Making.
Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time.

TEXT / REFERENCE BOOKS:
1. Project Management: The Managerial Process by Erik Larson and, Clifford Gray
2. Business Analysis by James Cadle et al.
4. Whigham David, Business Data Analysis, Oxford University, Press, Delhi.
5. Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie or Die. Eric Siegel.

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
Course Objectives:

Course Outcomes:

Syllabus contents:

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

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


**TEXT / REFERENCE BOOKS:**

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.

**NOTE:**
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2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
Course Objectives:
1. To develop modeling skills in students.
2. To develop skill in students for efficient designing analysis and control of complete system.
3. To make students capable of formulating the practical problems into mathematical problems.
4. To acquaint student with linear as well as non-linear programming problem and their application.

Course Outcomes:
1. Students will be able to apply the dynamic programming to solve problems of discrete and continuous variables.
2. Students will be able to carry out sensitivity analysis.
3. Student will be able to model the real world problem and simulate it.
4. The students will be able to carry forward the operation research techniques in practical problems.

Syllabus contents:


UNIT II: Non linear programming: NLPP Mathematical formulation and solution with equally constraints, Lagrange’s method, Graphical method, Kuhn—Tucker necessary & sufficient conditions for the optimality of objective function in GNLP problem. Dynamic programming: Kuhn –Tucker condition’s, Wolfe’s and Beale’s method.

UNIT III: Deterministic inventory control models: Meaning & function role of inventory control, reason for carrying inventory, single item inventory control model with & without shortages. Probabilistic inventory control models: Inventory control models without set up cost and with set up cost.
UNIT IV: Project management; PERT and CPM, Basic difference between PERT & CPM, Phases up project management PERT /CPM network component & precedence relationships, critical path analyses, projects scheduling with uncertain activity times, project time –cost trade-off.

Sequencing problem: Processing an jobs through two machines, three machines and through m-machines. Theory of games: Two- person zero –sum games,pure strategies (with saddle points) mixed strategies (without saddle point), algebraic method only.

TEXT / REFERENCE BOOKS:

2. H.M.Wanger, Principles of Operation Research PHI, Delhi, 1982

NOTE:

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3. Electronics gadgets including Cellular phones are not allowed in the examination.
MTOE657C: COST MANAGEMENT OF ENGINEERING PROJECTS
M. Tech. Semester – III (Common for all Branches)

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Syllabus contents:

UNIT I: INTRODUCTION AND OVERVIEW

Chapter 1 Introduction, basic economic concepts, interest formulae, present worth, rate of return. Elements of financial accounting: depreciation, taxes and their impact in economic studies.

Chapter 2 Cost concepts in decision making: elements of cost, relevant cost, overheads, differential cost, incremental cost and opportunity cost, objectives of a costing system, inventory valuation, creation of a data base for operational control, provision of data for decision making.

UNIT II: PROJECT

Chapter 3 Meaning, different types, why to manage, cost overrun centres, various stages of project execution, concept 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.

Chapter 4 Importance Project site: Data required with significance. Project contracts. Types and contents. Project cost control. Bar charts and network diagram. Project commissioning: Mechanical and process. Project appraisal and selection, recent trends in project management.

UNIT III: ECONOMIC ANALYSIS FOR ENGINEERING PROJECTS

Chapter 5 Cost behavior and profit planning, Marginal costing, distinction between marginal costing and absorption costing, Break even analysis, cost volume profit relationship, various decision making problems.

Standard costing and variance analysis, pricing strategies Pareto analysis, Target analysis, life cycle costing, Costing of service sector.

Chapter 6 just in time approach, material requirement planning, enterprise resource planning, Total Quality management and theory of constraints, Activity based cost management, Bench marking, Balanced score card, value chain analysis,

Budgetory control, Flexible budget, Performane budget, Zero based budget,
Measurement of divisional profitability pricing decisions including transfer pricing.

UNIT IV: QUANTITATIVE TECHNIQUES FOR COST MANAGEMENT

Chapter 7 PERT CPM: Activity networks, basic PERT/CPM calculations, Planning and scheduling of activity networks, Assumptions in PERT modeling, time cost tradeoffs, PERT/ cost accounting, Scheduling with limited resources, Generalized activity networks GERT, Prospects of PERT/CPM

Chapter 8 Linear programming, Transportation problems, Assignment problems, Simulation, Learning curve theory.

TEXT / REFERENCE BOOKS:

1. Cost Accounting: A Managerial Emphasis
   Charles T. Horngren, Srikant M. Datar, Madhav V. Rajan
   Pearson Edu.

2. Fundamentals of Financial Management
   Prasanna Chandra
   Tata McGraw Hill

3. Quantitative Techniques in Management
   N D Vohra
   Tata McGraw Hill

4. Foundation Engineering Handbook
   Winterkorn, Hans
   Chapman & Hall London.

5. Principles and Practice of cost accounting
   Ashish K Bhattacharya
   A H Wheeler

6. Principles of engineering economy
   E L Grant et al.
   John Wiley and Sons, New York.

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MTOE659C: COMPOSITE MATERIALS
M. Tech. Semester – III (Common for all Branches)

L P Credits Class Work : 25Marks
3 3 3 Examination : 75 Marks

Total : 100 Marks

Duration of Examination : 3 Hours

Syllabus contents:


UNIT IV: Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TEXT / REFERENCE BOOKS:
NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
Course Objectives:
To give an idea about different biomass and other solid waste materials as energy source and their processing and utilization for recovery of energy and other valuable products. A comprehensive knowledge of how wastes are utilized for recovery of value would be immensely useful for the students from all fields.

Course Outcomes:
In these days of energy crisis and environmental deterioration, students will understand the concept of energy by waste products. It is being used globally to generate electricity and provide industrial and domestic applications. Students will also enable to understand the environmental issues related to harnessing and utilization of various sources of energy and related environmental degradation.

Syllabus contents:


UNIT II: Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste, MSW

UNIT III: Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification, Biomass conversion processes, Thermo chemical conversion, Direct combustion, Types of biogas Plants, Applications.


TEXT / REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
The objective of this course is to develop in students the capacity for analysis & judgment and the ability to carry out independent investigation in design/development through a dissertation work involving creativity, innovation and ingenuity. The work should start with comprehensive literature search and critical appreciation thereof so as to select a research problem and finalize the topic of dissertation.

Each student will carry out an independent dissertation under the supervision of a supervisor; in no case, more than two supervisors may be associated with one dissertation work. The first supervisor must be from the department, however, for interdisciplinary research work, the second supervisor may be from other department of the university/ outside university/industry. In the latter case, consent of the second supervisor with justification thereof needs to be submitted to the dissertation coordinator.

The Dissertation (Phase-I) involving literature survey and problem formulation along with data collection (if required) commences in 3rd semester & will be completed as Dissertation (Phase-II) in 4th semester. Each student will be required to present two seminar talks, first towards the beginning of the Dissertation (Phase-I) to present the scope of the work and to finalize the topic, and the second towards the end of the semester, presenting the progress report containing literature survey, partial results (if any) of the work carried out by him/her in the semester. The student will be required to submit one copy of spiral-bound progress report to the M.Tech. Coordinator.

Internal evaluation of Dissertation (Phase-I) will be done by following committee:
1. Chairperson / Head of Department / Nominee : Chairperson
2. M.Tech. Coordinator/Senior Faculty : Member-Secretary
3. Respective Dissertation Supervisor(s) : Member(s)

Final exam will be conducted by the internal examiner (M.Tech. Coordinator/ faculty nominated by Chairperson) & an external examiner to be appointed by Controller of Examinations from a panel of examiners submitted by the Dept.

For this course, M. Tech. coordinator will be assigned a load of 1 hour per week excluding his/ her own guiding load. Dissertation supervisor (guiding teacher) will be assigned a load of 1 hour per week for the first student and additional 1 hour per week (for their own department only) for the subsequent student(s) subject to a maximum load of 2 hours. Work load allocated for the joint supervision within the department will be treated as half for each supervisor.
The Dissertation (Phase-II) shall be the extension of Dissertation (Phase-I) carried out in 3rd semester. Each student will be required to present three seminar talks, first at the beginning of the semester to present the progress made during the winter break; second in the middle of the semester involving partial results obtained and comparative analysis; and third towards the end of the semester, presenting the dissertation report of the work carried out. Each student will be required to submit two copies of dissertation report to M.Tech. Coordinator. The committee constituted by the Chairperson of the department will screen all the presentations so as to award the sessional marks.

**INTERNAL ASSESSMENT:**

The internal assessment (Class-work evaluation) will be effected through presentation and discussion thereon by the following committee:

1. Chairperson/Head of Department / Nominee : Chairperson
2. M.Tech. Coordinator/Senior Faculty : Member-Secretary
3. Respective Dissertation Supervisor(s) : Member(s)

**EXTERNAL ASSESSMENT:**

The following committee will evaluate dissertation:

1. Chairperson/Head of the Department / Nominee : Chairperson
2. Respective Dissertation Supervisor(s) : Member(s)
3. External Expert : To be appointed by the University.

For this course, supervisor(s) will be assigned a load of 2 hours per week for the first student and additional 1 hour per week for the subsequent student(s) subject to a maximum load of 3 hours. Work load allocated for the joint supervision within the department will be treated as half for each supervisor.

**NOTE:** There is a desirable requirement of one publication in a UGC-listed journal / unpaid journal. The external expert must be from the respective area of the specialization. Chairperson & M.Tech. Coordinator in mutual consultation will divide the submitted dissertations into groups depending upon area of specialization and recommend the list of experts for each group separately to the Vice-Chancellor for selecting the examiners (one examiner for not more than four students of a group).