"COURSE OUTCOME" STATEMENT FROM SYLLABUS BOOKS

B.Tech : Computer Science & Engineering

I Year I Semester

AR – 20 : B.Tech. – CSE

Programming for Problem Solving
(Common to all Branches)

L	T	P	C
3	0	3	4.5

Subject Code : 20ESI102

Course Objective

The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.

Course Outcomes

1. Understand the fundamentals of C programming
2. Choose the loops and decision making statements to solve the problem
3. Make use of pointers to access arrays, strings and implements different operations on arrays, and work with textual information, characters and strings.
4. Apply programming to write modular programs, user defined functions to solve real time problems and allocate memory using dynamic memory management functions.
5. Create user defined data types including structures and unions to solve problems.
6. Implement files operations in C programming for a given application and able to handle errors during program execution.

Unit – I

Introduction to Programming: Introduction to components of Computer system, Algorithm, Flow chart, Program development steps, C Tokens, Operator precedence, Structure of C program, Basic I/O statements.

Exercise Questions: 1

Ex 1: Write the C programs to calculate the following
- a) Area of triangle when sides are given.
- b) Program for Type Casting.
- c) Interchanging values of two variables.

Ex 2: Write the C programs to perform the following
- a) Read lower case character and convert into upper case.
- b) Find maximum of 3 values using conditional operator.
- c) Calculate area and perimeter of circle.

Unit – II

Control Structures: Decision statements: if, if-else, nested if and switch, **Iterative statements:** for, while, do while and nested loops **Branching:** Break, continue, goto.

Exercise Questions: 2

Ex 3: Write C programs for the following using decision making statements
- a) Program to find roots of quadratic equation.
- b) Find the Largest among 3 values.
- c) Calculate the grades of a student.

Ex 4: Write C programs for the following using Iterative Statements
- a) Arithmetical operations using switch-case.

Free Open Source Software

Subject Code : 18CST204
Credits : 2.0

External Marks: 60
Internal Marks : 40

Course Objective

The student will be able to:

- Obtain information regarding free open source software's (FOSS).
- Analyze the difference between FOSS, commercial software and open source software.
- Gain basic and practical knowledge of Python and Perl language.
- Write beginner level programs both in Python and Perl.

Course Outcomes

1. Understand the features and necessity of FOSS, features of Python, Python operators, syntax for writing Python statements
2. Understand the debug Python programs using the fundamental control structures, data types like numbers and strings and respective built-in functions
3. demonstrate Python programs to the practical usage of data types like Lists, Tuples, Dictionaries, functions and file handling .
4. Understand the features of Perl and able to write Perl programs demonstrating the usage of Perl variables and control structures
5. Analyze the usage of subroutine, pass parameters to a subroutine and call it. Able to implement file operations

Unit – I

Introduction to FOSS: Introduction to Free & Open source softwares, Need of foss
Introduction to Python: History, Features, Installing Python, Running Python, Operators, Statements and Expressions.

Unit – II

Control Structures: Conditional Statements, Loops
Data Types: Mutable vs immutable data type, Numbers and built-in functions, String and string handling functions

Unit – III

Data Types: Lists, Tuples, Dictionaries and their built-in functions.
Functions: Definitions, Declaration, Parameter passing, calling functions
File Handling: creating a file, opening a file, I/O with file (read, write, append), closing a file

Unit – IV

PERL: Features, Components, Syntax and Parsing Rules, Perl variable (Scalars, Arrays, Hashes) Statements and Control Structures

Unit – V

Perl operators, Subroutines, Working with Files

Design & Analysis of Algorithms

Subject Code: 18CST208
Credits : 3.0

External Marks: 60
Internal Marks : 40

Course Objectives

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Course Outcomes

1. Measure the performance and calculate the Time & Space complexities of algorithms.
2. Design effective algorithms based on Divide and Conquer and Greedy methods.
3. Discuss various problems suitable to Dynamic programming.
4. Construct a state space tree to solve different problems using Backtracking technique.
5. Find an optimal solution by applying different Branch and Bound techniques and illustrate Non-deterministic algorithms.

Unit – I

Introduction: Areas of Study of Algorithms; Pseudo-code Conventions; Performance Analysis, Asymptotic notations, Amortized analysis.

Unit – II

Divide and conquer: General method, Applications: Binary search, Quick sort, Merge sort, Strassen's Matrix multiplication.

Greedy method: General method, Applications: Job sequencing with deadlines, Knapsack problem, Minimum cost spanning trees, Single source shortest path problem

Unit – III

Dynamic Programming: Principle of Optimality, Applications: Matrix chain multiplication, Optimal Binary Search Trees (OBST), 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem.

Unit – IV

Graph traversals: DFS & BFS, Connected components, Articulation point & Bi-Connected components.

Backtracking: General method, Applications: n-Queens problem, Sum of subsets problem, Graph Coloring, Hamiltonian cycles.

Unit – V

Branch and Bound: Least Cost (LC) Search, FIFO Branch and Bound & LC Branch and Bound, Applications: 0/1 knapsack problem, Travelling sales person problem.

NP-Hard and NP-Complete problems: Basic concepts, Non-deterministic algorithms, Cook's theorem.

Text Book:

1) Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, India, 2010.
2) Aho, Ullman and Hopcroft, "Design and Analysis of algorithms", Pearson Education, Fourth Edition, India, 2009

Formal Languages & Automata Theory

Subject Code : 18CST310
Credits : 3.0

External Marks: 60
Internal Marks : 40

Course Objectives:

To introduce students the fundamental concepts in theoretical computer science, and the formal relationship among machines, languages, grammars and computational problems.

Course Outcomes:

At the end of the course, the student will be able to:

1. Design finite automata with & without output.
2. Convert finite automata into regular expression and vice versa.
3. Design grammars for regular and context free languages.
4. Explain the equivalence between CFG and PDA & equivalence between acceptances by final state and acceptance by empty stack of PDA
5. Design Turing Machines and determine the decidability of computational problems

Unit – I:

Finite Automata: Strings, Alphabet, Language, Operations, Finite state machine, languages, deterministic finite automaton and non deterministic finite automaton, computational problems. NFA with Epsilon transitions - Significance, acceptance of languages. Conversions and Equivalence: Equivalence between NFA with and without Epsilon transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Mealy machines.

Unit – II:

Regular Languages: Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

Unit – III:

Grammar Formalism: Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms. Right most and leftmost derivation of strings, Ambiguity in context free grammars, minimization of Context Free Grammars. Chomsky normal form, Greibach normal form, Enumeration properties of CFL (proofs omitted).

Unit – IV:

Push Down Automata: Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty stack and its equivalence. Equivalence of CFL and PDA, interconversion (Proofs not required).

Data Mining

Subject Code : 18CSE514
Credits : 3.0

External Marks: 60
Internal Marks : 40

Course Objectives:

- Introduce basic concepts, principles, major techniques and algorithms in Data Warehousing and Data Mining. These include concepts and techniques for data preprocessing, OLAP, association rule mining, data classification, and data clustering.
- Discuss applications, Emerging Areas in Data Mining.

Course Outcomes:

1. Recognize types of Data, Data Quality, need of preprocessing and different measures of similarity and dissimilarity.
2. Differentiate between methods for modeling multidimensional data, design and implement Data Warehouse.
3. Explain in detail major techniques and algorithms involved in data mining, including techniques and algorithms for association rule mining, data classification, and data clustering.
4. Evaluate and increase the performance of a classifier.
5. Compare and contrast Partitioning, Hierarchical and Density based Clustering Algorithms.

Unit – I

Introduction to Data Mining: What is data mining, motivating challenges, origins of data mining, data mining tasks, Types of Data, Data Quality, Data Preprocessing, Measures of similarity and Dissimilarity. (**Text Book 1**)

Unit – II

Data Warehouse and OLAP Technology: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. **Concept Description** - Characterization and Comparison: Data Generalization and Summarization-Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes. (**Text Book 2**).

Unit – III

Mining Frequent Patterns, Association: Basic Concepts, Market Basket Analysis, Frequent Itemsets, Closed Itemsets, and Association Rules, Frequent Itemset Mining methods: Apriori Algorithm, Generating Association Rules from Frequent Itemsets, Improving the efficiency of Apriori, FP–Growth algorithm (**Text Book 2**)

Unit – IV

Classification and Prediction: What is classification? What is prediction? Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Prediction, Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor, Increasing the Accuracy, Model Selection (**Text Book 2**

UML & Design Patterns

Credits : 3.5 **External Marks: 70**
Course Code: 16CS4024 **Internal Marks: 30**

Course Objectives:
The course content enables students to:

- Develop the different UML diagrams for a software system based on the given requirements.
- Apply forward engineering to convert diagram to code and reverse engineering to convert code to diagram.
- Analyze & design a s/w system in object oriented approach, using unified modeling language.
- Understand different types of Design patterns
- Learn advanced design techniques, principles, practices, and approaches in solving problems

Course Outcomes:
At the end of the course students are able to:

1. Understand the use of unified modeling language for object oriented analysis and design
2. Demonstrate the application of various UML diagrams.
3. Illustrate various object oriented analysis and design to build a software system.
4. Classify and document design patterns.
5. Construct various patterns to manage algorithms and assign responsibilities to objects.

Unit – I
Introduction to UML: Importance of modelling, principles of modelling, object oriented modelling, conceptual model of the UML, Architecture, and Software Development Life Cycle.
Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams.
Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

Unit – II
Basic Behavioural Modelling-I: Interactions, Interaction diagrams. Use cases, Use case Diagrams, Activity Diagrams.

Unit-III
Advanced Behavioural Modelling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.
Architectural Modelling: Component, Deployment, Component diagrams and Deployment diagrams.

Unit – IV
Introduction: What Is a Design Pattern? Design Patterns in Smalltalk MVC, Describing Design Patterns, How to Select a Design Pattern, How to Use a Design Pattern.

Unit – V
Creational Patterns: Abstract Factory, Singleton,
Structural Pattern: Adapter, Bridge, Composite.
Behavioural Patterns: Chain of Responsibility, Command,.

Human Computer Interaction

Credits : 3 **External Marks: 70**
Subject Code: 16CS4032 **Internal Marks: 30**

Course Objectives:

- To facilitate communication between students of psychology, design, and computer science on user interface development projects.
- To provide the future user interface designer with concepts and strategies for making Design decisions.
- To expose the future user interface designer to tools, techniques, and ideas for interface design.
- To introduce the student to the literature of human-computer interaction.
- To stress the importance of good user interface design

Course Outcomes:

After completing this course students must be able to demonstrate the knowledge and ability to:

1. Apply rules for effective graphical and web design methodology.
2. Evaluate many characteristics and considerations that must be applied to the interface and screen design process. .
3. Indentify the components of graphical and web interface and screens, including windows, menus and controls
4. Organize graphical screens to encourage the fastest and most accurate comprehension and execution of screen components.
5. Choose screen colors and design screen icons.

Unit - I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. Characteristics of GUI, Popularity of Graphics, Web user – Interface popularity, characteristics- Principles of user interface.

Unit - II

Design process: Human interaction with computers, importance of human characteristics in design, Human considerations in design. Understanding business functions-business definition and requirement Analysis, Determining Basic Business functions.

Unit - III

Develop System Menus and Navigation schemes: Structure, Function, Content, Formatting of Menus, Phrasing the Menu, Selecting Menu Choices, Navigating Menus, Kinds of graphical Menus. Write Clear Text and Messages.

Unit - IV

Select the Proper Kinds of Windows: Window Characteristics, Components of Windows, Window Presentation Styles, Types of Windows, Windows Management, Organizing Window Functions and Operations, Web Systems.Select the Proper Device-Based Controls.

Unit - V

Create Meaningful Graphics, Icons and Images: Icons, Multimedia Choose the Proper Colors: Color-What Is It? Color Uses, Possible Problems with Color, Color and human

B.Tech : Information Technology

I Year I Semester

AR – 20 : B.Tech. – IT

Programming for Problem Solving
(Common to all Branches)

L	T	P	C
3	0	3	4.5

Subject Code : 20ESI102

Course Objective

The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.

Course Outcomes

1. Understand the fundamentals of C programming
2. Choose the loops and decision making statements to solve the problem
3. Make use of pointers to access arrays, strings and implements different operations on arrays, and work with textual information, characters and strings.
4. Apply programming to write modular programs, user defined functions to solve real time problems and allocate memory using dynamic memory management functions.
5. Create user defined data types including structures and unions to solve problems.
6. Implement files operations in C programming for a given application and able to handle errors during program execution.

Unit – I

Introduction to Programming: Introduction to components of Computer system, Algorithm, Flow chart, Program development steps, C Tokens, Operator precedence, Structure of C program, Basic I/O statements.

Exercise Questions: 1

Ex 1: Write the C programs to calculate the following
- a) Area of triangle when sides are given.
- b) Program for Type Casting.
- c) Interchanging values of two variables.

Ex 2: Write the C programs to perform the following
- a) Read lower case character and convert into upper case.
- b) Find maximum of 3 values using conditional operator.
- c) Calculate area and perimeter of circle.

Unit – II

Control Structures: Decision statements: if, if-else, nested if and switch, **Iterative statements:** for, while, do while and nested loops **Branching:** Break, continue, goto.

Exercise Questions: 2

Ex 3: Write C programs for the following using decision making statements
- a) Program to find roots of quadratic equation.
- b) Find the Largest among 3 values.
- c) Calculate the grades of a student.

Ex 4: Write C programs for the following using Iterative Statements
- a) Arithmetical operations using switch-case.

Board of Studies

b) Read a number and display in reverse.
c) Check for Armstrong number property

Ex 5:

a) Generate Fibonacci series.
b) Generate Prime numbers between two numbers.
c) Write a program in C to display the pattern like right angle triangle using an asterisk

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Unit – III

Arrays: Definition, Types: 1D, Multi Dimensional arrays, declaration, initialization, accessing elements, Matrix operations and String Handling.
Pointers: Definition, Declaration, Initialization, Pointer arithmetic, Pointer to pointer, arrays and pointers, Dynamic memory allocation

Exercise Questions: 3

Ex 6: Implement the following using arrays

a) Largest and smallest from a list of elements.
b) Program for Linear Search.
c) Program for Bubble Sort.

Ex 7: Implement the following using arrays

a) Matrix addition.
b) Matrix Multiplication.
c) Program using string handling functions

Ex 8: Implement the following using DMA Functions

a) Find the sum and average of list of elements using DMA Functions
b) Implementation of call by reference and call by valve.

Ex 9:

a) Implement C Program using any numerical methods

Unit – IV

Functions: Definitions, Declaration, Types of Functions, Parameter passing, Passing Arrays to functions, Recursion, library functions, functions and pointers, and Storage classes,

Exercise Questions: 4

Ex 10:

a) Factorial using recursion and non recursion.
b) GCD using recursion and non recursion.
c) To count the digits of a given number using recursion

AR – 20 : B.Tech. – IT

Data Structures and Algorithms

L	T	P	C
3	0	0	3

Subject Code: 20CST101

Course Outcomes:

On completion of this course, the student will be able to:

1. Compute the time and space complexities and calibrate the performance of a given algorithm.
2. Compare the performances of various Searching and Sorting techniques.
3. Demonstrate the advantages of dynamic memory allocation via linked lists.
4. Illustrate the applications of Stacks and Queues.
5. Implement the basic operations and Traversals on binary Trees.
6. Understand traversals and shortest path algorithms on a Graph.

Unit – I

Introduction: Basic Concepts of Data Structures; Notations of Time & Space Complexity: Performance Analysis of algorithms: Iterative & Recursive Algorithms; Asymptotic Notations (O, Ω, θ, o, ω)

Unit – II

Searching: Linear Search, Binary Search: Algorithm & Analysis; **Hashing:** Hash functions, Collision Resolution techniques; **Sorting:** Methodology & Performance Analysis of Sorting Algorithms: Selection, Bubble, Insertion, Quick, Merge, Heap Sort.

Unit – III

Linked Lists: Comparison with Arrays; Operations on Singly linked list: Creation, Insertion, Deletion, Traversing, Searching; Operations on Doubly linked list; Operations on Circular Linked Lists;

Unit – IV

Stacks: Definition & Efficient operations: Push & Pop; Applications of Stacks: Conversion & Evaluation of expressions;

Queues: Types of Queues: Simple Queue; Circular Queue: Efficient Operations on Queues; Implementation of Stack and Queue using Linked Lists.

Unit – V

Trees: Basic Terminology of Trees; Binary Tree: Traversals; Binary Search Tree Operations: Insert, Delete; Introduction to Balanced Trees: AVL, B-Tree

Unit – VI

Graph: Basic Terminologies and Representations of Graphs; Graph traversal algorithms: Breadth-FS & Depth-FS; Single-Source Shortest Path Algorithm: Dijkstra's Algorithm.

Text Books:

1. Mark Allen Weiss , **"Data Structures and Algorithm Analysis",** Fourth Edition , Pearson.
2. Ellis Horowitz, Sartaj Sahni, **"Fundamentals of Data Structures"**, Illustrated Edition,Computer- Science Press.

Reference Books

1. Michel T. Goodrich, Roberto Tamassia, David Mount, **"Data Structures and Algorithm Analysis",** 2nd Edition, John Wiley & Sons, Inc.
2. Adam. Drozdek , **"Data Structure And Algorithms In C++",** 4th edition, Cengage.

CHAIRMAN

AR - 18 - B.Tech. - IT

OBJECT ORIENTED PROGRAMMING

External Marks: 60
Internal Marks : 40

Subject Code : 18CST203
Credits : 3.0

Course Objectives:

- The objective of the course is to teach the basic concepts and techniques which form the object oriented programming paradigm.
- Well equipped with Java SDK environment to create, debug and run simple Java programs.

Course Outcomes:

After completion of this course, the student will be able to:

1. Knowledge of the structure and model of the Java programming language,(knowledge).
2. Use the Java programming language for various programming technologies (understanding).
3. Develop software in the Java programming language, (application).
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis).
5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis).

Unit – I

INTRODUCTION TO JAVA: Evolution of Java, Java Buzzwords, The Java Virtual Machine, An overview of Java- Simple Java Program, Naming Conventions in Java, Data types, Variables, Expressions, Automatic type Conversion, Operators, Control Statements , Arrays, Strings. **[Chapters [1,3,4,5]- Text Book 1]**

Unit -II

CLASSES & OBJECTS: Class fundamentals, Declaring Objects, Initializing the instance variables, Access Control, Constructors, Methods in Java, Overloading Methods and constructors, Static Methods, Recursion, final keyword, this keyword, garbage collection, finalize() method. **[Chapters [6, 7] - Text Book 1]**

Unit -III

INHERITANCE: Inheritance Basics, Types of Inheritance, The Keyword 'super', Final with inheritance.

POLYMORPHISM: Method Overriding, Dynamic Method Dispatch, Abstract Classes.

INTERFACES: Interface, Multiple Inheritance using Interface, Abstract Classes vs. Interfaces.

[Chapters [8, 9] - Text Book 1]

Unit -IV

PACKAGES: Packages, Different Types of Packages, Access Protection, Importing Packages.

EXCEPTION HANDLING: Exception-handling fundamentals, throw Clause, throws Clause, Types of Exceptions: Built-in Exception, User Defined Exception.
[Chapters [9, 10] - Text Book 1]

Unit -V

THREADS: Java Thread Model, Main Thread, Creating a Thread and Running it, terminating the Thread, Creating Multiple Threads, Thread Synchronization, Thread Priorities.
APPLETS: Applet Basics, Applet Life Cycle, A Simple Applet, HTML applet tag, Applet Parameters.
[Chapters [11, 13] - Text Book 1]

Text Books:

1. Herbert Schildt, *"Java The complete reference"*, 8th Edition, McGrawHill, 2011.
2. Timothy budd, *"An introduction to object-oriented programming"*, 3rd Edition, Pearson Education, 2009.

Reference Books:

1. E.Balaguruswamy, *"Programming with Java A Primer"*, 4th Edition, TataMcGraw-Hill, 2009.
2. Y. Daniel Liang, *"Introduction to Java programming"*, 9th Edition, Pearson education, 2012.

Reference Links:

1. http://en.wikibooks.org/wiki/Java_Programming - Java Learning WikiBook
2. http://www.javabeginner.com - Java Beginner Tutorial

AR - 18 - B.Tech. -IT

OPERATING SYSTEMS

Subject Code : 18CST206
Credits : 3.0

External Marks: 6
Internal Marks : 4

Course Objectives:

- Understand structures and functions of operating systems.
- Learn about Processes, Threads and scheduling Algorithms.
- Understand the principals of concurrency and Deadlocks.
- Learn various memory management Schemes.
- Study files system and Mass storage Devices.

Course Outcomes:

1. Explain the different structures of operating system and design various scheduling algorithms.
2. Propose solutions for achieving process synchronization and design deadlock prevention, detection, avoidance algorithms.
3. Compare and contrast various memory management schemes.
4. Design and implement file systems.
5. Familiarize with disk scheduling and device drivers.

Unit – I

Computer System and Operating System Overview: Overview of Computer Operating System, Operating systems functions, Types of operating systems, System calls.
Process Management: Process concept, Process scheduling, Operations, Multi Thread programming models. Process scheduling criteria and algorithms, and their evaluation.

Unit – II

Concurrency: Process synchronization, the critical-section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, synchronization examples.
Principles of deadlock: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock.

Unit – III

Memory Management: Swapping, Contiguous memory allocation, paging, structure of the page table, segmentation.
Virtual Memory Management: Virtual memory, demand paging, page replacement algorithms, FIFO, Optimal page replacement and LRU; Allocation of Frames, Thrashing.

Unit – IV

File System Interface: The concept of a file, Access Methods: Sequential Access, Direct Access and Indexed Access; Directory structure, files sharing, protection.

File System Implementation: File system structure, file system implementation, directory implementation, allocation methods: Contiguous allocation, Linked allocation and Indexed allocation; free-space management.

Unit – V

I/O management & Disk scheduling: I/O Devices, Organization of I/O functions, I/O Buffering Mass-storage structure, Disk structure, Disk attachment, Disk scheduling.

Text Books:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne Operating System Principles- 7th Edition, John Wiley.
2. Stallings, 2005, Operating Systems – Internal and Design Principles Sixth Edition, Pearson education.

Reference Books:

1. D.M. Dhamdhere Operating systems-A concept based approach-, 2nd Edition, TMH
2. Crowley Operating System A Design Approach-, TMH.
3. Andrew S Tanenbaum Modern Operating Systems, 2nd edition Pearson/PHI.

Reference Links:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents-IISc-BANG/Operating%20Systems New_index1.html

Formal Languages & Automata Theory

Subject Code : 18CST310 **External Marks: 60**
Credits : 3.0 **Internal Marks : 40**

Course Objectives:

To introduce students the fundamental concepts in theoretical computer science, and the formal relationship among machines, languages, grammars and computational problems.

Course Outcomes:

At the end of the course, the student will be able to:

1. Design finite automata with & without output.
2. Convert finite automata into regular expression and vice versa.
3. Design grammars for regular and context free languages.
4. Explain the equivalence between CFG and PDA & equivalence between acceptances by final state and acceptance by empty stack of PDA
5. Design Turing Machines and determine the decidability of computational problems

Unit – I:

Finite Automata: Strings, Alphabet, Language, Operations, Finite state machine, languages, deterministic finite automaton and non deterministic finite automaton, computational problems. NFA with Epsilon transitions - Significance, acceptance of languages. Conversions and Equivalence: Equivalence between NFA with and without Epsilon transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Mealy machines.

Unit – II:

Regular Languages: Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

Unit – III:

Grammar Formalism: Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms. Right most and leftmost derivation of strings, Ambiguity in context free grammars, minimization of Context Free Grammars. Chomsky normal form, Greibach normal form, Enumeration properties of CFL (proofs omitted).

Unit – IV:

Push Down Automata: Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty stack and its equivalence. Equivalence of CFL and PDA, interconversion (Proofs not required).

Unit – V:

Turing Machine & Computability Theory: Turing Machine, definition, model, design of Computable functions, recursively enumerable languages, counter machine, types of T machines (proofs not required). Chomsky hierarchy of languages, linear bounded automata context sensitive language, Universal Turing Machine, post correspondence problem.

Text Books:

1. Hopcroft, J. E., Motwani, R., and Ullman, J. D., (2007), *Introduction to Automata Theory, Langua and Computation*, Pearson
2. Daniel I.A. Cohen, John Wiley Introduction to Computer Theory 2nd edition

Reference Books:

1. John C Martin, Introduction to languages and the Theory of Computation, TMH
2. Lewis H.P. & Papadimition "Elements of Theory of Computation", C.H. Pearson /PHI.
3. Mishra and Chandrashekaran, Theory of Computer Science – Automata languages and computation -2nd edition, PHI.
4. Sipser ,Introduction to Theory of Computation –2nd edition Thomson

Web Reference:

http://nptel.iitm.ac.in/courses/webcourse-contents/IIT-%20 Guwahati/afl/index.htm

AR - 18 - B.Tech. - IT | III Year II Semester

Data Mining

Subject Code : 18CST314 | **External Marks: 60**
Credits : 3.0 | **Internal Marks : 40**

Course Objectives:

- Introduce basic concepts, principles, major techniques and algorithms in Data Warehousing and Data Mining. These include concepts and techniques for data preprocessing, OLAP, association rule mining, data classification, and data clustering.
- Discuss applications, Emerging Areas in Data Mining.

Course Outcomes:

1. Recognize types of Data, Data Quality, need of preprocessing and different measures of similarity and dissimilarity.
2. Differentiate between methods for modeling multidimensional data, design and implement Data Warehouse.
3. Explain in detail major techniques and algorithms involved in data mining, including techniques and algorithms for association rule mining, data classification, and data clustering.
4. Evaluate and increase the performance of a classifier.
5. Compare and contrast Partitioning, Hierarchical and Density based Clustering Algorithms.

Unit – I

Introduction to Data Mining: What is data mining, motivating challenges, origins of data mining, data mining tasks, Types of Data, Data Quality, Data Preprocessing, Measures of similarity and Dissimilarity. (**Text Book 1**)

Unit – II

Data Warehouse and OLAP Technology: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining, **Concept Description** - Characterization and Comparison: Data Generalization and Summarization-Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes. (**Text Book 2**).

Unit – III

Mining Frequent Patterns, Associatios: Basic Concepts, Market Basket Analysis, Frequent Itemsets, Closed Itemsets, and Association Rules, Frequent Itemset Mining methods: Apriori Algoriyhm, Generating Association Rules from Frequent Itemsets, Improving the efficiency of Apriori, FP–Growth algorithm (**Text Book 2**)

Unit – IV

Classification and Prediction: What is classification? What is prediction? Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Prediction, Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor, Increasing the Accuracy, Model Selection (**Text Book 2**

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Unit – V

Cluster Analysis:

Overview- types of clustering basic K–means, K-means – additional issues, bisecting k-means k-means and different types of clusters, strengths and weaknesses, k-means as an optimization problem, Agglomerative hierarchical clustering, basic agglomerative hierarchical clustering algorithm, DBSCAN, BIRCH, and CURE Algorithms (**Text Book 1**)

Text Books:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Person Education, 2007.
2. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.

Reference Books:

1. G. K. Gupta, "Introduction to Data Mining with Case Studies", Eastern Economy Edition, Prent Hall of India, 2006.
2. Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw – Hill Edition, Thirteenth Reprint 2008.

AR-16 – B.Tech – IT

IV Year I Semester

UML & DESIGN PATTERNS

Credits : 3.5
Course Code: 16CS4024

External Marks: 70
Internal Marks: 30

Course Objectives:
The course content enables students to:

- Develop the different UML diagrams for a software system based on the given requirements.
- Apply forward engineering to convert diagram to code and reverse engineering to convert code to diagram.
- Analyze & design a s/w system in object oriented approach, using unified modeling language.
- Understand different types of Design patterns
- Learn advanced design techniques, principles, practices, and approaches in solving problems

Course Outcomes:
At the end of the course students are able to:

1. Understand the use of unified modeling language for object oriented analysis and design
2. Demonstrate the application of various UML diagrams.
3. Illustrate various object oriented analysis and design to build a software system.
4. Classify and document design patterns.
5. Construct various patterns to manage algorithms and assign responsibilities to objects.

Unit – I
Introduction to UML: Importance of modelling, principles of modelling, object oriented modelling, conceptual model of the UML, Architecture, and Software Development Life Cycle.
Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams.
Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

Unit – II
Basic Behavioural Modelling-I: Interactions, Interaction diagrams. Use cases, Use case Diagrams, Activity Diagrams.

Unit-III
Advanced Behavioural Modelling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.
Architectural Modelling: Component, Deployment, Component diagrams and Deployment diagrams.

Unit – IV
Introduction: What Is a Design Pattern? Design Patterns in Smalltalk MVC, Describing Design Patterns, How to Select a Design Pattern, How to Use a Design Pattern.

Unit – V
Creational Patterns: Abstract Factory, Singleton.
Structural Pattern: Adapter, Bridge, Composite.
Behavioural Patterns: Chain of Responsibility, Command.

Text Books:

1. The unified Modeling language user guide by Grady Booch, James Rambaugh, Ivar Jacobson, PEA.
2. Design Patterns By Erich Gamma, Pearson Education, 3rd Edition.

Reference Books:

1. Satzinger: Object Oriented Analysis and Design, CENGAGE.
2. http://www.uml.ac.at/ex/lernen
3. https://www.developer.com/design/article.php/3309461/Using-Design-Patterns-in-UML.htm

AR-16 – B.Tech -IT

IV Year II Semester

PARALLEL COMPUTING
(Elective – III)

Credits : 3.0
Subject Code: 16IT4005

External Marks: 70
Internal Marks: 30

Course Objectives:

- To learn parallel and distributed algorithms development techniques for shared memory and message passing models.
- To study the main classes of parallel algorithms.
- To study the complexity and correctness models for parallel algorithms.

Course Outcomes:

Students will be able to:

1. Extending the types of computing and the differences among them.
2. Defining and Reflecting evaluation and problem decomposition techniques.
3. Interpreting the concept of pipelining.
4. Programming on message passing and parallel programming
5. Simulate different parallel algorithms.

Unit-I

Basic Techniques, Parallel Computers for increase Computation speed, Parallel & Cluster Computing.

Unit-II

Message Passing Technique- Evaluating Parallel programs and debugging, Portioning and Divide and Conquer strategies examples

Unit-III

Pipelining- Techniques computing platform, pipeline programs examples

Unit-IV

Synchronous Computations, load balancing, distributed termination examples, programming with shared memory, shared memory multiprocessor constructs for specifying parallelist sharing data parallel programming languages and constructs, open MP

Unit-V

Distributed shared memory systems and programming achieving constant memory distributed shared memory programming primitives, algorithms – sorting and numerical algorithms.

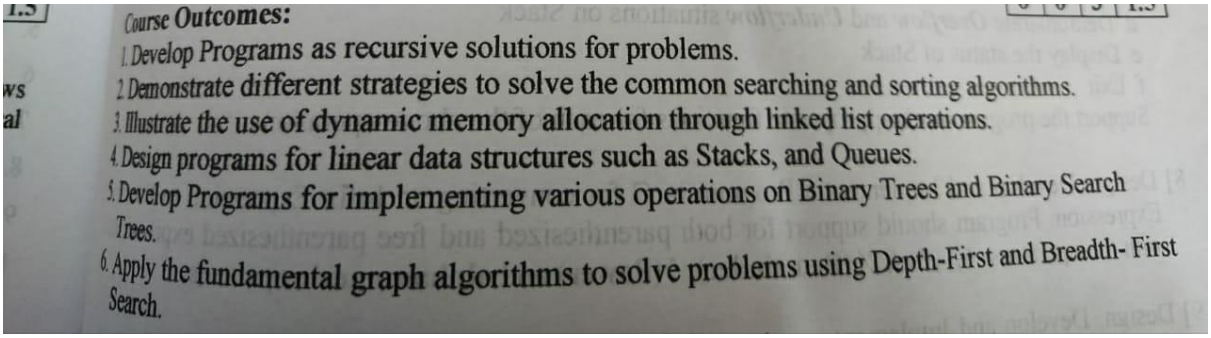
Text Book:

1. Parallel Programming, Barry Wilkinson, Michael Allen, Pearson Education, 2nd Edition.

Reference Book:

1. Introduction to Parallel algorithms by Jaja from Pearson, 1992

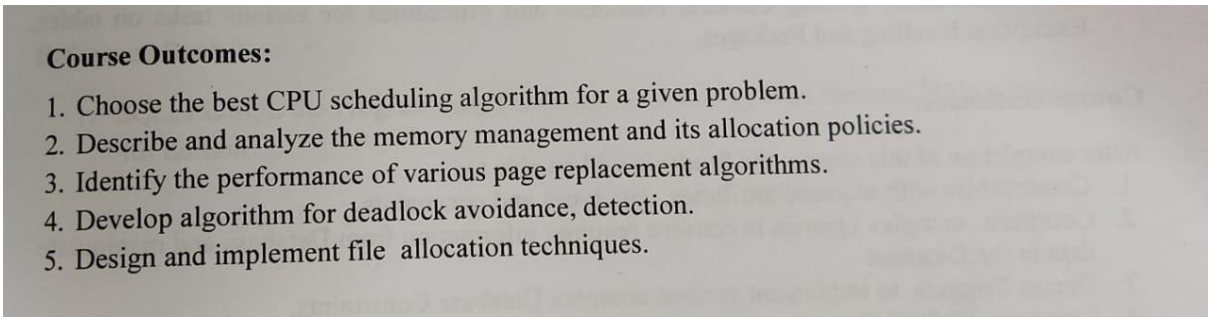
AR20 I YEAR LAB MANUAL COURSE OUTCOMES



Course Outcomes:

1. Develop Programs as recursive solutions for problems.
2. Demonstrate different strategies to solve the common searching and sorting algorithms.
3. Illustrate the use of dynamic memory allocation through linked list operations.
4. Design programs for linear data structures such as Stacks, and Queues.
5. Develop Programs for implementing various operations on Binary Trees and Binary Search Trees.
6. Apply the fundamental graph algorithms to solve problems using Depth-First and Breadth- First Search.

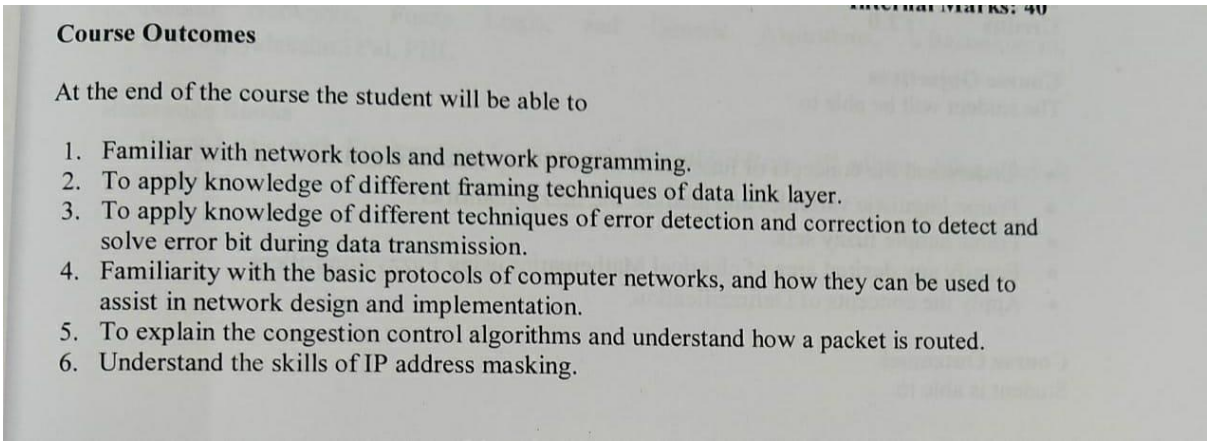
AR18 II YEAR LABMANUAL COURSE OUTCOMES



Course Outcomes:

1. Choose the best CPU scheduling algorithm for a given problem.
2. Describe and analyze the memory management and its allocation policies.
3. Identify the performance of various page replacement algorithms.
4. Develop algorithm for deadlock avoidance, detection.
5. Design and implement file allocation techniques.

AR18 III YEAR LABMANUAL COURSE OUTCOMES

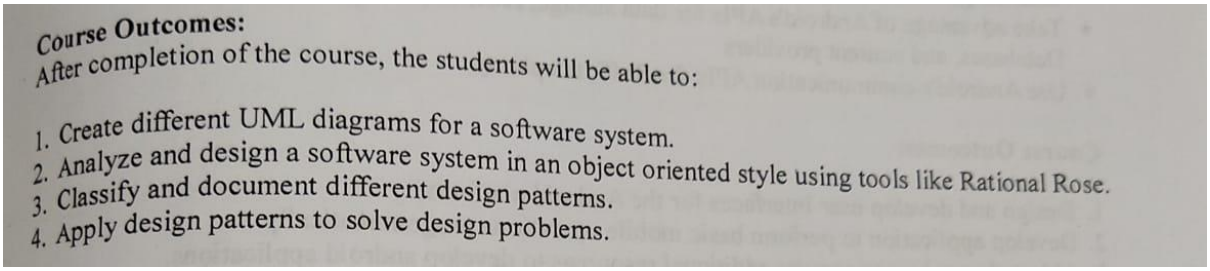


Course Outcomes

At the end of the course the student will be able to

1. Familiar with network tools and network programming.
2. To apply knowledge of different framing techniques of data link layer.
3. To apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.
4. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
5. To explain the congestion control algorithms and understand how a packet is routed.
6. Understand the skills of IP address masking.

AR16 IV YEAR LABMANUAL COURSE OUTCOMES



Course Outcomes:

After completion of the course, the students will be able to:

1. Create different UML diagrams for a software system.
2. Analyze and design a software system in an object oriented style using tools like Rational Rose.
3. Classify and document different design patterns.
4. Apply design patterns to solve design problems.

B.Tech : ECE

I YEAR

Aditya Institute of Technology and Management (Autonomous), Tekkali
I Year B.Tech (Electronics and Communication Engineering) – 1st Sem

APPLIED PHYSICS
(Common for EEE, ECE, CSE & IT)

Subject Code: 20BST105	L	T	P	C
	3	0	0	3.0

Course Description
This course encompass Fundamental Concepts of Physics that include

- Wave Optics
- Lasers
- Fiber Optics
- Modern Physics
- Electro Magnetic Theory
- Semiconductor Physics

that are inevitable for any Engineering student so that these prerequisites aid the student to readily understand Day to Day Engineering Problems with Pragmatic Approach.

Course Objectives:

- To realize the principles of optics in designing optical devices
- To comprehend the Principles of Lasers
- To Infer the Principles of Fiber Optics
- To Recognize the shortcoming of classical physics and describe the need for modifications to classical theory
- To Identify the interaction of electromagnetic fields
- To summarize the characteristics of semiconductor materials.

Course Outcomes:
Students will be able to
CO 1. Apply the principles of optics in designing optical devices
CO 2. Illustrate the Principles of Lasers
CO 3. Outline the Principles of Fiber Optics
CO 4. Resolve the discrepancies in classical estimates through quantum principles
CO 5. Analyze the interaction of electromagnetic fields.
CO 6. Interpret the characteristics of semiconductor materials.

Unit - I
Wave Optics
Interference - Introduction, Principle of Superposition of Waves, Interference in Plane Parallel Film due to Reflected Light, Newton's Rings under Reflected Light - Determination of Wavelength of Monochromatic Source of Light.

Diffraction - Introduction, Differences between Interference and Diffraction, Fraunhofer Diffraction due to Single Slit – Intensity Distribution.

Aditya Institute of Technology and Management (Autonomous), Tekkali
I Year B.Tech (Electronics and Communication Engineering) – 1st Sem.

BASIC ELECTRICAL ENGINEERING LAB

Subject Code: 20ESL101	L	T	P	C
	0	0	3	1.5

Course Objective:

- To introduce the student to study different electrical components and to verify the basic laws related to electrical engineering, Speed control of D.C. motor, testing of transformer, electrical wiring system through study, practice, and experiments.

Course Outcomes:

Students will be able to

CO 1. Label various types of electrical components.
CO 2. Demonstrate various basic electrical laws.
CO 3. Demonstrate speed control DC motor & Characteristics of generator.
CO 4. Experiment with lamps.
CO 5. Examine electrical wiring system

List of Experiments:

1. Study of electrical components.
2. To verify Ohm's law.
3. To verify (a) Kirchhoff's current law (b) Kirchhoff's voltage law.
4. To verify the total resistance of the series and parallel connected circuits.
5. Find armature resistance, field resistance and filament Lamp Resistance using V-I method.
6. Magnetization characteristics of DC shunt generator.
7. Speed control of D.C. Shunt motor by a) Armature Voltage control b) Field flux control method
8. Fluorescent tube connection.
9. (a) One way control of lamp
   (b) Two way control of lamp
10. Fan wiring.

Additional Experiments:

11. Soldering and bread board precautions.
12. To find voltage current relationship for series RL circuit and determine power factor.

Aditya Institute of Technology and Management (Autonomous), Tekkali
I Year B.Tech (Electronics and Communication Engineering) – 2nd Sem.

ENVI RONMENTAL SCIENCE
(Common to All Branches)

Subject Code: 20MCT102	L	T	P	C
	2	0	0	0.0

Course Objectives:

- Memorize the knowledge of environment and status of different resources on earth.
- Identify the significance, arrangement, causes of annihilation and conservation of ecosystems and biodiversity.
- Identify the significance, types and conservation of biodiversity.
- Discriminate causes, effects of a variety of pollutions and suitable control methods.
- Identify the hurdles of sustainable development; evaluate the different environmental management and legal issues.
- Describe the population growths, health problems and evaluate the environmental assets.

Course Outcomes:

By Studying this Course Student will

CO 1. Recognize and speaks well again on the general issues of environment and know how to conserve resources for better usage.
CO 2. Explain and demonstrate the ecosystems setup, assess.
CO 3. Recognize and conserving of diversity to upkeep.
CO 4. Examine a range of pollution problems along with control and their eco-friendly disposal methods.
CO 5. Translate the sustainable development practice through clean development mechanisms.
CO 6. Evaluate the changing trends of world population and compile the information in order to document the environmental assets.

Unit – I (*6 lectures*)

Importance of Environmental Studies and Natural Resources: Definition of Environment – Importance - Need for Public Awareness

Forest Resources - Use and over exploitation - deforestation – consequences – case study

Water Resources - Use and over utilization - dams - benefits and problems on Tribes and Environment

Food Resources – Food security concept - changes caused by agriculture and overgrazing -effects of modern agriculture – fertilizer - pesticide problems - water logging - salinity – concept of sustainable agricultural methods - case study

Energy Resources - Non-renewable energy resources – coal – crude oil - natural gas - use of renewable and alternate energy sources

Unit – II (*3 lectures*)

Ecosystems: Definition – Structure of ecosystem: producers - consumers – decomposers. Functions of ecosystem: Food chains - food webs - ecological pyramids - Energy flow – Nutrient cycles (Carbon cycle and Nitrogen cycle). Ecological succession

Aditya Institute of Technology and Management (Autonomous), Tekkali
I Year B.Tech (Electronics and Communication Engineering) – 2nd Sem.

LANGUAGE PROFICIENCY LAB

(Common to All Branches)

Subject Code: 20HSL101	L	T	P	C
	0	0	3	1.5

Course Objectives:

- To enable students develop neutralized accent
- To assist students utter words intelligibly
- To enhance the ability of students to speak spontaneously
- To help students converse aptly as the context demands
- To get students acquire perceptive abilities in professional conversations
- To aid students grasp and interpret information provided in graphs and tables

Course Outcomes:

CO 1. Students will be able to recognize differences among various accents and speak with neutralized accent.
CO 2. Students will be able to pronounce words accurately with the knowledge of speech sounds and use appropriate rhythm and intonation patterns in speech.
CO 3. Students will be able to speak extemporaneously about anything in general.
CO 4. Students will be able to generate dialogues for various situations.
CO 5. Students will be able to present posters perceptively and concisely.
CO 6. Students will be able to comprehend and interpret data provided in graphs and tables.

Course Syllabus

Unit – I: Listening Comprehension of Audio and Video clips of different accents

Unit – II: Pronunciation—Intonation—Stress—Rhythm

Unit – III: JAM — Narration of an Event

Unit – IV: Situational Dialogues

Unit – V: Poster Presentation

Unit – VI: Interpretation of Data in Graphs and Tables

Text Books:

1. Communication Skills. Sanjay Kumar and Pushpa Lata. OUP. 2011.
2. Practical English Usage. Michael Swan. OUP. 1995.
3. Speak Well. K. Nirupa Rani. Orient Blackswan, Hyderabad. 2012.
4. Strengthen Your Communication Skills. M. Hari Prasad. Maruthi Publications, Hyd. 2014.
5. Strengthen Your Steps. M. Hari Prasad. Maruthi Publications, Hyderabad. 2012.
6. Technical Communication. Meenakshi and Sangeetha. OUP. New Delhi. 2013.

II YEAR

Aditya Institute of Technology and Management (Autonomous), Tekkali
II Year B.Tech (Electronics and Communication Engineering) – 1st Sem.

SIGNALS & SYSTEMS

Subject Code: 18ECT204 **Internal Marks:40**
Credits: 3.0 **External Marks:60**

Course Objectives:

- Describe signals and systems in mathematical framework.
- Discuss the fundamental concepts of signals in Fourier domain.
- Demonstrate an understanding of the fundamental properties of Linear Time Invariant systems.
- Acquire knowledge on need of sampling, convolution and correlation concepts.
- Discuss the importance of Laplace and Z- Transforms.

Course Outcomes:

At the end of the course the student will be able to:

CO 1. Classify various types of signals and systems
CO 2. Compute the Fourier series and Fourier transform of a set of well-defined continuous time signals.
CO 3. Analyze the characteristics of Linear Time Invariant systems
CO 4. Explain the need of sampling, convolution and correlation concepts.
CO 5. Summarize the concepts of Laplace and Z transforms

Unit – I

Signal Analysis: Introduction to signals and systems, classification of signals and systems, analogy between vectors and signals, orthogonal signal space, signal approximation using orthogonal functions, mean square error, closed or complete set of orthogonal functions, orthogonality in complex functions, exponential and sinusoidal signals, properties of elementary signals.

Unit – II

Fourier series: Representation of Fourier series, continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, trigonometric and exponential Fourier series, Complex Fourier spectrum.

Fourier Transform: Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signals and standard signals, properties of Fourier transforms, Fourier transform of periodic signals.

Unit – III

Continuous Time LTI systems: Representation of continuous time signals in terms of impulses, Linear time variant and invariant systems, Unit impulse response and the convolution integral representations of LTI system, transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, signal bandwidth, system bandwidth, ideal LPF, HPF and BPF characteristics, causality and Poly-Wiener criterion for physical realization.

Aditya Institute of Technology and Management (Autonomous), Tekkali
II Year B.Tech (Electronics and Communication Engineering) – 1st Sem.

ELECTRONIC CIRCUITS ANALYSIS LAB

Subject Code: 18ECL202 **Internal Marks:40**
Credits: 1.5 **External Marks:60**

Course Objectives:

- To design RC phase shift oscillator using transistors for different frequencies
- To design Wien Bridge oscillator using transistors for different frequencies
- To obtain frequency response of Single Stage amplifier .
- To obtain frequency response of two stage RC coupled amplifier
- To obtain the conduction angle of Power amplifier and to design single tuned amplifier

Course Outcomes:

At the end of the course the student will be able to:

CO 1. Construct the RC phase shift oscillator using transistors for different frequencies
CO 2. Design Wien Bridge oscillator using transistors for different frequencies
CO 3. Estimate frequency response of Single Stage amplifier
CO 4. Estimate frequency response of two stage RC coupled amplifier
CO 5. Calculate the conduction angle of Power amplifier and resonant frequency of single tuned amplifier.

Design and Simulation in Simulation Laboratory using Multisim / Pspice / Equivalent Simulation Software & verifying the result by hardware:(Any 6 experiments)

1. RC Phase Shift Oscillator using Transistors - Design for different frequencies
2. Wien Bridge Oscillator using Transistors- Design for different frequencies
3. Two Stage RC Coupled amplifier – Frequency response
4. Series Voltage Regulator
5. Shunt Voltage Regulator
6. Class A Power Amplifier
7. Class B Power Amplifier
8. Class C Power Amplifier
9. Single Tuned Voltage Amplifier
10. JFET – Common Source Amplifier

Additional Experiments:

1. Double Tuned Voltage Amplifier
2. Hartley Oscillator.

Aditya Institute of Technology and Management (Autonomous), Tekkali
II Year B.Tech (Electronics and Communication Engineering) – 2nd Sem.

ELECTRO MAGNETIC WAVES & TRANSMISSION LINES

Subject Code: 18ECT207
Credits: 4.0

Internal Marks:40
External Marks:60

Course Objectives:

- To apply differential equations, vector algebra, integral multivariate calculus and complex calculus to solve for basic electrostatic, magneto static and electromagnetic field problems.
- To analyze the interaction of electromagnetic fields in different media.
- To demonstrate the completeness of Maxwell's relations for describing electromagnetic fields.
- To describe the propagation of plane electromagnetic waves in lossless and lossy media.
- To solve for the reflection and transmission of uniform plane waves at planar interfaces
- To learn overall concepts of Transmission line theory.

Course Outcomes:

At the end of the course the student will be able to

CO 1. Apply differential equations, vector algebra, integral multivariate calculus and complex calculus to solve for basic electrostatic, magneto static and electromagnetic field problems.
CO 2. Analyze the interaction of electromagnetic fields in different media.
CO 3. Describe electromagnetic fields using Maxwell's relations.
CO 4. Solve the reflection and transmission of uniform plane waves at planar interfaces.
CO 5. Learn about Transmission line theory.

Unit – I

Review of Coordinate Systems, Vector Calculus. Electrostatics : Coulomb's Law, Electric Field Intensity, Charge Distributions, Electric Flux Density, Gauss Law, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Dielectric Constant, Continuity Equation, Poisson's and Laplace's Equations.

Unit – II

Magneto Statics : Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Forces due to Magnetic Fields.

Unit – III

Maxwell's Equations for Time Varying fields : Faraday's Law and emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface: Dielectric - Dielectric and Dielectric-Conductor Interfaces.

Aditya Institute of Technology and Management (Autonomous), Tek
II Year B.Tech (Electronics and Communication Engineering) – 2nd Sem.

PULSE AND DIGITAL CIRCUITS LAB

Subject Code: 18ECL205 Internal M
Credits:1.5 External M

Course Objectives:

- Design of low pass and high pass filter for different time constants.
- Examine the operation of clippers and clampers.
- Analysis of logic gates and sampling gates.
- Generation of different types of waveforms using transistor circuits.
- Evaluation of UTP and LTP using Schmitt Trigger.
- Design of switch using transistor.

Course Outcomes:

At the end of the course the student will be able to:

CO 1. Design linear and non linear wave shaping circuits.
CO 2. Demonstrate the operation of logic gates and sampling gates.
CO 3. Analyze multivibrators and its applications.
CO 4. Generate Oscillations and sweep signals using UJT and Boot strap circuits.
CO 5. Test and explain the operation of Transistor as a switch.

List of Experiments (at least ten experiments are to be done) :

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Sampling Gates.
6. Astable Multivibrator.
7. Monostable Multivibrator.
8. Bistable Multivibrator.
9. Schmitt Trigger.
10. UJT Relaxation Oscillator.
11. Bootstrap sweep circuit.

Additional Experiments:

1. Study of logic gates using IC's.
2. Study of flip-flops using IC's

III YEAR

AR18 – B. Tech – ECE

Aditya Institute of Technology and Management (Autonomous), Tekkali

Aditya Institute of Technology and Management (Electronics and Communication Engineering) – I[st] Sem.

III Year B.Tech (Electronics and Communication Engineering)

DIGITAL COMMUNICATIONS

Subject Code: 18ECT313 | **Internal Marks: 40**

Credits: 3.0 | **External Marks: 60**

Course Objectives:

- To summarize the Basic Process of Digital communication system and digitization techniques.
- To demonstrate different digital modulation techniques.
- To compute probability errors associated with different digital modulation techniques using Matched filter and outline the concept of Information theory.
- To outline the Source coding techniques, channel capacity and bandwidth- S/N trade off and illustrate linear block code techniques which will detect and correct the errors associated with received data.
- To learn Convolution code Encoding and Decoding Techniques.

Course Outcomes:

At the end of the course the student will be able to:

CO 1. Compare the PCM, DPCM, DM and ADM digitization techniques.

CO 2. Analyze the ASK, FSK, PSK, DPSK and QPSK digital modulation techniques based on the bandwidth.

CO 3. Compute the probability of error for digital modulation techniques and measure the information through mathematical modeling.

CO 4. Determine the coding efficiency using source coding algorithms and discuss error coding controlling techniques.

CO 5. Develop convolution encoding sequences using time domain, transform domain and graphical methods and Viterbi decoding algorithm

Unit-I

Introduction to Digital Communications: Elements of digital communication system. Advantages of digital communication system.

Digitization Techniques: PCM-Sampling, quantization and coding, quantization error, Companding. Differential PCM systems (DPCM); Delta modulation and drawbacks; adaptive delta modulation, noise in PCM and DM systems.

Unit-II

Digital Modulation Techniques: Introduction, ASK, FSK, PSK, DPSK, QPSK, Introduction to M-ary systems, non-coherent detection of ASK and FSK.

Unit III

Data Transmission: Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, calculation of error probability of ASK, PSK and FSK.

Information Theory: Discrete messages, concept of amount of information and its properties. Average information, entropy and its properties. Information rate, mutual information and its properties.

AR18 – B. Tech – ECE

Aditya Institute of Technology and Management (Autonomous), Tekkali
III Year B.Tech (Electronics and Communication Engineering) – 1st Sem.

DIGITAL COMMUNICATIONS LAB

Internal Marks: 40
External Marks: 60

Subject Code: 18ECL306
Credits: 1.5

Course Objectives:

- Estimate the process of transmitting many signals through a single channel by Time Division Multiplexing (multiple time slots) and draw corresponding waveform.
- Know how different Digitizers convert analog signal into digital signal (Binary).
- Study different digital modulation methods and demodulation and to observe waveforms.
- Study Source encoder and decoder algorithm implementation.
- Illustrate the Linear Block Codes (Hamming and Cyclic) and Non Linear Block Codes (Convolution).

Course Outcomes:

At the end of the course the student will be able to:

CO 1. Examine the Time Division Multiplexed output for given input signals with different frequencies
CO 2. Examine the digital outputs for given analog signals by using PCM, DPCM and DM techniques and verify Receiver characteristics
CO 3. Analyze the plots and power density spectrums of ASK, FSK, PSK and DPSK Digital Modulation and Demodulation techniques for given input.
CO 4. Demonstrate of Linear Block Codes and Cyclic Cods for error controlling.
CO 5. Develop convolution encoder and decoder for the given input sequences.

List of Experiments (At least ten experiments are to be done) :

1. Time division multiplexing.
2. Pulse code modulation & Differential pulse code modulation.
3. Delta modulation.
4. Frequency shift keying.
5. Phase shift keying & Differential phase shift keying.
6. Amplitude Shift Keying
7. Source encoder and decoder
8. Linear block code – encoder and decoder
9. Binary cyclic code – encoder and decoder
10. Convolution code – encoder and decoder
11. Receiver characteristics
12. Spectrums of PSK, ASK, FSK & DPSK.

Additional Experiments:

1. Study of generation of Unipolar NRZ, Polar NRZ, Unipolar RZ and Polar RZ line code.
2. QPSK Modulation.

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Aditya Institute of Technology and Management (Autonomous), Tekkali
III Year B.Tech (Electronics and Communication Engineering) – 2nd Sem.

MICROPROCESSORS AND MICROCONTROLLERS

Subject Code: 18ECT315
Credits: 3.0

Internal Marks: 40
External Marks: 60

Course Objectives:

- To interpret the essential components of the computer and understand the architecture of 8086 microprocessor.
- To study the instruction set and assembler directives of 8086 microprocessor.
- To interface I/O and advanced peripherals with 8086.
- To study the architectural features of 80386,80486 Pentium and ARM processors.
- To study the Architecture and Assembly Language Programming of 8051 Microcontroller.

Course Outcomes:

At the end of the course student will be able to:

CO1. Identify a detailed software & hardware structure of the 8086 Microprocessor.
CO2. Develop assembly level programs with the help of Instruction set of 8086.
CO3. Develop Interfacing techniques for 8255, 8259A, 8251 and 8257.
CO4. Compare Architectural features of 8086 with advanced processors 80386,80486, Pentium and ARM processors.
CO5. Identify a detailed software & hardware structure of the 8051 Microcontroller.

Unit-I

Microprocessor 8086: Introduction, architecture, register organization, memory organization, signal description and pin diagram, addressing modes, classification of interrupts, interrupt service routine and interrupt vector table, timing diagrams of 8086.

Unit-II

Assembly Language Programming of 8086: Instruction set-Data Transfer instructions, Arithmetic, logical, Branch instructions, Flag manipulation instructions, machine control instructions , String instructions, assembler directives, procedures and macros, assembly language programs.

Unit-III

8086 Interfacing with I/O devices: Programmable Peripheral Interface (8255),modes of operation of 8255, interfacing 8255, Programmable interrupt controller (8259A),interfacing 8259A , Functional block diagram of USART(8251).DMA controller 8257.

Unit-IV

Advanced Microprocessors: Architecture, Features, register organization, signal description, data types and physical address calculation, mode of operations, segmentation and paging of 80386, comparison of 80486 and Pentium processors

ARM Processor fundamentals: ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table.

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Aditya Institute of Technology and Management (Autonomous), Tekkali
III Year B.Tech (Electronics and Communication Engineering) – 2nd Sem.

MICROPROCESSORS AND MICROCONTROLLER LAB

Subject Code: 18ECL309
Credits: 1.5

Internal Marks: 40
External Marks: 60

Course Objectives:
Learning the

- MASAM (MACRO ASSEMBLER) software.
- Learning Addressing modes of 8086.
- Understand the Assembly language programming.
- Learning the instruction set of 8086 microprocessor and 8051 microcontroller.
- Study the interfacing of the processor with various peripheral devices

Course Outcomes:
At the end of the course the student will be able to:
CO 1. Develop hands on experience with 8086 Assembly language programming using MASM.
CO 2. Develop DAC interfacing with 8086 to generate step, square, Triangular and Sine waves.
CO 3. Develop Stepper motor, Traffic lights interfacing with 8051 Microcontroller.

List of Experiments (At least Ten experiments are to be done) :

I. Microprocessor 8086

1. Introduction to MASM/TASM.
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.

II. Interfacing

1. 8255 – PPI: Write ALP to Generate analog signals by Interfacing DAC through 8255 PPI .

III. Microcontroller 8051

1. Interfacing stepper motor
2. Interfacing Traffic lights.
3. Interfacing with MIC.

Additional Experiment:

1. Interfacing ADC with 8051 Microcontroller.
2. Interfacing Elevator with 8051Microcontroller.

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MICROWAVE ENGINEERING

IV Year I Sem

Subject Code: 16EC4027
Credits: 3

Internal Marks: 30
External Marks: 70

Course Objectives:

- To apply electromagnetic theory to calculations regarding waveguides and transmission lines.
- To characterize microwave systems and components in terms of network theory (Scattering matrix, ABCD matrix, impedance matrix, etc.)
- To analyze the difference between the conventional tubes and the microwave tubes for the transmission of the EM waves.
- To design microwave components such as power dividers, hybrid junctions, microwave filters, ferrite devices etc.
- To handle microwave equipment and make measurements.

Course Outcomes:

At the end of the course the student will be able to:

CO1: Apply the EM theory for calculation of various parameters related to waveguides.
CO2: Integrate a wide range of microwave components for various applications.
CO3: Analyze construction and operation of various microwave tubes for transmission of the microwave frequencies.
CO4: Explain the significance, types and characteristics of microwave solid state devices.
CO5: Perform various measurements using microwave equipment.

NIT I

ICROWAVE TRANSMISSION LINES: Introduction, Microwave frequency Bands, Advantages and pplications of Microwaves. Modes- TE, TM, TEM. Waveguides: Rectangular wave guide -TE/TM ode analysis, Expressions for Fields, Cut-off Frequencies, Dominant and Degenerate Modes, Mode haracteristics, Introduction to cavity resonators.

NIT II

AVEGUIDE COMPONENTS: Coupling Mechanisms - probe, loop, Waveguide Attenuators, attering Matrix and its properties, Waveguide Multiport Junctions – E plane and H plane Tees, Magic e, Hybrid Ring, Directional Couplers, Faraday rotation, Ferrite Components – Gyrator, Isolator and rculator.

NIT III

ICROWAVE TUBES – I: Limitations of conventional tubes at microwave frequencies, Two Cavity ystrons, Velocity Modulation Process, Bunching Process, o/p Power and Efficiency, Reflex Klystrons, unching Process, Power Output, Efficiency, Oscillating Modes and output Characteristics.

IMAGE PROCESSING LAB

Subject Code: 16EC4115 **Internal Marks: 25**
Credits: 1.5 **External Marks: 50**

Course Objectives:

- To display the image and perform arithmetic and logical operations on it.
- To enhance the image using point processing techniques.
- To obtain the histogram equalization and specifications of an image
- To find the smoothening and sharpening of image using spatial and frequency domain filters
- To compress the image using DCT and DWT transforms.

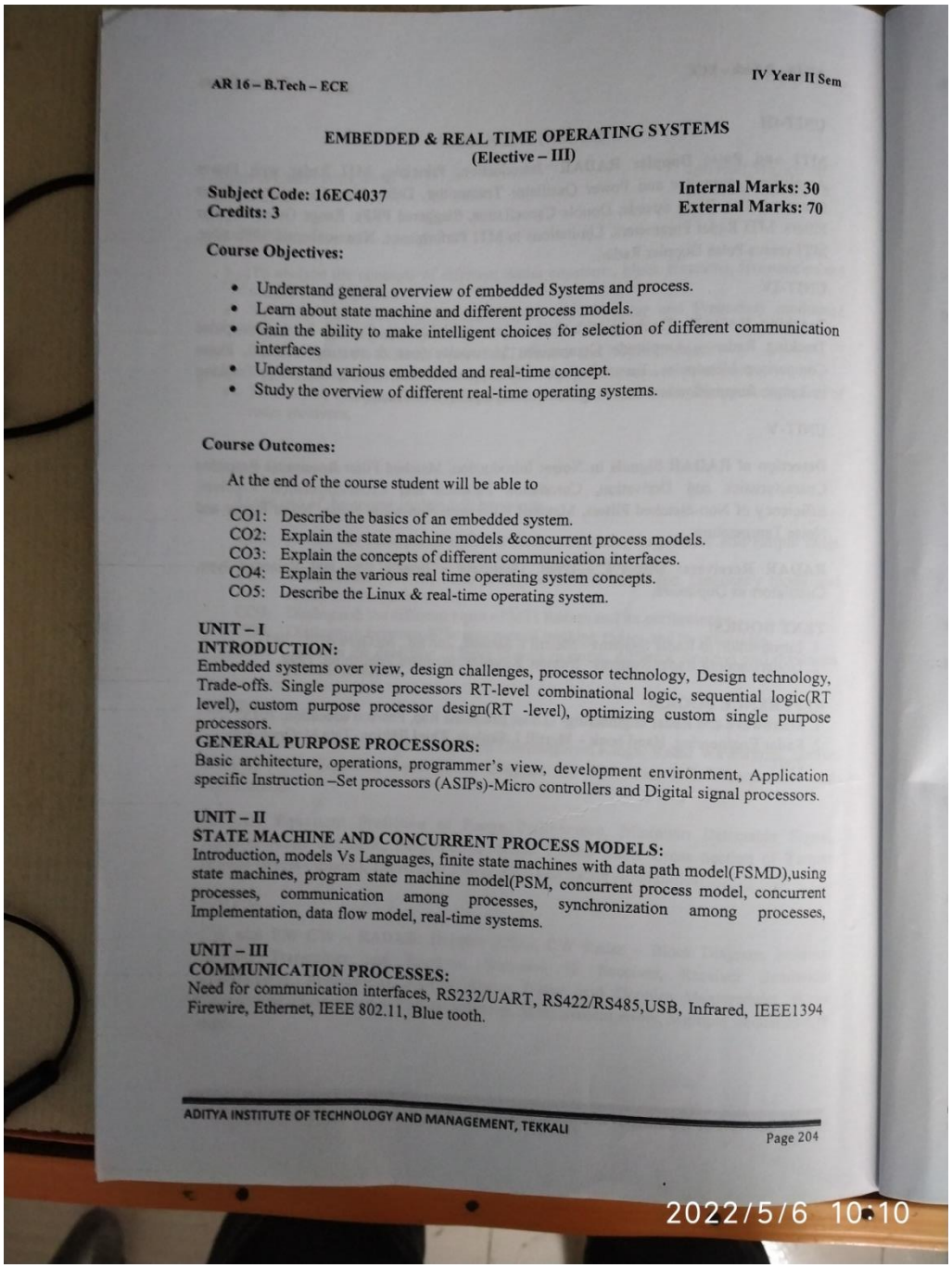
Course Outcomes:

At the end of the course the student will be able to

CO1: Read and display the image, perform addition, subtraction, AND, OR operations on images
CO2: Perform the operations like image negative and contrast stretching
CO3: Find the histogram equalization and specification of image
CO4: Smoothen and sharpen the image both in spatial and frequency domain
CO5: Compress the image using the transformations like DCT and DWT

List of Experiments:

1. Read and display of monochrome and color image.
2. Image arithmetic operations: addition, subtraction image, logical operations: AND, OR.
3. Geometric transformation of image: translation, rotation and scaling.
4. Image enhancement using point processing methods: image negative, contrast stretching.
5. Image enhancement using Histogram equalization and specification.
6. Image smoothing and sharpening using spatial masks.
7. Image smoothing and sharpening using frequency domain filters.
8. Image de-noising: Gaussian noise, salt and pepper noise.
9. Edge detection using different edge detection operators: gradient and Laplacian
10. Image compression using DCT.



EMBEDDED & REAL TIME OPERATING SYSTEMS
(Elective – III)

Subject Code: 16EC4037 **Internal Marks: 30**
Credits: 3 **External Marks: 70**

Course Objectives:

- Understand general overview of embedded Systems and process.
- Learn about state machine and different process models.
- Gain the ability to make intelligent choices for selection of different communication interfaces
- Understand various embedded and real-time concept.
- Study the overview of different real-time operating systems.

Course Outcomes:

At the end of the course student will be able to

CO1: Describe the basics of an embedded system.
CO2: Explain the state machine models &concurrent process models.
CO3: Explain the concepts of different communication interfaces.
CO4: Explain the various real time operating system concepts.
CO5: Describe the Linux & real-time operating system.

UNIT – I
INTRODUCTION:
Embedded systems over view, design challenges, processor technology, Design technology, Trade-offs. Single purpose processors RT-level combinational logic, sequential logic(RT level), custom purpose processor design(RT -level), optimizing custom single purpose processors.
GENERAL PURPOSE PROCESSORS:
Basic architecture, operations, programmer's view, development environment, Application specific Instruction –Set processors (ASIPs)-Micro controllers and Digital signal processors.

UNIT – II
STATE MACHINE AND CONCURRENT PROCESS MODELS:
Introduction, models Vs Languages, finite state machines with data path model(FSMD),using state machines, program state machine model(PSM, concurrent process model, concurrent processes, communication among processes, synchronization among processes, Implementation, data flow model, real-time systems.

UNIT – III
COMMUNICATION PROCESSES:
Need for communication interfaces, RS232/UART, RS422/RS485,USB, Infrared, IEEE1394 Firewire, Ethernet, IEEE 802.11, Blue tooth.

B.Tech: Mechanical Engineering

AR-20
I-I

R20 - B. Tech. - ME

I Year B. Tech. I Semester

CHEMISTRY

Subject Code: 20BST107

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COURSE OBJECTIVES:

The students will become familiar and understand about:

- Rationalise the importance of water for society and industrial needs.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- To become familiar in moulding methods of preparation of different types of plastic materials
- Rationalise organic reactions such as addition, substitution, elimination, rearrangement reactions.
- Rationalise reference electrodes and science of corrosion.
- Distinguish Renewable & Non-Renewable energy resources and rationalise about green chemistry, batteries.

COURSE OUTCOMES:

The course will enable the student to:

CO1: Rationalise the importance of water for society and industrial needs.
CO2: Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
CO3: Differentiate different moulding techniques of plastic materials
CO4: Rationalise organic reactions such as addition, substitution, elimination, rearrangement reactions.
CO5: Rationalise the science of corrosion.
CO6: Distinguish Renewable & Non-Renewable energy resources and rationalise about green chemistry, batteries.

UNIT-I:

Water Technology ***(9 lectures)***

Hardness of Water – Temporary and Permanent Hardness - Units of Hardness - Estimation of Hardness by EDTA Method - Problems on Temporary and Permanent Hardness - Disadvantages of Hard Water – Softening Methods of Hard Water- Zeolite or Permutit Process - Ion Exchange Process - Methods of Treatment of Water for Domestic Purposes – Sedimentation, Coagulation, Filtration, Disinfection - Sterilization, Chlorination, Break Point chlorination, Ozonisation.

UNIT-II:

Spectroscopy ***(8 lectures)***

Spectroscopy - Electronic Spectroscopy - Types of Electronic Transitions - Definition of Chromophore – Definition of Auxochrome – Absorption and Intensity Shifts - Introduction to I.R. Spectroscopy – Fingerprint Region – Introduction to NMR. – Principle - Equivalent and Non-Equivalent Protons - Chemical Shift- Splitting – Coupling Constant.

UNIT-III:

Polymers and Plastics *(7 lectures)*

Definitions of Polymer, Polymerization – Functionality – Degree of polymerization - Types of Polymerization (Addition and Condensation Polymerizations) - Plastics – Definition, Thermoplastics, Thermosetting Plastics – Compounding of Plastics – Moulding of Plastics into Articles (Compression, Injection, Transfer and Extrusion Moulding Methods) - Preparation, Properties and Engineering Uses of PVC and Bakelite.

UNIT-IV:

Organic Reactions *(7 lectures)*

Types of Organic reactions: Addition - Electrophilic, Nucleophilic and Free radical - Substitution - Electrophilic, Nucleophilic (SN^1 and SN^2) and Free radical – Elimination (E_1 and E_2) – Rearrangement Reactions (Claisen, PinacolPinacolone Rearrangement).

UNIT-V:

Corrosion and Its Control *(9 lectures)*

Definition of Corrosion – Theories of Corrosion (Chemical & Electrochemical) – Mechanism of Electrochemical Corrosion (Oxygen Absorption Type and Hydrogen Evolution Type) - Galvanic Series - Factors Influencing Corrosion – Corrosion Control Methods - Proper Designing, Modifying the Environment, Cathodic Protections – Sacrificial Anodic Protection and Impressed Current Cathodic Protection.Metallic (Anodic and Cathodic) Coatings – Methods of application on metals (Galvanizing and Tinning).

UNIT-VI:

Green Chemistry & Energy *(8 lectures)*

Introduction to green chemistry – Definition and 12 principles of green chemistry.

Types of energy sources – Renewable & Non-Renewable - Introduction to solar energy – harnessing of solar energy – photo voltaic cells – Concentrated Solar power plants.

Introduction of Energy storage devices: Principle& mechanism of Batteries &Supercapacitors, Types of Batteries (Alkaline & Lead-Acid) - Difference between Batteries and Supercapacitors.

SUGGESTED TEXT BOOKS :

(i) University chemistry, by B. H. Mahan
(ii) Elementary organic spectroscopy: principles and applications, by Y. R. Sharma
(iii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
(iv) "Engineering Chemistry", P. C. Jain and Monica Jain, DhanpatRai Publications, Co., New Delhi, 2004, 16th Edition

AR-20
I-II

R20 - B. Tech. - ME

I Year B. Tech. II Semester

THERMODYNAMICS

Subject Code: 20MET101

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3	0	0	3

COURSE OBJECTIVES:

- To identify and formulate elementary level engineering problems related to thermodynamics and energy transformation in a conceptual form as well as in terms of mathematical and physical models.
- To apply the basic principles of classical thermodynamics to the analysis of processes and cycles involving pure simple substances.
- To effectively generalize the basic axioms of classical, macroscopic thermodynamic analysis and to extrapolate these concepts to systems and substances not necessarily covered in the course.

COURSE OUTCOMES:

On completion of this course, students should be able to

CO 1 : Apply basic concepts, zeroth law and first law to thermodynamic processes
CO 2 : Apply steady flow energy equation to flow systems, First law to Non-flow thermodynamic processes
CO 3 : Apply Second law of Thermodynamics to Estimate the efficiency of Heat engine and COP of Heat pump. Determine increase of entropy in system due to any thermodynamic process.
CO 4 : Calculate available and unavailable energies for steady flow process and Non-flow process
CO 5 : Determine energy transferred using equations and Mollier charts for pure substances. Determine properties of mixtures from the properties of its constituents and composition.
CO 6 : Derive thermal efficiency and mean effective pressures for various thermodynamic cycles and compare their performances.

UNIT-I

Terminology& Laws: System - Types, Boundary, Surroundings, Control volume. Macroscopic and microscopic viewpoints, Concept of continuum.Zeroth Law of TD -Thermodynamic equilibrium, State, Property – Entensive and Intensive, Process, Cycle - Reversible and Irreversible, Work, Heat.
First Law: First Law of TD -Internal Energy, Joule's Experiments, PMM-I.

UNIT-II

First Law Applied to Non-Flow Processes: Corollaries, First law applied to various non-flow processes – Change in Internal Energy – Systems undergoing process and cycle – Free expansion.
First Law Applied to Flow Systems: Steady Flow Energy Equation – Turbine, Nozzle and Heat Exchanger, Limitations of First law.

UNIT-III

Second Law: Kelvin Plank statement -Heat Engines, Clausius statement - Heat Pump, Their equivalence, PMM-II,Carnot Cycle – Carnot Efficiency
Entropy: ClausiusTheorem –Clausius Inequality, Concept of entropy- Principle of increase of entropy, Third Law – Zero Entropy, Disorderness

R20 - B. Tech. - ME

I Year B. Tech. II Semester

UNIT-IV

Available Energy: AE Referred to cycle – Decrease in AE when heat transfer through Finite Temperature Difference, AE from Finite Energy Source. Maximum work in Reversible Process.
Availability: Steady flow process, Non-flow Process.

UNIT-V

Pure Substances: Introduction, P-V-T surfaces, T-S diagrams, Mollier charts, Property Tables,PhaseTransformations – Quality or Dryness fraction.
Gas Laws and TD relations: Avogadro's Law, Ideal gas – Equation of state, Universal gas constant, Deference in Heat Capacities, Ratio of Heat Capacities. Maxwell's Equations, Various Thermodynamic Processes

UNIT-VI

Thermodynamic Cycles: Otto, Diesel, Dual Combustion – Description, P–V and T-S diagram, Thermal efficiency, Comparison, Mean effective pressure

TEXT BOOKS:

1. Engineering Thermodynamics, P.K. Nag, Tata McGraw-Hill Publications.
2. Thermodynamics: An Engineering Approach, Michael A. Boles and Yungus A. Cengel, Tata McGraw-Hill Publications.
3. Thermal Engineering, R.K. Rajput, S.Chand Publications.
4. Steam Tables &Mollier Charts. (**Permitted for Exam**)

REFERENCES BOOKS:

1. Thermal Engineering, P.L. Ballaney, Khanna Publications,
2. Thermal Engineering, M.L.Mathur, F.S.Mehta, Jain Brothers Publications,
3. Introduction to Thermodynamics, J.B.Jones, G.A.Hawkins, John Wiley Publications,
4. Fundamentals of Thermodynamics, Gordon John Van Wylen, Richard Edwin Sonntag, John Wiley Publications,

AR-18
II-I

MATERIALS ENGINEERING

Subject Code: 18MET202 **Internal Marks: 40**
Credits: 3.0 **External Marks: 60**

COURSE OBJECTIVES:

- To understand different engineering materials and their structures.
- To understand the phase diagrams.
- To understand the powder metallurgy processes.
- To understand various heat treatment processes.

COURSE OUTCOMES:

On completion of this course, students should be able to

CO 1. Gain thorough knowledge in engineering materials and their structures.
CO 2. Understand necessity of alloying and effect of alloying element on properties of materials.
CO 3. Understand thoroughly Iron carbon equilibrium diagram.
CO 4. Describe different types of cast irons and steels.
CO 5. Gain knowledge of heat treatment processes and powder metallurgy.

UNIT-I

Structure of Metals: Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys .

UNIT-II

Constitution of Alloys: Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

Phase Diagrams : Experimental methods of construction of equilibrium phase diagrams, Isomorphous alloy systems, Lever rule, Study of Iron and Iron carbide phase diagram.

UNIT-III

Cast Irons and Steels: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, tool and die steels.

UNIT-IV

Heat treatment of steels: Stages of heat treatment and cooling methods. Annealing, normalizing, Hardening, TTT diagrams, tempering, Hardenability, surface - hardening methods.

Powder Metallurgy: Definition, Methods of production of metal powders, Stages in powder metallurgical components preparation, Design considerations.

UNIT-V

Aluminum and Titanium: Classifications, Structure and properties.

Mechanical Properties and Testing: Types of properties, Hardness Testing: -Rockwell, Brinell and Vickers, Toughness Testing: Charpy V-Notch, Izod tests, creep, fatigue tests.

AR18 – B. Tech. - ME

II Year B. Tech., I Semester

TEXT BOOKS:

1. Introduction to Physical Metallurgy / Sidney H. Avener.
2. Elements of Material science / V. Rahghavan

REFERENCE BOOKS:

1. An introduction to Metallurgy , sir Alan Cottrell , second edition universities press (India) private limited
2. Engineering materials and metallurgy/R.K.Rajput/ S.Chand.
3. Science of Engineering Materials / Agarwal

AR-18
II-II

IC ENGINES

Subject Code: 18MET205 **Internal Marks: 40**
Credits: 3.0 **External Marks: 60**

COURSE OBJECTIVES:

- To learn the testing and performance of different IC engines.
- To learn about air cycles and their analysis.
- To learn about working and operation of different air compressors.

COURSE OUTCOMES:

On completion of this course, students should be able to

CO 1. Analyze air standard, fuel air and actual air cycles in terms of various losses. Understand construction, working and mechanism of engine subsystems.
CO 2. Describe combustion processes occurring in SI and CI engines. Identify the factors affecting flame speed, ignition lag, flame propagation and knocking.
CO 3. Calculate engine performance using various parameters and heat balance sheet.
CO 4. Determine exhaust gas emissions from SI and CI engines.
CO 5 Explain operating and working principles of rotary, reciprocating and axial flow compressors.

UNIT-I

CLASSIFICATION OF IC ENGINES: Classification based on fuel, working cycle, method of fuel supply. Ignition and Governing. Scavenging of two stroke engines. Fuel – air cycles & actual air cycles and their analysis.

FUELS: Calculation of Calorific value of fuels, Stoichiometric air required – Conversion of volumetric to mass analysis and vice-versa – Flue gas analysis, ORSAT apparatus.

UNIT-II

Spark Ignition Engines: Flame speed-effect of turbulence and other parameters. Normal and abnormal combustion. Auto ignition and Pre ignition. Fuel requirements, knock ratings, combustion chambers. Carburetion-mixture strength requirements. Simple carburettor-limitations, compensating arrangements. Gasoline injection systems.

Compression Ignition Systems: Low and high speed types.Air utilization and output. Combustion process-Ignition delay. Knocking and effect of variables. Fuel requirements and rating. Combustion chambers. Fuel injection systems. Wankel engine.

UNIT-III

Performance of IC Engines: Measurement of engine power, analysis of engine performance. Factors effecting efficiency and power, heat loss, pumping loss. Geometry, Speed, Air/Fuel ratio. Heat balance test. BIS standards for testing and rating.

UNIT-IV

SI and CI engine emissions. Harmful effects. Emissions measurement methods. Methods for controlling emissions. EURO and BHARAT emission norms.

Alternate Fuels For IC Engines: Need for use of alternate fuels. Use of alcohol fuels. Biodiesel. Biogas and Hydrogen in engines.

UNIT-V

AIR COMPRESSORS:

Reciprocating Compressors: Principle of operation, Work required, Isothermal efficiency, Volumetric efficiency – Effect of clearance, Stage compression.

Rotary Compressors: Roots Blower, Vane sealed compressor – mechanical details and principles of working, efficiency considerations.

Axial Flow Compressors: Mechanical details and principle of operation – Velocity triangles and energy transfer per stage – Degree of reaction, Work done factor, isentropic efficiency.

TEXT BOOKS:

1. Ganesan.V., Internal Combustion Engines, Tata McGraw Hill Publishing Company, 2007.
2. Mathur, M.L., and Sharma, R.P., A Course in Internal Combustion Engines, Dhanpat Rai and Sons, 2008.

REFERENCE BOOKS:

1. Thermal Engineering, P.L.Ballaney, Khanna Publications,
2. Internal Combustion Engine Fundamentals, John B Heywood, McGraw Hill Publications,
3. A Course in Thermal Engineering, S.C. Arora, S. Domkundwar, Dhanpat Rai Publications,
4. John, B.H., Internal Combustion Engine Fundamentals, McGraw Hill, 1988.

AR-18
III-I

AR18 – B. Tech. - ME

III Year B. Tech., I Semester

MANUFACTURING TECHNOLOGY - II

Subject Code: 18MET311 | **Internal Marks: 40**
Credits: 3 | **External Marks: 60**

COURSE OBJECTIVES:

- To provide basic knowledge on different machines like lathe, shaper, and planner.
- To provide clear information on cutting tool geometry.
- To provide basic concepts of measurements by using different techniques

COURSE OUTCOMES:

On completion of this course, students should be able to

- Assess machinability of different materials using specific cutting forces and surface finish. Explain theory of metal cutting including cutting tool geometry, materials, life and wear.
- Describe basic parts and various operations performed on lathe. Explain the mechanisms used in various special purpose lathes.
- Discuss parts, working principles, operations and applications of shaping, slotting, planning, milling, drilling, broaching and grinding machines.
- Explain gear cutting, gear forming, gear generation, gear shaping and gear hobbing.
- To gain knowledge in measuring techniques and instruments, limits and limit gauges, go and no-go gauges, and some of the gauges used in inspection of mechanical parts in Industry.

UNIT-I

THEORY OF METAL CUTTING: Introduction, Material removal processes, Types of machine tools – Theory of metal cutting, Cutting tool geometry, Chip formation – Orthogonal cutting, Merchant's Force diagram – Cutting tool materials, Tool wear, Tool life, Surface finish – Cutting fluids.

UNIT-II

CENTRE LATHE: Constructional features, Various operations, Taper turning methods, Thread cutting methods – Special attachments, Machining time and power estimation.

SPECIAL PURPOSE LATHES: Capstan and turret lathes, Automats, Single spindle, Swiss type, Automatic screw type, Multi spindle, Turret Indexing mechanism, Bar feed mechanism.

UNIT-III

RECIPROCATING MACHINE TOOLS: Shaper, Planer and Slotter.

MILLING, DRILLING AND ALLIED OPERATIONS, BROACHING: Types, Milling cutters, Operations, Indexing – Hole making, Drilling, Quill mechanism, Reaming, Boring, Broaching machines, Broach construction, Push, Pull, Surface and Continuous Broaching machines.

UNIT-IV

ABRASIVE PROCESSES AND GEAR CUTTING: Abrasive processes, Grinding wheel, Specifications and selection, Types of grinding process, Cylindrical grinding, Surface grinding, Centreless grinding – Honing, Lapping, Super finishing, Polishing and Buffing, Abrasive jet machining, Gear cutting, Forming, Generation, Shaping, Hobbing.

AR18 – B. Tech. - ME

III Year B. Tech., I Semester

UNIT-V

SYSTEMS OF LIMITS AND FITS: Introduction, Normal size, Tolerance limits, Deviations, Allowance, Fits and their types, Unilateral and bilateral tolerance system, Hole and shaft basis systems, Interchangeability and selective assembly.

LIMIT GAUGES: Taylor's principle – Design of go and no-go gauges, plug ring, snap, gap, taper, profile and position gauges.

TEXT BOOKS:

1. A Textbook of Production Technology: Manufacturing Processes by P C Sharma, Published by S Chand & Co Ltd.,, India
2. A Textbook of Production Engineering, By P C Sharma, Published by S Chand & Co Ltd., India
3. Production Technology, R.K. Jain, S.C. Gupta, Khanna Pub.

REFERENCES BOOKS:

1. Workshop Technology Vol-II, B.S. Raghuwanshi, Khanna Pub.
2. Metal Cutting Principles, Milton C Shaw, CBS Pub.
3. Metal Cutting and Machine Tools, Geoffrey Boothroyd, CRC Press.

AR-18
III-II

AR18 – B. Tech. – ME

III Year B. Tech., II Semester

DESIGN OF MACHINE MEMBERS - II

Subject Code: 18MET314 **Internal Marks: 40**
Credits: 3 **External Marks: 60**

COURSE OBJECTIVES:

- To design piston and cylinder for IC engine and analyze stresses in thick cylindrical shells.
- To design the dimensions of connecting rod and crankshaft that can sustain various loads.
- To design power transmission components like flat & v-belts, ropes, pulleys for belt and rope drives.
- To design major dimensions of spur and helical gears for dynamic loads, bending strength, compressive strength and wear.
- To design journal, ball and roller bearings with adequate bearing life and heat dissipation.

COURSE OUTCOMES:

On completion of this course, students should be able to

- Design piston and cylinder for IC engine and analyze stresses in thick cylindrical shells.
- Design the dimensions of connecting rod and crankshaft that can sustain various loads.
- Design power transmission components like flat & v-belts, ropes, pulleys for belt and rope drives.
- Design major dimensions of spur and helical gears for dynamic loads, bending strength, compressive strength and wear.
- Design journal, ball and roller bearings with adequate bearing life and heat dissipation.

UNIT-I

DESIGN OF THICK PRESSURE VESSELS: Thick cylinders-Prin- Lame's equation, Cylinders with external pressure, compound cylinders, Thickness of cylindrical shells.

DESIGN OF CYLINDER AND PISTON: Cylinder wall, Cylinder head, Studs for cylinder head, Piston head, piston ribs and cup, piston rings, Piston barrel, Piston skirt and Piston pin.

UNIT-II

DESIGN OF CONNECTING ROD: Buckling of connecting rod, cross-section of connecting rod, Big and small end bearings, Big end cap and bolts, check for whipping stress.

DESIGN OF CRANKSHAFT: Centre crankshaft at TDC position, Centre crankshaft at angle of maximum torque, Side crankshaft at TDC position, Side crankshaft at angle of maximum torque.

UNIT-III

DESIGN OF POWER SCREWS: Design of Screws – Square, ACME, Buttress Screws – Design of Nut – Compound screw, Differential screw, Ball screw, possible failures – Overhauling and self-locking screws – Stresses in power screws –Design of screw jack.

DESIGN OF BELT AND ROPE DRIVES: Selection of flat belts, Pulleys for flat belts, Arms of cast iron pulley, Selection of V-belts and V-grooved pulley, Construction of wire rope, Stresses in wire ropes, Rope sheaves and drums.

UNIT-IV

DESIGN OF SPUR GEAR DRIVES: Force analysis on spur gear tooth, Gear blank design, module and face width, Beam strength of gear tooth, Effective load on gear tooth, Estimation of module based on beam strength, Wear strength of gear tooth, Estimation of module based on wear strength,

DESIGN OF HELICAL GEAR DRIVES: Force analysis on helical gear tooth, Beam strength of helical gears, Effective load on gear tooth and Wear strength of helical gears.

UNIT-V

BEARINGS : Types of Journal bearings - Lubrication - Bearing Modulus - Full and partial bearings -Clearance ratio - Heat dissipation of bearings, bearing materials - journal bearing design, Petroff equation - Ball and roller bearings - Static loading of ball & roller bearings, Bearing life.

TEXT BOOKS:

1. Machine Design, V.B. Bhandari, Tata McGraw Hill Publications,
2. Machine Design, R.S. Khurmi, S. Chand Publications,
3. Machine Design Data Book, S. Md. Jalaluddin, Anuradha Publications, (**Permitted for Exam**)
4. Machine Design Data Book, V.B. Bhandari, Tata McGraw Hill Publications, (**Permitted for Exam**)

REFERENCES BOOKS:

1. Machine Design, Schaum Series, Tata McGraw Hill Publications,
2. Machine Design, Joseph E. Shigley, McGraw Hill Publications,
3. Machine Design, N.C. Pandya and C.S. Shaw, Charotar Publications,
4. Machine Design, S.Md. Jalaluddin, Anuradha Publications,

AR-16
IV-I

AR16 – B. Tech. - ME

IV Year B. Tech., I Semester

HEAT TRANSFER

Subject Code: 16ME4027 **Internal Marks: 30**
Credits: 3.5 **External Marks: 70**

COURSE OBJECTIVES:

- To provide knowledge on modes of heat transfer like conduction, convection and radiation.
- To provide knowledge on different coordinate systems used in heat transfer.
- To provide knowledge on emissivity and absorptivity.

COURSE OUTCOMES:

On completion of this course, students should be able to

- Derive general heat conduction equation in cartesian, cylindrical and spherical coordinates. Determine heat conducted through both simple and composite plane walls, cylinders and spheres.
- Determine heat conducted through simple shapes with internal heat generation, and through various kinds of fins. Determine transient unsteady temperature distribution for simple shapes using Heisler charts.
- Determine heat convected in forced convection of both external and internal flows, laminar and turbulent flows.
- Determine heat convected in natural convection for flow over a plate. Understand and solve problems in pool boiling and condensation. Perform heat exchanger analysis and design using LMTD and NTU methods.
- Apply various radiation laws, compute shape factors for simple configurations, use electrical analogy for radiation problems and design radiation shields.

UNIT-I

Modes of Heat Transfer: Basic concepts, Mechanisms of heat transfer: Conduction, Convection, Radiation.

Conduction-I: Fourier law of conduction – General differential equation of heat conduction in cartesian and cylindrical coordinates — Conduction through plane walls, cylinders and spherical systems – Composite systems.

UNIT-II

Conduction-II: Conduction with internal heat generation – Extended surfaces – Unsteady heat conduction - Lumped analysis – Use of Heislers chart.

UNIT-III

Forced Convection: Basic Concepts, Heat transfer coefficients, Types of convection – Dimensional analysis – Boundary layer concept – Forced convection of external flows, flow over plates, cylinders and spheres – Internal flows, Laminar, Turbulent, Combined laminar and turbulent – Flow over bank of tubes.

UNIT-IV

Natural Convection: Free convection, Flow over Vertical plate, Horizontal plate, Inclined plate, Cylinders and Spheres.

Boiling & Condensation: Boiling, Pool boiling, Regimes of pool boiling – Flow boiling. Nusselts theory of condensation – Correlations in boiling and condensation

AR16 – B. Tech. - ME

IV Year B. Tech., I Semester

Heat Exchangers: Types of heat exchangers – Heat exchanger analysis: LMTD method, NTU Effectiveness method – Overall heat transfer coefficient, Fouling factor.

UNIT-V

Radiation: Basic concepts, Laws of radiation: Stefan-Boltzman law, Kirchoffs law – Black body radiation, Grey body radiation – Shape factor algebra, Electrical analogy – Radiation Shields.

TEXT BOOKS:

1. Fundamentals of Engineering Heat and Mass Transfer, R.C. Sachdeva, New Age Pub.
2. Heat Transfer, Yunus A Cengel, McGraw Hill Pub
3. Heat Transfer, R.K. Rajput, S. Chand Pub.
4. Heat Transfer Databook, C.P. Kothandaraman, New Age Pub. (**Permitted for Exams**)

REFERENCE BOOKS:

1. Heat Transfer, P.K. Nag, Tata McGraw Hill Pub.
2. A Course in Heat & Mass Transfer, S.C. Arora, S. Domkundwar, A.V. Domkundwar, Dhanpat Rai Pub.
3. Heat Transfer, J.P. Holman, McGraw Hill Pub.

AR-16
IV-II

PRODUCTION PLANNING AND CONTROL

Subject Code : 16ME4034 **Internal Marks: 30**
Credits: 3.0 **External Marks: 70**

COURSE OBJECTIVES:

- To understand production systems and their characteristics.
- To evaluate types of forecasting techniques and to compare qualitative and quantitative methods.
- To understand material requirement planning procedures.
- To apply aggregate planning strategies.
- To describe routing procedure and scheduling policies & techniques.

COURSE OUTCOMES:
On completion of this course, students should be able to

- Describe the objectives and functions of PPC and the types of production. Evaluate different types of forecasting techniques.
- Apply aggregate planning strategies. Discuss line balancing and planning methods.
- Evaluate MRP and JIT systems against traditional inventory control systems.
- Apply scheduling techniques to production systems.
- Draw route sheets. Explain activities of dispatching and expediting.

UNIT-I
Introduction to PPC and Forecasting: Definition, Objectives, Functions of Production Planning and Control, Types of Production systems and their Characteristics, Comparison between Production Planning and Production Control, Organization for PPC.

Forecasting: Introduction, Long-term and Short-term Forecasting, Classification of Forecasting Methods, Judgmental Techniques, Time Series analysis, Moving Average Forecasting, Exponential Smoothing Method, Casual Forecasting Method,

UNIT-II
Planning: Capacity Planning, Factors Influencing Effective Capacity, Aggregate Planning, Strategies and Costs.
Assembly Line Balancing, Master Production Schedule, Functions of MPS, Preparation of MPS.

UNIT-III
Planning for Materials Requirement: Inventory management, Functions of inventories, Effect of demand on Inventory stock, Determination of E.O.Q. and economic order quantity and Economic lot size, Inventory control systems : P-System and Q-System, ABC analysis.

MRP, MRP II, Concept of JIT, Basic Elements of JIT, Benefits of JIT, KANBAN System and Implementation of JIT.

UNIT-IV
Product and Service Reliability: Introduction, Definition and Measures of Reliability, Reliability Distributions, Reliability of a System with Component in Series, Parallel and Combined Series, Failure, Maintainability, Availability, Reliability Life Testing.
Business Process Re-engineering: Definition and Characteristics of BPR, Need for BPR, Steps involved in BPR.

AR16 – B. Tech. - ME

IV Year B. Tech., II Semester

UNIT-V:
Routing, Dispatching and Expediting:
Routing: Definition, Routing procedure, Factors affecting routing procedure, Route sheet, Bill of material.
Dispatching: Activities of dispatcher, Dispatching procedure.
Expediting: Definition, Reasons for existence of function, Types of expediting, Applications of computer in production planning and control.

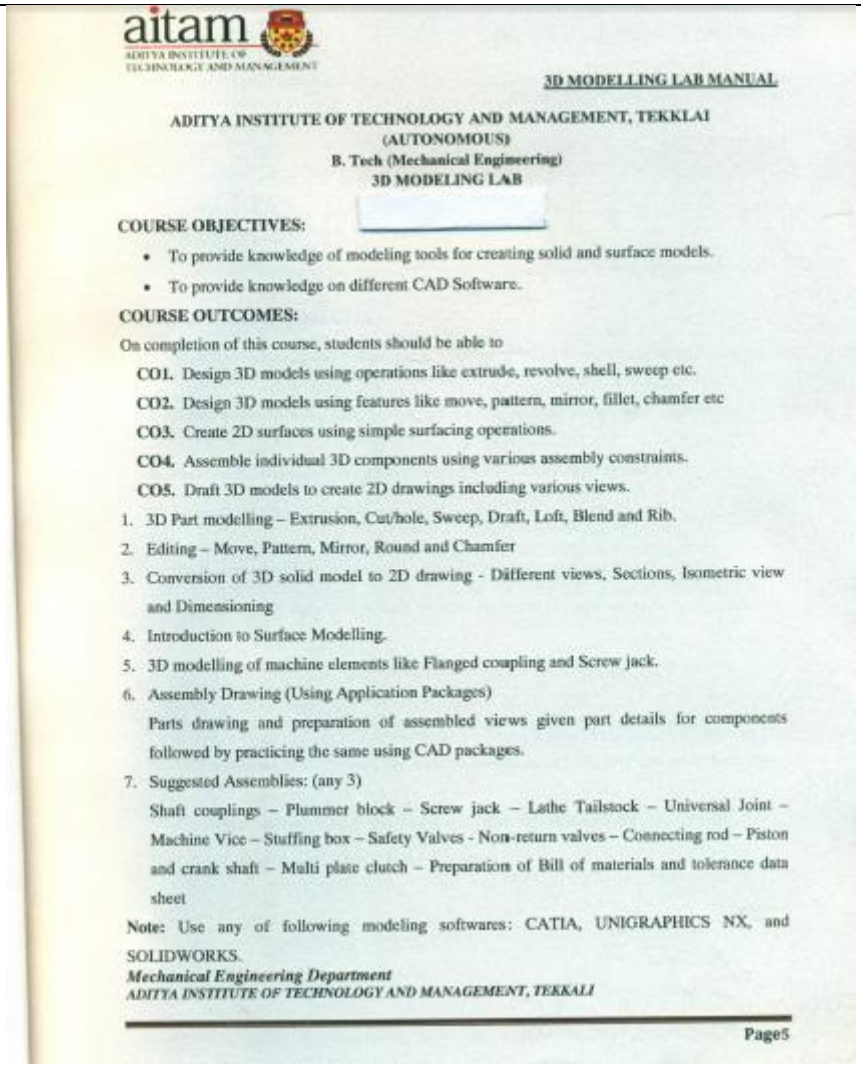
TEXT BOOKS:

1. Industrial Engineering and Production Management, Martand Telsang, S. Chand Publications.
2. Operations Management – Design, Planning and Control for Manufacturing and Services, James. B. Dilworth, McGraw Hill International Publications.

REFERENCE BOOKS:

1. Modern Production / Operations Management, Elwood S. Buffa, Rakesh K. Sarin, John Wiley Publications.
2. Production Planning Control and Industrial Management, K. C. Jain, L. N. Aggarwal, Khanna Publications.
3. Theory and Problems in Production & Operations Management, S. N. Chary, Tata McGraw Hill Publications.

Lab Manuals



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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

3D MODELLING LAB MANUAL

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKLAI
(AUTONOMOUS)
B. Tech (Mechanical Engineering)
3D MODELING LAB

COURSE OBJECTIVES:

- To provide knowledge of modeling tools for creating solid and surface models.
- To provide knowledge on different CAD Software.

COURSE OUTCOMES:

On completion of this course, students should be able to

CO1. Design 3D models using operations like extrude, revolve, shell, sweep etc.

CO2. Design 3D models using features like move, pattern, mirror, fillet, chamfer etc

CO3. Create 2D surfaces using simple surfacing operations.

CO4. Assemble individual 3D components using various assembly constraints.

CO5. Draft 3D models to create 2D drawings including various views.

1. 3D Part modelling – Extrusion, Cut/hole, Sweep, Draft, Loft, Blend and Rib.
2. Editing – Move, Pattern, Mirror, Round and Chamfer
3. Conversion of 3D solid model to 2D drawing - Different views, Sections, Isometric view and Dimensioning
4. Introduction to Surface Modelling.
5. 3D modelling of machine elements like Flanged coupling and Screw jack.
6. Assembly Drawing (Using Application Packages)
   Parts drawing and preparation of assembled views given part details for components followed by practicing the same using CAD packages.
7. Suggested Assemblies: (any 3)
   Shaft couplings – Plummer block – Screw jack – Lathe Tailstock – Universal Joint – Machine Vice – Stuffing box – Safety Valves - Non-return valves – Connecting rod – Piston and crank shaft – Multi plate clutch – Preparation of Bill of materials and tolerance data sheet

Note: Use any of following modeling softwares: CATIA, UNIGRAPHICS NX, and SOLIDWORKS.

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKLAI
(AUTONOMOUS)
B. Tech (Mechanical Engineering)
CAE LAB

COURSE OBJECTIVES:

- To perform finite element analysis on various components and structural elements and find the deflections and stresses for different loading conditions.
- To calculate the natural frequencies and forced response for 2D and 3D structures using FEA.
- To simulate the tool path of cutting tool on the work piece in computer aided manufacturing.
- To generate NC program on verification of tool path for simple components in turning and milling.

COURSE OUTCOMES:

On completion of this course, students should be able to

CO 1. Determine deflections and stresses in 1D & 2D bars, trusses, and beams; and in 2D plane stress, plane strain, axisymmetric models by conducting static FE analysis.
CO 2. Determine deflections and stresses in 3D bodies, 3D shell components by conducting static FE analysis.
CO 3. Estimate natural frequencies and mode shapes, harmonic response of 2D beams using FEA.
CO 4. Conduct steady state thermal analysis on 2D and 3D models.
CO 5. Develop NC program to create simple components on NC lathe and mill in a CAM package. Simulate the tool path and check for errors in virtual manufacturing environment.

1. **Introduction to finite element analysis packages ANSYS or NASTRAN**
   a. Static Analysis of beams and trusses.
   b. Static Analysis of 2D and 3D models
   c. Modal Analysis of 2D and 3D models
   d. Harmonic Analysis of 2D and 3D models
   e. Thermal analysis of 2D and 3D models.
2. **Tool Path Simulation and NC Code Generation**
   NC Code generation using CAD / CAM software - Post processing for standard CNC Controls for any of FANUC, Siemens, Hiedenhain etc.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	3	3	3	3				1	1		1	3		
CO2	2	3	3	3	3				1	1		1	3		
CO3	2	3	3	3	3				1	1		1	3		
CO4	2	3	3	3	3				1	1		1	2	2	
CO5	2	3	3	3	3				1	1		1	2		2

COURSE OBJECTIVES & COURSE OUTCOMES

COURSE OBJECTIVES:

- To understand metallographic structures.

COURSE OUTCOMES:

On completion of this course, students should be able to

- Determine metallographic structure for pure metals, cast irons, mild steels, alloys.
- Interpret effect of heat treatment on hardness of steels measured using Jominy End Quench Test.

CO& PO MAPPING

MOS/MET LAB	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1				2	1		1	1			2	3		1
CO2	1	3	1	2	1		1					2	3		2

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKLAI
(AUTONOMOUS)
B. Tech (Mechanical Engineering)
MECHANICS OF SOLIDS LAB

COURSE OBJECTIVES:

- To understand different material testing techniques.
- To find hardness, tension and compression strength of given specimens.

COURSE OUTCOMES:

On completion of this course, students should be able to

CO3. Test mechanical properties of given specimen using tension test, compression test, bending test, shear test on universal testing machine.

CO4. Grade the specimen by conducting Izod and Charpy impact strength, Brinell and Rockwell hardness tests.

CO5. Compute spring stiffness by measuring spring deformations for applied loads.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO3	2	3		3					2	1		1	3		
CO4	2	3		3	1				2	1		1	3		
CO5	2	3		3					2	1		1	3		

B.Tech : EEE

BASIC ELECTRICAL ENGINEERING

Subject Code:20EST101

L	T	P	C
3	0	0	3

Course objectives:

- To introduce the basic knowledge of electric circuits
- To illustrate knowledge with network reduction techniques.
- To analyze AC circuits.
- To provide knowledge on Magnetic circuits.
- To become familiar with DC Generator.
- To understand the concept of DC Motor.

Course outcomes:

CO1: Able to summarize different electrical circuits.
CO2: Able to construct network reduction techniques
CO3: Able to outline the basics of AC circuits.
CO4: Able to state magnetic circuits.
CO5: Able to examine DC Generator.
CO6: Able to explain DC Motor.

UNIT –I Introduction to Electric Circuits

Basic definitions, Electrical circuit elements (R, L and C), Voltage and current sourcesIndependent and dependent sources, Ohm's Law, Series & Parallel circuits, Source transformation, Kirchhoff's Laws, , simple problems.

UNIT-II Network Reduction Techniques

Star-Delta transformation, Nodal Analysis, Super node, Mesh analysis, super mesh-Problems.

UNIT-III AC Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series only), real power, reactive power, apparent power, power factor, simple problems.

UNIT-IVMagnetic circuits

Basic definitions of magnetic flux, flux density, Reluctance, Magneto motive force (m.m.f), magneticfield intensity, magnetic permeability and susceptibility. Comparison between magnetic and electrical circuits, inductively coupled circuits, coefficient of coupling, dot convention,simple problems on magnetic circuits.

UNIT-VDC Generator
Generator-Principle of Operation, Construction, EMF equation, Classification, O.C.C, internal and external characteristics of shunt generator, Applications.

UNIT-VI DC Motor
Motor-principle of operation, Torque equation, Classification Speed Control Methods, Operation of 3 point starter,Applications.

TEXT BOOKS

1. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand& Co.
2. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.

REFERENCE BOOKS .

1. Basic Electrical Engineering Dr.K.B.MadhuSahuscitech publications (india) pvt.ltd.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.

DIFFERENTIAL EQUATIONS
(Common to all Branches)

Subject Code:20BST102

L	T	P	C
2	1	0	3

Course Objectives:

- To solve the first order Ordinary Differential equations and apply to Orthogonal trajectories, Newton's Law of Cooling and Law of Growth (Decay).
- To solve second and higher order ordinary differential equations.
- Derive the Fourier series expansion of one variable functions.
- Understand Taylor's, Maclaurin's series expansion and rules of calculating extreme value of two or more variable functions.
- Learn the methods of solving first order quasi-linear (Lagrange) partial differential equations and first order non-linear partial differential equations.
- Understand the method of solving a linear Partial differential equation with constant coefficients by method of Separation of Variables, solve a one dimensional Wave and a one dimensional Heat equation.

Course Outcomes

The student will be able to:

1. Apply the mathematical tool for the solution of Ordinary Differential equations, Orthogonal trajectories, Newton's Law of Cooling and Law of Growth (Decay).
2. Evaluate higher order homogenous and non-homogenous linear differential equations with constant coefficients.
3. Estimate the Fourier series expansion of one variable functions.
4. Estimate the Taylor's, Maclaurin's series expansion of two variable functions and extreme values of two or more variable functions.
5. Evaluate a first order quasi-linear (Lagrange) partial differential equations and first order non-linear partial differential equations.
6. Evaluate a one dimensional Wave and Heat equation.

Unit – I

Ordinary differential equations of first order: Linear type - Bernoulli type–Exact type - Equations reducible to exact type- Orthogonal Trajectories-Newton's law of cooling - Law of Growth and Decay. (8 hrs)

Unit – II

Ordinary differential equations of higher order: Higher order homogenous and non-homogenous linear differential equations with constant coefficients- Complimentary Functions-Particular integrals for the functions of type $\sin(ax+b)/\cos(ax+b)$, x^m, e^{ax} , $e^{ax}V(x)$ - Method of variation of parameters, Applications-LCR circuits. (8 hrs)

Unit – III

Fourier Series: Fourier Series -Even and odd functions– Fourier series of functions defined in the interval $(0, 2\pi)$, $(-\pi, \pi)$, $(0, 2c)$,$(-c,c)$ - Half range Fourier sine and cosine series**(8 hrs)**

Unit – IV

Partial Differentiation: Functions of two or more variables-Partial differentiation-Total Derivative- Taylor's and Maclaurin's Series (without proof) - Maxima, minima of functions without constraints and functions with constraints (Lagrange method of undetermined multipliers). (8 hrs)

Unit- V

Partial Differential Equations of first order: Partial differential Equations - Formation of partial differential equations– solutions of first order quasi-linear (Lagrange) partial differential equations and first order non-linear (standard type) partial differential equations. (8 hrs)

Unit – VI

Applications of Partial Differential Equations: Solution of linear Partial differential equations with constant coefficients – Method of Separation of Variables- One dimensional Wave and Heat equations. (8 hrs)

Text Books

1. B.V.Ramana, Higher Engineering Mathematics, 44th Edition, Tata McGraw Hill New Delhi,2014.
2. Dr.B.S.Grewal, Higher Engineering Mathematics, 43nd Edition, Khanna Publishers, 2015.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

ELECTROMAGNETIC FIELD THEORY

Subject Code: 18EET203 **Internal Marks:40**
Credits: 3 **External Marks: 60**

Course Objective:

- Will be able to state and apply the Coulombs Law and Gauss's law to find the Electric filedintensity.
- Will compute capacitance of different configurations and to analyze the behavior of dielectrics at different boundaryconditions.
- Will have abilityto state and apply the Biot-Savartlaw and Ampere's circuit law to find the Magnetic fieldintensity.
- Will gains the knowledge on applying Lorenz force equation and determination of self inductance and mutual inductances for differentconfigurations.
- Will list the Faraday's laws and to Modify the Maxwell's equations for timevarying fields.

Course Outcomes:

CO1: Able to state and apply the Coulombs Law and Gauss's law to find the Electric filedintensity.
CO2: To compute capacitance of different configurations and to analyze the behavior ofdielectrics at different boundary conditions.
CO3: ability to state and apply the Biot-Savart law and Ampere's circuit law to find theMagnetic field intensity.
CO4: Gains the knowledge on applying Lorenz force equation and determination of self inductance and mutual inductances for different configurations.
CO5: To list Faraday's laws and to Modify the Maxwell's equations for time varying fields.

UNIT I:

Fundamentals of electrostatics and its applications: Co-ordinate system-Cartesian, cylindrical, spherical-differential length-area -volume in these co-ordinate systems-importance of divergence, curl, grad and Laplacian. Electrostatic fields- coulomb's law-Electric field intensity- electric field intensity due to a line and a surface charge- Gauss law in integral and point form- applications of Gauss law- Maxwell's first law-work done in moving a point charge in an electric field- potential gradient.

UNIT II:

Conductors, Dielectrics and Capacitors: Current density- conduction and convention current density- ohm's lawin point form-current continuity equation-conductors and dielectric material- behaviorof conductors in an electric field- boundary conditions- -Electric dipole-Dipole moment- capacitance- capacitance of parallel plate, spherical and co-axial capacitors -Laplace and Poisson's equations.

UNIT III:

Magnetostatics: Static magnetic fields- Biot-savart's law- Oersted' experiment-magnetic field intensity(MFI)- MFI due to a straight current carrying filament- MFI due to circular - Maxwell's second equation div(B)=0- Ampere's circuital law and its applications- MFI due to infinite sheet of current and a long current carrying filament- point form of Ampere's circuital law- Maxwell's third equation curl(H)=J.

UNIT IV:

Magnetic materials and Inductance: Magnetic force- moving charges in a Magnetic field- Lorentz force equation- force on straight and long current carrying conductor in a magnetic field- force between two straight, long and parallel current carrying conductors- magnetic dipole and dipole moment-torque on current loop placed in a magnetic field- self inductance of a solenoid, toroid and co-axial cable.

UNIT V:

Electromagnetic waves and Time varying fields: Time varying fields- Faraday's laws of electromagnetic induction- Its integral and point forms- Maxwells fourth equation–statically and dynamically induced EMF'S- simple problems- modification of Maxwell's equation for time varying fields-Displacement current-poynthing theorem and pointing vector.

TEXT BOOKS:

1. Engineering Electromagnetics, W.H. Hayt Jr. McGraw Hill – New York.
2. Elements of Electromagnetics, M.N.O. Sadiku, Oxford press,2002.

REFERENCE BOOKS:

1. EM Waves and Radiating Systems, E.C. Jordan, PHI,1997.
2. Electromagnetics with applications, Kraus and Fleisch, McGraw Hill,1999.
3. Introduction to Electro-dynamics, David J.Griffiths,PHI.

CONTROL SYSTEMS

Subject Code: 18EET209 **Internal Marks: 40**
Credits: 3 **External Marks: 60**

Course objective:

- To describe the feedback controls with basic components of control systems.
- To formulate mathematical models of physical systems and block diagram representation.
- To analyze stability of the system from transfer function approach.
- To describe and analyze various time domain and frequency domain tools for analysis and design of linear control systems.
- To Represent physical systems in state space form and analyze them.

Course outcomes:

CO1: Able to understand basic components of feedback control systems; formulate mathematical models of physical systems and represent them in block diagrams and signal flow graphs.
CO2: Able to understand the time- domain specifications; Analyze first and second order control systems in time domain;
CO3: Able to understand the concepts of stability; Analyze stability of the system from transfer functions approach and graphical methods.
CO4: Able to Design controllers, compensators for improve the performance specifications.
CO5: Able to Represent physical systems in state space form and analyze them.

UNIT I:

Introduction: Concepts of Control Systems- Open Loop and closed loop control systems- examples- Classification of control systems- Feedback characteristics- Effects of feedback characteristic.
Mathematical models of physical systems: Differential equations- transfer functions and block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula - Translational and Rotational mechanical systems.

UNIT II:

Transfer function of elements of control systems: Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver,
Time response analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems, and proportional integral derivative systems.

UNIT III:

Concept of stability: The concept of stability – Routh's stability criterion – qualitative stability and conditional stability

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT IV:

Frequency response analysis: Introduction, Frequency domain specifications-Bode plots-Determination of Frequency domain specifications and transfer function from the Bode plot-Phase margin and Gain margin-Stability Analysis from Bode Plots.Polar Plots- Nyquist Plots-Stability Analysis.

UNIT V:

Design and Compensation techniques: Introduction and preliminary design considerations-Lag, Lead, Lead-Lag compensation based on frequency response approach.

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix.

TEXT BOOKS:

1. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International Limited Publishers, 2nd edition.

2. Automatic Control Systems byFaridGolnaraghi, Benjamin C. KUO,Wiley india Pvt. Ltd, Ninth Edition.

REFERENCE BOOKS:

1. Control Systems by A.Anand Kumar, PHI Publications,4th edition.

2. Control Systems Engineering by S.Palani,TataMcGraw Hill Publications.

3. Modern Control Engineering, Fifth edition, Kotsuhiko Ogata, Prentice Hall of India Pvt. Ltd.

POWER ELECTRONICS

Subject Code: 18EET310
Credits: 3

Internal Marks: 40
External Marks: 60

Course Objectives:
This course deals with characteristics of semi conductor device, AC-DC, DC-DC, AC-AC and DC-AC Converters. The importance of using pulse width modulation techniques is also discussed in this course.

Course Outcomes:
Students will be able to:
CO1: Distinguish between different types of power semiconductor devices and their characteristics.
CO2: Evaluate the performance of single Phase controlled converters with different loads.
CO3: Describe the performance of three Phase controlled converters with different loads.
CO4: Explain the operation of AC voltage controllers and Cyclo-converters.
CO5: Analyze and evaluate the operation of DC –DC Choppers and inverters.

UNIT – I
Power Semi Conductor Devices:
Thyristors– Silicon Controlled Rectifiers (SCR's)–TRIAC, Power BJT – Power MOSFET – Power IGBT,IGCT and their V-I characteristics – Turn on methods and Dynamic characteristics of SCR.Two transistor analogy – SCR – UJT firing circuit – Series and parallel connections of SCR's – Thyristor ratings and protection –SCR commutation- Numerical problems.

UNIT – II
Single Phase AC-DC Converters:
Principle of phase control, half wave controlled rectifiers, half wave controlled rectifiers with R, R-L, R-L-E load, Single-phase half-controlled converter with Resistive and RL load, - Derivation of average load voltage,current and input power factor. Fully controlled converters- Midpoint and Bridge connections with Resistive, RL loads and RLE load- Derivation of average load voltage , current and input power factor – Line commutated inverters without and with Freewheeling Diode, Effect of source inductance – Derivation of load voltage and current.

UNIT – III
Three Phase AC-DC Converters:
Three phase converters – Three pulse and six pulse converters – bridge connections with R and RL loads- average load voltage – Effect of Source inductance – Dual converters (both single phase and three phase).

UNIT – IV

AC Voltage Controllers &Cyclo Converters:

Single phase AC voltage controllers with R and RL loads – modes of operation of TRIAC – TRIAC with R and RL loads – Derivation of RMS load voltage, current and input power factor – Firing circuits – Numerical problems.

Cyclo converters – Single phase mid-point cyclo converters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cyclo converter (Principle of operation only).

UNIT – V

DC-DC Convertors & Inverters DC-AC

Choppers – Time ratio control and Current limit control strategies – Step down choppers, Derivation of load voltage and currents with R, RL loads- Step up Chopper – load voltage expression – Buck, Boost and Buck-Boost (Principle of operation only)

Single phase bridge inverters with R, RL loads, 3-phase bridge inverters . Voltage control of single phase inverters –single pulse width modulation, multiple pulse width modulation, sinusoidal pulse width modulation.

TEXT BOOKS:

1. Power Electronics – by P.S.Bhimbra, Khanna Publishers.
2. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998

REFERENCE BOOKS:

1. Power Electronics – by VedamSubramanyam, New Age International (P) Limited, Publishers
2. Power Electronics – by V.R.Murthy , 1st edition -2005, OXFORD University Press
3. Power Electronics-by P.C.Sen,TataMcGraw-Hill Publishing.
4. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradra, A. Joshi and R. M. K. Sinha, New Age International (P) Limited Publishers, 1996.
5. Power Electronics: converters, applications & design by Nedmohan, Tore M. Undeland, Riobbins by Wiley India Pvt. Ltd.

PRINCIPLES OF SIGNALS AND SYSTEMS
(Professional Elective-II)

Subject Code: 18EEE321 **Internal Marks: 40**
Credits: 3 **External Marks: 60**

Course Objective:
This course covers various types of continuous and discrete-time signals and systems, their properties and representations and different types of transform that are necessary for the analysis of continuous in discrete-time signals and systems.

Course Outcomes:
Student will be able to
CO1.Characterize and analyze the properties of continuous time(CT) and discrete time(DT) signals and systems
CO2.Analyze CT and DT systems in Time domain using convolution and Conceptualize the effects of sampling a CT signal
CO3.Represent CT and DT systems in the Frequency domain using Fourier analysis tools like CTFS, CTFT, DTFS and DTFT.
CO4.Compute the Laplace transforms of Continuous time signals and analyze continuous systems using Laplace transforms
CO5.Analyze discrete systems using Z Transforms.

UNIT-I
Introduction to Signals and Systems:
Introduction- Continuous time signals, discrete time signals, Basic operations on signals, classification of signals. Introduction to systems-classification and properties of systems.

UNIT-II
Time Domain Analysis of Systems:
Time domain Analysis of Discrete-Time Systems: Time domain representation of discrete time Linear Time Invariant (LTI) systems, convolution sum, properties of convolution. Stability of LTI system . Time domain analysis of continuous-Time Systems: Convolution integral, Properties of convolution. Sampling and aliasing, impulse sampling, sampling theorem.

UNIT-III
Fourier Analysis and Fourier Transforms
Fourier theorem- Trigonometric form and exponential form of Fourier series – conditions of symmetry-line spectra and phase angle spectra .Fourier Integrals and Fourier Transforms – properties of Fourier Transforms, applications to electrical circuits, limitations.

UNIT-IV
Laplace Transforms:
Definition of Laplace transform, Region of convergence, properties of Laplace transforms, unilateral Laplace transforms and causality and stability analysis using LT, Inverse Laplace transforms, relation between LT and FT, applications to electrical circuits, limitations.

UNIT-V

Z-TRANSFORMS:

Definition of Z-transform, Z-transform and ROC of finite duration, infinite duration signals, causality and stability analysis using Z-transforms, properties of Z-transforms, inverse Z-transform, applications to electrical circuits, limitations.

TEXT BOOKS:

1. Alan V Oppenheim, Alan S Wilsky and Hamid Nawab S, "Signals & Systems", Prentice Hall, New Delhi, 2005.
2. Simon Haykin and Barry Van Veen, "Signals & Systems", John Wiley and Sons Inc.New Delhi, 2008.
3.Signals and systems –by A.Anand Kumar, Third edition, PHI learning private Limited.
4.Signals and Systems by K. Uma Rao, AndhePallavi, I.K International.

REFERENCE BOOKS:

1. Signals and systems –by Ramesh Babu and R.AnanadaNatarajan.
2. Ashok Ambardar, "Introduction to Analog and Digital Signal Processing", PWS Publishing Company, Newyork, 2002.
3. Rodger E Zaimer and William H Tranter, "Signals & Systems – Continuous and Discrete", McMillan Publishing Company, Bangalore ,2005

POWER SYSTEM OPERATION AND CONTROL

Subject Code: 16EE4024 **Internal marks: 30**
Credits: 3.5 **External Marks: 70**

Course objectives:

- Learn the characteristics of generation unit/output curves and study the optimal allocation of total load among the generation units without and with transmission losses.
- To develop the mathematical modeling of long range hydro thermal scheduling and to study the kirchmayer's method for short term hydro thermal co-ordination.
- Learn how generating units are committed to meet load over the hours of a week using dynamic programming.
- It emphasizes on single area and two area load frequency control.
- To understand about reactive power control and the methods of compensation.

Course outcomes:

CO1: Explain how optimal allocation of total load among the generation units is done with and without losses.
CO2: Solve Unit Commitment problem using dynamic programming technique for a given power system.
CO3: Develop the block diagram for an isolated power system and also analyze the dynamic response of it with & without integrated control.
CO4: Draw the block diagram model for a two area power system.
CO5: Explain Reactive power control and its compensation methods.

UNIT I:

Economic Operation of Power Systems: Optimal operation of Generators in thermal Power Stations, - heat rate Curve – Cost Curve- Incremental fuel and Production costs, input – output characteristics, and optimum generation allocation with line losses neglected. Optimum generation allocation including the effect of transmission line losses – Loss coefficients, General transmission line loss formula.

UNIT II:

Hydrothermal Scheduling: Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, scheduling problems – Short term hydrothermal scheduling problem.
Unit commitment: Optimal unit commitment problem – Need for unit commitment – constraints in unit commitment – solution methods – dynamic programming.

UNIT III:

Single Area Load Frequency control: Modeling of speed governing, steam turbine and generator- Necessity of keeping frequency constant-Definition of Control area – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation.

UNIT IV:

Two – Area Load Frequency Control: Introduction-Block diagram representation of two area system with Load frequency control –Static and dynamic response -uncontrolled case

UNIT-V

Reactive Power Control: Overview of Reactive Power controls – Reactive Power compensation in transmission systems- advantages and disadvantages of different types of compensating equipment for transmission systems; load compensation – Specifications of load compensator-Line compensation-Introduction to Flexible Alternating Current Transmission Systems (FACTS).

TEXT BOOKS:

1. Power System Analysis and Design by J. Duncan Glover and M. S. Sarma, THOMPSON, 3rd Edition.
2. Modern Power System Analysis – by I. J. Nagrath & D. P. Kothari Tata Mc Graw – Hill Publishing Company Ltd, 2nd edition.

REFERENCES:

1. Power System Analysis by Hadi Saadat- TMH Edition.
2. Power System stability & control, Prabha Kundur
3. Electric Energy systems theory – by O.I. Elgerd, Tata Mc Graw – hill Publishing Company Ltd, Second edition.
4. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.

DIGITAL CONTROL SYSTEMS

Subject Code: 16EE4030
Credits: 3

Internal Marks: 30
External Marks: 70

Course objective

- Summarize the sampling techniques.
- Computing the Z- transforms and inverse Z transforms.
- Determining stability of digital control systems.
- Understanding state equations.
- Testing controllability and observability in state space analysis.

Course outcomes

CO1: Students can understand the modeling of sampling process.
CO2: Students can operate the Z- transforms and inverse Z transforms.
CO3: Students can determine stability of digital control systems.
CO4: Students can understand state equations & their various state responses.
CO5: Students can test controllability and observability in state space analysis.

UNIT I:

Sampling: Advantages of sampling process in Control Systems, mathematical analysis of the sampling process – mathematical description of the ideal sampling process. The ideal sampler - sampling theorem - S-plane properties. Reconstruction of sampled signals, zero-order hold - First – order hold -fractional order hold and exponential hold devices.

UNIT II:

Z transforms & Applications: Review of Z transforms, Mapping between S-plane and Z-plane, inverse Z-transform, Limitations of the Z-transform, Applications of Z transforms, pulse-transfer function, pulse transfer function of the zero-order hold.

UNIT III:

Stability tests: Stability tests of the Digital control Systems JURY's stability tests, extension of Routh-Hurwitz criterion to Digital Control Systems. Root Locus for Digital Control Systems. Controllability and Obseravabilty.

UNIT IV:

Discrete State equations –1: State equations of digital systems, state transition equations of digital systems, solution of the time-invariant Discrete State Equations by the Z-transformations.

UNIT V:

Discrete State equations – 2: Relation between state equation and transfer function, computing the state transition matrix by the Z-transform method,Relation between state equations and high order difference equations via canonical form, Analysis of the state diagrams of the Sam pled Data Control Systems.

Text Books:

1. Discrete – time Control Systems, OGATA, PHI Publications.
2. Digital Control Systems, Benjamin C.Kuo, Hold-Saunders International Edition .

Reference Books:

1. Digital Control and State Variable MethodsM.Gopal, Tata McGraw-HillPublishing Co. Ltd., New Delhi (1997).
2. Digital Control Systems, C.H. Houpis and G.B.Lamount, McGraw-Hill Book Company (1985).

AR - 20

COURSE STRUCTURE
AND
DETAILED SYLLABUS
(I-I & I-II Semesters Syllabus)
&
Academic Regulations

CIVIL ENGINEERING

For

B. TECH. FOUR YEARS DEGREE PROGRAMME

(Applicable for the batches admitted from 2020-21)

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

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Recognized under 2(f),12(b) of UGC
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Accredited by NAAC (UGC) with A+ Grade
K. Kotturu, TEKKALI-532 201, Srikakulam, Andhra Pradesh

V. Ciitthubu
Head of the Department
Department of Civil Engineering
AITAM, TEKKALI.

BASIC ELECTRICAL ENGINEERING

Course Code: 20EST101

L	T	P	C
3	0	0	3

Course objectives:

- To introduce the basic knowledge of electric circuits
- To illustrate knowledge with network reduction techniques.
- To analyze AC circuits.
- To provide knowledge on Magnetic circuits.
- To become familiar with DC Generator.
- To understand the concept of DC Motor.

Course outcomes:

CO1: Able to summarize different electrical circuits.
CO2: Able to construct network reduction techniques
CO3: Able to outline the basics of AC circuits.
CO4: Able to state magnetic circuits.
CO5: Able to examine DC Generator.
CO6: Able to explain DC Motor.

UNIT –I Introduction to Electric Circuits

Basic definitions, Electrical circuit elements (R, L and C), Voltage and current sources Independent and dependent sources, Ohm's Law, Series & Parallel circuits, Source transformation, Kirchhoff's Laws, . simple problems.

UNIT-II Network Reduction Techniques

Star-Delta transformation, Nodal Analysis, Super node, Mesh analysis, super mesh-Problems.

UNIT-III AC Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series only), real power, reactive power, apparent power, power factor, simple problems.

UNIT-IV Magnetic circuits

Basic definitions of magnetic flux, flux density, Reluctance, Magneto motive force (m.m.f), magnetic field intensity, magnetic permeability and susceptibility. Comparison between magnetic and electrical circuits, inductively coupled circuits, coefficient of coupling, dot convention, simple problems on magnetic circuits.

UNIT-V DC Generator

Generator-Principle of Operation, Construction, EMF equation, Classification, O.C.C, internal and external characteristics of shunt generator, Applications.

UNIT-VI DC Motor

Motor-principle of operation, Torque equation, Classification Speed Control Methods, Operation of 3 point starter, Applications.

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TEXT BOOKS

1. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand& Co.
2. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.

REFERENCE BOOKS .

1. Basic Electrical Engineering Dr.K.B.MadhuSahu scitech publications (india) pvt.ltd.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.

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Surveying and Geomatics

Course Code:20CET101

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To measure the land area by plane table and chaining.
- To explain the conventional methods of surveying
- To apply the concept of leveling to prepare the contour maps
- To apply the concept of tachometer in angular measurement, elevation and distance between an object
- To determine the relief and tilt displacements from the aerial photographs
- To demonstrate the working principle of remote sensing

COURSE OUTCOMES:

On completion of the course, the students will be able to:

- Measure the land area by plane table and chaining.
- Explain the conventional methods of surveying
- Apply the concept of leveling to prepare the contour maps
- Apply the concept of tachometer in angular measurement, elevation and distance between an object
- Determine the relief and tilt displacements from the aerial photographs
- **Demonstrate the working principle of remote sensing**

UNIT I

Introduction: Surveying definition & objectives, plane surveying principles and classification, scales, Errors and Mistakes.

Chain Surveying: Principles, Equipment, Working from whole to part, Types of tapes and chains, selection of stations, offsets, Tape Variations, Errors and Corrections

UNIT II

Compass Surveying: Types of compass, Measurement of directions and angles, types of compass, meridians and bearings, local attraction, magnetic declination, traversing, plotting of traverse, adjustment of closing error.

UNIT III

Levelling and Contouring: Description of a point (position) on the earth's surface, instruments for leveling, principle and classification of leveling, bench marks, leveling staff, readings and booking of levels, field work, longitudinal section and cross section, plotting the profile, height (level) computations, contours, characteristics of contours, methods of contouring, interpolation, contour gradient, contour maps.

UNIT IV

Theodolite and Tacheometric Surveying: Principle of theodolite survey, Theodolite component parts, observations, Traversing, traverse computations, Trigonometrical Surveying, Tacheometry, principle of tacheometry, methods of tacheometry, tacheometry as applied to subtense measurement, fundamentals of total station and GPS.

Curves: Types of curves, design and setting out – simple and compound curves.

UNIT V

Photogrammetry Surveying : Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy.

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Department of Civil Engineering
AITAM, TEKKALI.

UNIT VI

Remote Sensing and GIS: Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors, visual image interpretation. Introduction to GIS.

TEXT BOOKS:

1. Duggal S K, "Surveying (Vol – I, 2 & 3), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 4th edition, 2017.
2. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain., Surveying I & II, Laxmi Publications, 17th edition, 2016.
3 Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
4. Anji Reddy M., Remote sensing and Geographical information system, B.S. Publications, 2001.
5. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi, 2nd edition, 2014.

REFERENCES:

1. Chandra A. M., Plane Surveying, New Age International Publ., 2007.
2. Geomatics Engineering by Manoj, K. Arora and Badjatia, Nem Chand & Bros, 2011.

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AR - 18

COURSE STRUCTURE AND DETAILED SYLLABUS

&

Academic Regulations

CIVIL ENGINEERING

For

B. TECH. FOUR YEARS DEGREE PROGRAMME

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K. Kotturu, TEKKALI-532 201, Srikakulam, Andhra Pradesh

AR-18 – B.Tech – Civil **II year I Sem**

Mechanics of solids-I

Course Code: 18CET203 **External Marks: 60**
Credits : 03 (2L: 1T: 0P) **Internal Marks: 40**

COURSE OBJECTIVES:
Students will have

- to study the simple stresses & strains and stress-strain diagram of mild steel..
- to study the shear force and bending moments of the Simply supported, cantilever and over hanging beams for the loads of point load , UDL and UVL.
- to study the flexural stresses which include bending equation, section modulus of rectangle, circular and I sections, composite sections.
- to study the derivation of shear stress formula and shear stress distribution across various sections include rectangle, circular and I sections.
- to study the torsion of circular shafts which include, Assumptions made in the theory of pure torsion, derivation of torsion equation, torsion moment of resistance, polar section modulus, power transmitted by shafts, combined bending, torsion and end thrust, design of shafts according to theories of failure.

COURSE OUTCOMES:
Students will get ability

- Summarize and analyze simple stresses & strains of ductile materials.
- Determine the shear force and bending moments of the Simply supported, cantilever and over hanging beams under various loads.
- Assess the flexural stresses of various cross sections using simple bending theory .
- Assess the shear stresses of various cross sections .
- Describe and analyze torsion of circular shafts.

UNIT – I
Simple stresses and strains
Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses, Resilience – Gradual, sudden, impact and shock loadings –, proof resilience

UNIT – II
Shear force and bending moment
Definition of beam –Types of supports - Types of beams – Concept of shear force(S.F.) and bending moment (B.M.) – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, UDL., uniformly varying loads and combination of
these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III
Flexural stresses:
Theory of simple bending – Assumptions – Derivation of bending equation - Neutral axis – Determination bending stresses – section modulus of rectangular, circular sections (Solid and Hollow), I, T and Channel sections –Composite sections.

UNIT – IV

Shear stresses:

Derivation of formula – shear stress distribution across various beam sections like rectangular, circu triangular, I, T and H sections, Shear center for different sections, unsymmetrical bending.

UNIT – V

Torsion of circular shafts

Theory of pure torsion – Assumptions made in the theory of pure torsion- Derivation of Torsion equation- Torsion moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending torsion and end thrust – Design of shafts according to theories of failure

Springs

Introduction- Types of springs-Deflection of close and open coiled helical springs under axial pull and axi couple-Springs in series and parallel-Carriage of leaf springs

Text Books:

1. Introduction to text book of Strength of materials by R.K.Bansal – Laxmi publications Pvt. Ltd., N Delhi.
2.Mechanics of Solid, by Ferdinandp Beer and others – Tata Mc.Grawhill Publications,2000.
3.Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.
4.Strength of materials by R. Subramanian, Oxford university press, New Delhi
5.Strength of materials Elementary Theory and Problems - Vol. I by Timoshenko.

Reference Books:

1. Strength of Materials by Schaum'sout line series – Mc. Grawhill International Editions.
2. Strength of Materials by S. Ramakrishna and R.Narayan – Dhanpat Rai publications.
3. Strength of materials by R.K.Rajput, S.Chand& Co, New Delhi.
4. Strength of Materials by A.R.Basu, Dhanpat Rai & Co, Nai Sarah, New Delhi.
5. Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Delhi.
6. Strength of Materials by BhaviKatti.

CO-PO, PSO Mapping

MOS -I	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PS
CO1	3	3	3	3						2		3	3		
CO2	3	3	3	3						2		3	3		
CO3	3	3	3	3						2		3	3		
CO4	3	3	3	3						2		3	3		
CO5	3	3	3	3						2		3	3		

Structural Analysis-I

Course Code: 18CET209 **External Marks: 60**
Credits : 03 (3L:0T: 0P) **Internal Marks: 40**

COURSE OBJECTIVES:

Students will have

- To study about Analysis of pin jointed plane frames which include determination of forces in members of plane, pin-jointed, , perfect trusses by method of joints and method of sections. Analysis of cantilever and simply supported trusses
- To study about propped cantilever beam which include analysis of propped cantilever beam with U.D.L, central point load, eccentric point load, and number of point loads, Shear force and bending moment diagrams
- To study about the Fixed Beams statically indeterminate beams with U.D.L, central point load, eccentric point load, number of point loads, Shear force and bending moment diagrams.
- To study about the continuous beams which include Clapeyron's theorem of three moments, analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, shear force and bending moment diagrams.
- To study about the Theorems relating to elastic structures, Principle of virtual work, Strain energy in elastic structures, complementary energy, Castigliano"s theorem, Betti"s and Maxwell"s reciprocal theorems.
- To study about the concepts Principle of virtual work and Castigliano"s theorem, Deflection of determinate pin jointed trusses and rigid jointed frames by principle of virtual work, Strain Energy and Castigliano"s theorem

COURSE OUTCOMES:

Students will get ability

- Analyze simply supported and cantilever pin jointed plane frames using various methods.
- Analyze propped cantilever and fixed beams for various loads.
- Analyze continuous beams by Clapeyron's theorem for different support and loading conditions.
- Analyze Theorems relating to elastic structures,Castigliano"s theorem, Betti"s and Maxwell"s reciprocal theorems.
- Analyze Principle of virtual work (unit load method) and Castigliano"s theorem, Deflection of determinate pin jointed trusses and rigid jointed Strain Energy and Castigliano"s theorem.

UNIT – I

Static and Kinematic indeterminacy of beams, frames, trusses

Analysis Of Pin Jointed Plane Frames: Determination of forces in members of plane, pin-jointed, perfect trusses by (i) method of joints and (ii) method of sections. Analysis of cantilever and simply supported trusses

UNIT – II

Propped Cantilever Beam: Analysis of propped cantilever beam with U.D.L, central point load, eccentric point load, and number of point loads – Shear force and bending moment diagrams.

Fixed Beams: Introduction to statically indeterminate beams with U.D.L, central point load, eccentric point load, number of point loads- Shear force and bending moment diagrams

UNIT – III

Analysis Continuous Beams: Clapeyron's theorem of three moments- Analysis of continuous beams w constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous be with different moment of inertia for different spans, shear force and Bending moment diagrams

UNIT – IV

Principle of virtual work: Strain energy in elastic structures, complementary energy, Castiglione's theor Betti's and Maxwell's reciprocal theorems.

UNIT – V

Unit load method and Castigliano's theorem- Determination of Deflection of determinate pin jointed tru and rigid jointed frames

Text Books:

1. Analysis of Structures-Vol I &Vol II by V.N. Vazirani&M.M.Ratwani, Khanna Publications, New Delhi
2. Basic structural Analysis by C.S. Reddy, Tata Mcgrawhill, New Delhi
3. Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan& Dr. P.Perumal- Laxmi publicati pvt. Ltd., New Delhi
4. Theory of Structures by S.Ramamrutam.
5. Structural Analysis by R.C.Hibbeler 8th Edition

Reference Books:

1. Mechanics of Structures by S.B.Junnarkar, Charotar Publishing House, Anand, Gujrat
2. Theory of structures by Timoshenko
3. Theory of Structures by Gupta, Pandit& Gupta; Tat Mc.Graw – Hill Publishing Co.Ltd., New Delhi.
4. Theory of Structures by R.S. Khurmi, S. Chand Publishers
5. Strength of Materials and Mechanics of Structures- by B.C.Punmia, Khanna Publications, New Delhi
6. Introduction to structural analysis by B.D. Nautiyal, New age international publishers, New Delhi

CO-PO, PSO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PS
CO 1	3	3								2		3	2		
CO 2	3	3								2		3	2		
CO 3	3	3								2		3	2		
CO 4	3	3								2		3	2		
CO 5	3	3								2		3	2		

Geotechnical Engineering-I

Course Code: 18CET311 **External Marks: 60**
Credits : 3.0 (3L: 0T:0P) **Internal Marks: 40**

Course Objectives:
The Students will have

- to study introduction which include soil formation, soil structure and clay mineralogy, adsorbed water, mass, volume relationship, relative density, index properties of soils which include grain size analysis, sieve and hydrometer methods , consistency limits and indices, I.S. classification of soils
- to study about permeability which include soil water, capillary rise, flow of water through soils, Darcy's law, permeability , laboratory determination of coefficient of permeability , permeability of layered systems. seepage through soils which include 1-D,2-D, flow nets, characteristics, Uses, quick sand condition and seepage through soils.
- to study about stress distribution in soils which include Boussinesq's and Wester gaard's theories for point loads and areas of different shapes, Newmark's influence chart
- to study about compaction which include mechanism of compaction, factors affecting, effects of compaction on soil properties, field compaction equipment, compaction control consolidation which include stress history of clay; e-p and e-log p curves, magnitude and rate of consolidation ,Terzaghi's theory and Theory determination of coefficient of consolidation from laboratory tests
- to study about shear strength of soils, Mohr ,Coulomb Failure theories, types of laboratory strength tests, strength tests based on drainage conditions , shear strength of sands, critical void ratio, liquefaction, shear strength of clays

Course Outcomes:
Students will get ability:

- Explain soil formation, volume-weight relations, index properties and classification of soils.
- Describe permeability and seepage of soils
- Compute stress distribution in soils with different loading conditions using Boussinesq's and Wester gaard's theories
- Describe compaction and consolidation of soils
- Determine shear strength of soil by various theories and laboratory tests

UNIT- I
Introduction: Soil formation and properties – soil structure and clay mineralogy – Adsorbed water – Mass-volume relationship – Relative density.
Index properties of soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

UNIT- II
Permeability: Soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting – laboratory determination of coefficient of permeability –Permeability of layered systems.
Seepage through soils:1-D & 2-D,Flownets: Characteristics and Uses, Quick sand condition and Seepage through soils.

UNIT- III
Stress distribution in soils: Total, neutral and effective stresses, Boussinesq's and Wester gaard's theories for point loads and areas of different shapes – Newmark's influence chart.

UNIT – IV

Compaction: Mechanism of compaction - laboratory compaction tests (Heavy and Light) – factors affec
– effects of compaction on soil properties. – Field compaction Equipment - compaction control.
Consolidation: stress history of clay; e-p and e-log p curves – magnitude and rate of 1-D consolidatio
Terzaghi's Theory determination of coefficient of consolidation from laboratory tests.

UNIT –V

Shear strength of soils : Mohr – Coulomb Failure theories – Types of laboratory strength tests – stren
tests based on drainage conditions – Shear strength of sands – Critical Void Ratio – Liquefaction- sh
strength of clays

Text Books:

1 Basic and Applied Soil Mechanics by Gopal Ranjan &ASR Rao, New age International Pvt . Ltd, New Delhi, Third edition, 2016
2. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi, 200
3.Soil Mechanics and Foundations by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi, Sixteenth edition, 2017.
4. Principles of Geo technical Engineering by B. N. Das and K.Sobhan, Cengage India Private Limite Ninth edition, 2017

References:

1. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).
2. Soil Mechanics – T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork.
3. Geotechnical Engineering by Purushotham Raj
4. Fundamentals of soil mechanics by D.W.Taylor
5. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

CO-PO, PSO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS 3
CO 1	3	2								1		1	3	3	
CO 2	3	2								1		1	3	3	
CO 3	3	2								1		1	3	3	
CO 4	3	2								1		1	3	3	
CO 5	3	2								1		1	3	3	

Transportation Engineering-I

Course Code: 18CET315
Credits : 2.0 (2L: 0T:0P)

External Marks: 60
Internal Marks: 40

Course Objectives:
The Students will have

- Study about highway development and planning in India, highway alignment and engineering surveys.
- Study about various elements of highway geometric design.
- Study about highway materials such as aggregates, bitumen and bituminous mix design.
- Study about construction of different types of roads and highway drainage.
- Study about traffic engineering parameters such as volume, speed, density, Parking Studies , road accidents and about Intersections

Course Outcomes:
On completion of the course, the students will be able to:

- Understand importance of highway development and different road classifications.
- Evaluate the Geometric design elements of the highway.
- Identify and gain knowledge about highway materials used in highway construction.
- Understanding the mechanism of different types of roads and their construction.
- Explain basic parameters of traffic, parking studies, road accident analysis and identifying grade and grade separated intersections

UNIT - I
Highway development and planning: Highway development in India – Different modes of transportation, role of highway transportation, Necessity for Highway Planning - Road Development Plans- Classification of Roads- Road Network Patterns.
Highway Alignment: Alignment - Factors affecting Alignment- Engineering Surveys - Drawings and Reports

UNIT - II
Geometric design: Importance of Geometric Design - Highway Cross Section Elements - Sight Distance - Stopping sight Distance, Overtaking Sight Distance and Intermediate Sight Distance.
Design of Horizontal Alignment - Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT – III
Highway materials: Soil, Aggregate, Bitumen and Tar- Tests on aggregates – Aggregate Properties and their Importance- Tar properties - Differentiation between Tar and Bitumen - Tests on Bitumen - Bituminous Concrete- Requirements of Design Mix- Marshall's Method of Bituminous Mix design

UNIT – IV
Highway Construction: Construction of roads – Earthen roads - W.B.M. roads – Bituminous Roads – stresses; Cement Concrete roads – tie bars and dowel bars – stresses. Maintenance of all types of roads - Highway drainage – Arborical culture – Street lighting.

UNIT – V
Traffic engineering: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures
At Grade intersection: Types of Intersections – Conflicts at Intersections- Types of At-Grade Intersections
Grade separated inter section: Types Rotary Intersection – Fly overs, ROB, Criteria for selection, Advantage and disadvantages of grade separated intersection.

Text Books:
1. C.E.G.Justo& A. VeeraragavanS.K.Khanna "Highway Engineering", Nemchand& Bros., 10th Edition, 2017.
2. L.R.Kadiyali and Lal "Principles & Practices of Highway Engineering" Khanna Publications, 4th Edition, 2004.
3. V.N.Vazirani and S.P.Chandra, "Transportation Engineering- Vol. I", Khanna Publications, 4th Edition, 1994.

Reference Books:
1. S.P.Bindra, "Highway Engineering" Dhanpat Rai & Sons. – 4th Edition (1981)
2. Dr.L.R.Kadyali, "Traffic Engineering & Transportation Planning", Khanna publications - 6th Edition – 1997.
3. Indian Road Congress, Ministry of Road Transport and Highways, and Special Publications

CO-PO, PSO Mapping

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CO 1	3	2	3		2					1		1	3	2	1
CO 2	3	2	3		2					1		1	3	2	1
CO 3	3	2	3		2					1		1	3	2	1
CO 4	3	2	3		2					1		1	3	2	1
CO 5	3	2	3		2	2				1		1	3	2	1

AR 16

ACADEMIC REGULATIONS
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AND
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CIVIL ENGINEERING

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Estimation and Quantity Surveying

Code: 16CE4027 IV Year I Sem
s: 2.5 External Marks: 70
Internal Marks: 30

RSE OBJECTIVES:

- To identify standard specifications for detailed estimation of building.
- To understand the calculation of earthwork excavation for roads and canals.
- To determine the rates of various aspects of buildings.
- To compute the cost of the various items of civil works.
- To recognize preparation of the detailed project report and Valuation of buildings.

RSE OUTCOMES:

- Prepare detailed and abstract estimate of buildings.
- Compute earthwork excavation for roads and canals.
- Estimate the cost of the various items of civil works.
- Estimate reinforcement for bar bending and prepare bar bending schedules.
- Prepare Detailed Project Report and Valuation of buildings.

T - I

ral items of work in Building – Standard Units Principles of working out quantities for detailed and act estimates – Approximate method of Estimating- Detailed Estimates of Buildings.

T - II

work for roads and canals: Lead and Lift – Types of methods – Mid Sectional area method – Mean tional area method – Simpson's rule method

T - III

Analysis: Standard specifications for different items of building construction. Working out data for Masonry, R.R. Masonry, Plastering, Plain Concrete, R.C.C., and Distempering.

T-IV

forcement bar bending schedule: Footing, Pedestal, column, plinth beam, slab beam and slab and bar rement schedules.

T - V

ration of Detailed Project Report (DPR)-Accounting and billing -Valuation of buildings.

T BOOKS

imating and Costing by B.N. Dutta, UBS publishers, 2000.
imating and Costing by G.S. Birdie

RENCES :

ndard Schedule of rates and standard data book by public works department.
S: 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works –
)
imation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
tional Building Code

Subject Code: 16CE4034 **Air Pollution Control** IV Year II Sem
Credits: 3.0

COURSE OBJECTIVES:

External Marks: 70
Internal Marks: 30

- To explain about air pollution including Classification of sources.
- To analyze effects of air pollution and its effects on man, material and vegetation.
- To describe Ambient Air Quality Management and monitoring.
- To explain Control of particulates and equipment design.
- To explain about methods to Control of NO 2 and SO 2 emissions etc., and control measures.

COURSE OUTCOMES:

- Explain about air pollution including Classification of sources.
- Analyze effects of air pollution and its effects on man, material and vegetation.
- Describe Ambient Air Quality Management and monitoring.
- Explain Control of particulates and equipment design
- Explain about methods to Control of NO 2 and SO 2 emissions etc., and control measures

UNIT-I

Air Pollution–Definitions, Scope, Significance and Episodes, Air Pollutants – Measurement of Pollution Classifications – Natural and Artificial –Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

UNIT- II

Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, and Ozone Holes-Effects of art treasures.

UNIT- III

Ambient Air Quality Management – Monitoring of SPM, SO; NO and CO Stack Monitoring for the Flue gases –Micro meteorological monitoring Emission Standards.

UNIT-IV

Control of particulates –Control at Sources, Process Changes, Equipment modifications, Design and operation of control, Equipment's – Settling Chambers, Centrifugal separators, Reverse Flow Cyclones, Fabric filters – Bag House, Dry and Wet scrubbers, Electrostatic precipitators.

UNIT- V

General Methods of Control of NO_2 and SO_2 emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

xt Books:

1. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
2. Air pollution and control by KVSG Murali Krishna.

ference Books:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.
2. Air Pollution by Wark and Warner – Harper & Row, New York.

M.TECH.: CSE

AR - 19 - M.Tech. - CSE

I Year I Semester

Soft Computing
(Program Elective)

Subject Code: 19MCS1005
Credits : 3.0

External Marks: 60
Internal Marks : 40

Course Objective

To give students knowledge of soft computing theories fundamentals, i.e. Fundamentals of artificial and neural networks, fuzzy sets and fuzzy logic and genetic algorithms.

Course Outcomes

1. Student can able to building intelligent systems through soft computing techniques with their day to day applications.
2. Student should be able to understand and apply the concept of artificial neural networks
3. Student should be able to understand and implement the concept of Unsupervised Learning Network
4. Student should be able to compare the classical sets with fuzzy sets.
5. Student should be able to implement the fuzzy rules and fuzzy logic with their day to day applications.
6. Student should be able to understand the concept of Genetic Algorithms.

Unit – I

AI Problems and Search: AI problems, Techniques, Problem Spaces and Search, Heuristic Search Techniques- Generate and Test, Hill Climbing, Best First Search Problem reduction, Constraint Satisfaction and Means End Analysis. Approaches to Knowledge Representation- Using Predicate Logic and Rules.

Unit – II

Artificial Neural Networks: Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Backpropagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

Unit – III

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks- Introduction to various networks.

Unit – IV

Introduction to Classical Sets (crisp Sets)and Fuzzy Sets- operations and Fuzzy sets. Classical Relations -and Fuzzy Relations- Cardinality, Operations, Properties and composition. Tolerance

Machine Learning
(Program Core – III)

Subject Code: 19MCS1009 **External Marks: 60**
Credits : 3.0 **Internal Marks : 40**

Course Objective

- To understand how to design a learning system and what are concept learning tasks
- To analyze how to apply decision tree learning in classification tasks.
- To understand predicate logic as one of the knowledge representation techniques.
- To gain an insight into the role played by neural networks in machine learning.
- To learn the concepts of genetic algorithm and genetic programming.
- To learn the concept of reinforcement Learning.

Course Outcomes

After completion of course, students would be able to

1. Have a broad understanding of machine learning algorithms and their use in data-driven knowledge discovery and program synthesis.
2. Identify, formulate and solve machine learning problems that arise in practical applications
3. Understand instance based learning algorithms.
4. Design a neural network to solve classification and function approximation problems.
5. Build optimal classifiers using genetic algorithms.
6. Understand how to apply a variety of Reinforcement learning algorithms to data.

Unit – I

Introduction – Well defined learning problems, Designing a Learning System, Machine learning: what and why? ypes of machine learning,Issues in Machine Learning;**Concept Learning Task** - General-to-specific ordering of hypotheses. Find-S, List then eliminate algorithm, Candidate elimination algorithm, Inductive bias

Unit – II

Decision Tree Learning - Decision tree learning algorithm-Inductive bias- Issues in Decision tree learning; **Artificial Neural Networks** – Perceptrons, Gradient descent and the Delta rule, Adaline, Multilayer networks, Derivation of backpropagation rule, Backpropagation Algorithm, Convergence, Generalization

Unit – III

Evaluating Machine Learning algorithms and Model Selection, Ensemble Methods (Boosting, Bagging, Random Forests),Learning set of rules-

Unit – IV

Bayesian Learning: Introduction, Bayes Theorem, Bayes Theorem and Concept Learning. **Instance-Based Learning:** Introduction, k-Nearest Neighbour Learning, Locally Weighted Regression.

Unit – V

Genetic Algorithms: Motivation, Genetic Algorithms, An Illustrative Example, Hypothesis Space Search, Genetic Programming.

M.TECH.: Structural Engineering

M.Tech, AR - 19

STRUCTURAL ENGINEERING
M.TECH COURSE STRUCTURE
AND DETAILED SYLLABUS,
(1^{st},2^{nd} , 3^{rd} ,4^{th} Sem)

CIVIL ENGINEERING

For

(Applicable for the batches admitted from 2019-20)

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

Approved By AICTE, New Delhi
Recognized under 2(f),12(b) of UGC
Permanently Affiliated to JNTUK, Kakinada.
K. Kotturu, TEKKALI-532 201, Srikakulam, Andhra Pradesh

Advanced Structural Analysis

SUBJECT CODE: 19MSE1001

L	P	C	IN	EXT
3	0	3	40	60

COURSE OBJECTIVES:

- To study Basic concepts in structural analysis like Static Indeterminacy and kinematic indeterminacy, Applications of principle of virtual work
- To study Force methods, Displacement Methods.
- To study Matrix concepts and coordinate systems & element and structure stiffness matrices.
- To study Matrix analysis of structures with axial elements of Plane trusses, Space trusses with different degree of freedoms.
- To study Stiffness method, development of grid elemental stiffness matrix, idealizing the beam stiffness solutions, curved beam element stiffness matrix.
- To studyFlexibility method for fixed and continuous beams.

COURSE OUTCOMES:

- Analyze Basic concepts in structural analysis
- Analysis the skeleton structures using Force methods, Displacement Methods
- Study Matrix concepts, coordinate systems, Contra-gradient principle.
- Study& Analyze Matrix analysis of structures with axial elements with different degree of freedoms.
- Analyze the beams and grids by Stiffness method&Matrix applications.
- Analyze the beams by Flexibility method&Matrix applications.

UNIT-I

Basic concepts in structural analysis:
Structure -structural elements, joints and supports, stability, rigidity and static indeterminacy, kinematic indeterminacy;
Loads-direct actions, indirect loading;
Response -equilibrium, compatibility, force-displacement relations;
Levels of analysis; analysis of statically determinate structures (trusses, beams, frames);
Applications of principle of virtual work and displacement-based and force-based energy principles; deriving stiffness and flexibility coefficients.

UNIT-II

Analysis of indeterminate structures: Force methods: Statically indeterminate structures (method of consistent deformations; theorem of least work). Displacement Methods: Kinematically indeterminate structures (slope-deflection method; moment distribution method).

UNIT-III

Matrix concepts and Matrix analysis of structures: Matrix; vector; basic matrix operations; rank; solution of linear simultaneous equations; eigenvalues and eigenvectors.
Introduction; coordinate systems; displacement and force transformation matrices;
Contra-gradient principle; element and structure stiffness matrices;
Element and structure flexibility matrices; equivalent joint loads; stiffness and flexibility approaches

FEM in Structural Engineering

SUBJECT CODE: 19MSE1005

L	P	C	IN	EXT
3	0	3	40	60

COURSE OUTCOMES:

Students will get ability

- To study A brief history of F.E.M. Need of the method, Equations of equilibrium, Compatibility, Strain displacement relations.
- To study and use Theory relating to the formulation of the finite element method, Element Stiffness Matrix and Element Load Vector.
- To study Application to Structural Elements, Galarkin Method, Interpolation Functions.
- To study isoparametric formulation, different types of elements and its interpolation functions.
- To study solve continuum problems using finite element methods into CST,Rectangular and Quadrilateral elements.
- To study Axi – symmetric element stress analysis and its computations.

COURSE OUTCOMES:

Students will get ability

CO 1: To learn A brief history of F.E.M. Need of the method, Equations of equilibrium, Compatibility, Strain displacement relations.

CO 2: To learn and use Theory relating to the formulation of the finite element method, Element Stiffness Matrix and Element Load Vector.

CO 3: To learn Application to Structural Elements, Galarkin Method, Interpolation Functions.

CO 4: To learn isoparametric formulation, different types of elements and its interpolation functions.

CO 5: To solve continuum problems using finite element methods into CST,Rectangular and Quadrilateral elements.

CO 6: To learn Axi – symmetric element stress analysis and its computations.

SYLLABUS:

1. **Introduction** - A brief history of F.E.M. minimum Potential Energy Principle, Direct Stiffness method, Equilibrium Equations, Assembly of Global Stiffness Matrix, Elements Stress and Strains.
2. **Beam elements** – Element Stiffness Matrix, Element Load Vector and Theory relating to the formulation of the finite element method, Matrix boundary conditions – All with reference to trusses under axial forces.
3. **Method of Weighted Residuals** – Galerkin Finite Element Method, applications to Structural Elements, Compatibility and completeness Requirements, Polynomial Forms and Applications.
4. **Types of Elements** – Different Types of elements and its shapes with Interpolation functions, Triangular Elements, Rectangular Elements, Three – Dimensional Elements, Isoparametric formulations.
5. **Application to Solid Mechanics** – Plane Stress, Plane Strain, CST Element, Rectangular Element, Iso parametric formulation of the Quadrilateral element.
6. **Axi – Symmetric Elements** – Axi – Symmetric Elements Stress analysis, Stress and Strain Computations,

TEXT BOOKS:

1. Finite Element Method in Engineering, Belegundu A.D., Chandrupatla, T.R., Prentice Hall India, 1991.
2. Finite Element Analysis , P. Seshu., PHI Learning Private Limited, Delhi, 2013..
3. Finite Element Methods in Engineering, Singiresu S. Rao, ELSEVIER, 5th Edition.

REFERENCES:

1. A First Course in the Finite Element Method, Daryl L. Logan, Cengage Learning,5th Edition, 2012.
2. An Introduction to Nonlinear Finite Element Analysis, J N Reddy, Oxford University Press, 2nd Edition, 2015.

CO – PO & PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	1	2		1			1	2		1	3		2
CO 2	2	3	1	2	1	1			1	2		2	3		2
CO 3	2	3	1	2	2	1			1	2		2	3		2
CO 4	2	3	1	2	2	1	1		2	2		2	3		2
CO 5	2	3	1	2	2	1	1		1	2		2	3		2
CO 6	3	1		1	1	1				2		2	3		2

COURSE OBJECTIVES:

- To Know how to find Atterburg's Limits, Field Density and Relative Density of Sand.
- To know how to do Grain size analysis, Compaction test, CBR Test.
- To know how to do Unconfined Compression test, Triaxial Compression test.
- To know how to do Direct Shear test , Vane Shear test etc.,

COURSE OUTCOMES:

1. Determine Atterberg's limits and differential free swell for clayey soils in laboratory.
2. Determine relative density, dry density and moisture content in the field and laboratory by core cutter, sand replacement and compaction tests.
3. Determine permeability and analyze coarse and fine grained soils in the laboratory.
4. Determine shear strength and shear strength parameters by vane shear, tri-axial, direct shear and unconfined compression tests in laboratory.
5. Determine CBR value, consolidation settlement and swell pressure in laboratory.

	Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	3.00	2	2		3	1			1	3	2		2		2	3
2	3.00	2	2		3	1			1	3	2		2		2	3
	3.00	2	2		3	1			1	3	2		2		2	3
	3.00	2	2		3	1			1	3	2		2		2	3
	3.00	2	2		3	1			1	3	2		2		2	3

COURSE OBJECTIVES: Students will have

1. to study how to calibrate of venturimeter & orifice meter
2. to study how to determine of coefficient of discharge for a small orifice by a constant head method.
3. to study how to determine of coefficient of discharge for an external mouth piece by variable head method.
4. to study how to calibrate of contracted Rectangular Notch and /or Triangular Notch
5. to study how to determine Coefficient of loss of head in a sudden contraction and friction factor.
6. to study how to verify bernoulli's equation.
7. to practice impact of jet on vanes
8. to study how to introduce concepts of fluid flow and hydraulic machines to make the students gainful.

COURSE OUTCOMES: Students will get ability

1. to understand how to Determine discharge of flow through venturimeter and orifice meter, loss of head due to sudden contraction & friction in pipe & verify Bernoulli's equation
2. to learn how to Determine Coefficient of discharge for a small orifice and external mouth piece by a constant head& variable head method respectively.
3. to understand how to determine discharge of flow using V-notch and rectangular notch
4. to learn how to Determine the force exerted by jet and study the efficiency of Pelton, Francis turbines & hydraulic jump
5. to understand to Determine the efficiency of centrifugal and reciprocating pumps

FM LAB	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	2	2	-	1	-	1	3	3	-	2	2	2	2
CO2	3	1	2	2	-	1	-	1	3	3	-	2	2	2	2
CO3	3	1	2	2	-	1	-	1	3	3	-	2	2	2	2
CO4	3	1	2	2	-	1	-	1	3	3	-	2	2	2	2
CO5	3	1	2	2	-	1	-	1	3	3	-	2	2	2	2

PSO-Program Specific Outcomes

1. Analyze, design and execute the civil engineering structures with good knowledge in engineering, mathematics & basic sciences
2. Survey, map, plan & layout of infrastructures viz. canals, roads, etc. and apply knowledge of environmental & geotechnical engineering
3. Acquire knowledge of various techniques, skills and engineering tools required for civil engineering structures including all types of buildings, irrigation structures, highways, railways, docks & harbours etc.

COURSE OBJECTIVES:

Students will have

1. To study how to determine pH, turbidity, Conductivity, Total dissolved solids, Alkalinity and Acidity of water sample in laboratory
2. To study how to determine Chlorides, iron, Dissolved Oxygen, Nitrogen, total Phosphorous in water sample in laboratory
3. To study how to determine and Estimate total solids, organic solids and inorganic solids in water sample in laboratory
4. To study how to determine B.O.D and C.O.D of waste water sample in laboratory
5. To study how to determine Optimum coagulant dose, Chlorine demand, coli form in drinking water sample in laboratory

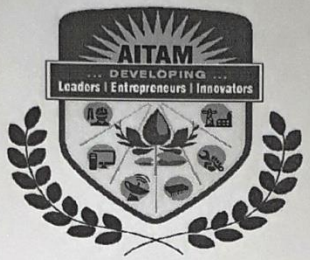
COURSE OUTCOMES:

Students will get ability:

1. Determine pH, turbidity, Conductivity, Total dissolved solids, Alkalinity and Acidity of water sample in laboratory
2. Determine Chlorides, iron, Dissolved Oxygen, Nitrogen, total Phosphorous in water sample in laboratory
3. Determine and Estimate total solids, organic solids and inorganic solids in water sample in laboratory
4. Determine B.O.D and C.O.D of waste water sample in laboratory
5. Determine Optimum coagulant dose, Chlorine demand, coli form in drinking water sample in laboratory.

EE LAB	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	3	3	3	2	2	2	1	2	-	-	2	-	2	-
CO2	2	3	3	3	2	2	2	1	2	-	-	2	-	2	-
CO3	2	3	3	3	2	2	2	1	2	-	-	2	-	2	-
CO4	2	3	2	3	2	2	2	1	2	-	-	2	-	2	-
CO5	2	3	2	3	2	2	2	1	2	-	-	2	-	2	-

Environmental Engineering Lab



Department of Civil Engineering
AITAM,TEKKALI

List of Experiments

Water sampling methods for lab analysis (**CO1**)

1. pH Metric Estimation of Acid By Base. (CO1)
2. Determination of Total Hardness By EDTA Method (CO1)
3. Determination of Acidity Of Water Sample (CO1)
4. Determination of Alkalinity Of Water Sample (CO1)
5. Estimation of Dissolved Oxygen In Water Sample (CO2)
6. Determination of Turbidity Of Water (CO3)
7. Determination of Iron By Thiocyanate Colorimetry (CO1)
8. Conductometric Estimation Of Acid By Base(CO1)
9. Determination Of Biochemical Oxygen Demand(CO4)
10. Determination Of Total Solids(CO3)
11. Determination Of Optimum Coagulant Dosage(CO5)

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AUTONOMOUS)
TEKKALI-532201, A. P

Fluid Mechanics and Hydraulic Machinery Lab

NAME :

YEAR :

REGD. NO :

Department of
Civil Engineering

COURSE OBJECTIVES: Students will have

1. to study how to calibrate of venturimeter & orifice meter
2. to study how to determine of coefficient of discharge for a small orifice by a constant head method.
3. to study how to determine of coefficient of discharge for an external mouth piece by variable head method.
4. to study how to calibrate of contracted Rectangular Notch and /or Triangular Notch
5. to study how to determine Coefficient of loss of head in a sudden contraction and friction factor.
6. to study how to verify bernoulli's equation.
7. to practice impact of jet on vanes
8. to study how to introduce concepts of fluid flow and hydraulic machines to make the students gainful.

COURSE OUTCOMES: Students will get ability

1. to understand how to Determine discharge of flow through venturimeter and orifice meter, loss of head due to sudden contraction & friction in pipe & verify Bernoulli's equation
2. to learn how to Determine Coefficient of discharge for a small orifice and external mouth piece by a constant head& variable head method respectively.
3. to understand how to determine discharge of flow using V-notch and rectangular notch
4. to learn how to Determine the force exerted by jet and study the efficiency of Pelton, Francis turbines & hydraulic jump
5. to understand to Determine the efficiency of centrifugal and reciprocating pumps

FM LAB	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	2	2	-	1	-	1	3	3	-	2	2	2	2
CO2	3	1	2	2	-	1	-	1	3	3	-	2	2	2	2
CO3	3	1	2	2	-	1	-	1	3	3	-	2	2	2	2
CO4	3	1	2	2	-	1	-	1	3	3	-	2	2	2	2
CO5	3	1	2	2	-	1	-	1	3	3	-	2	2	2	2

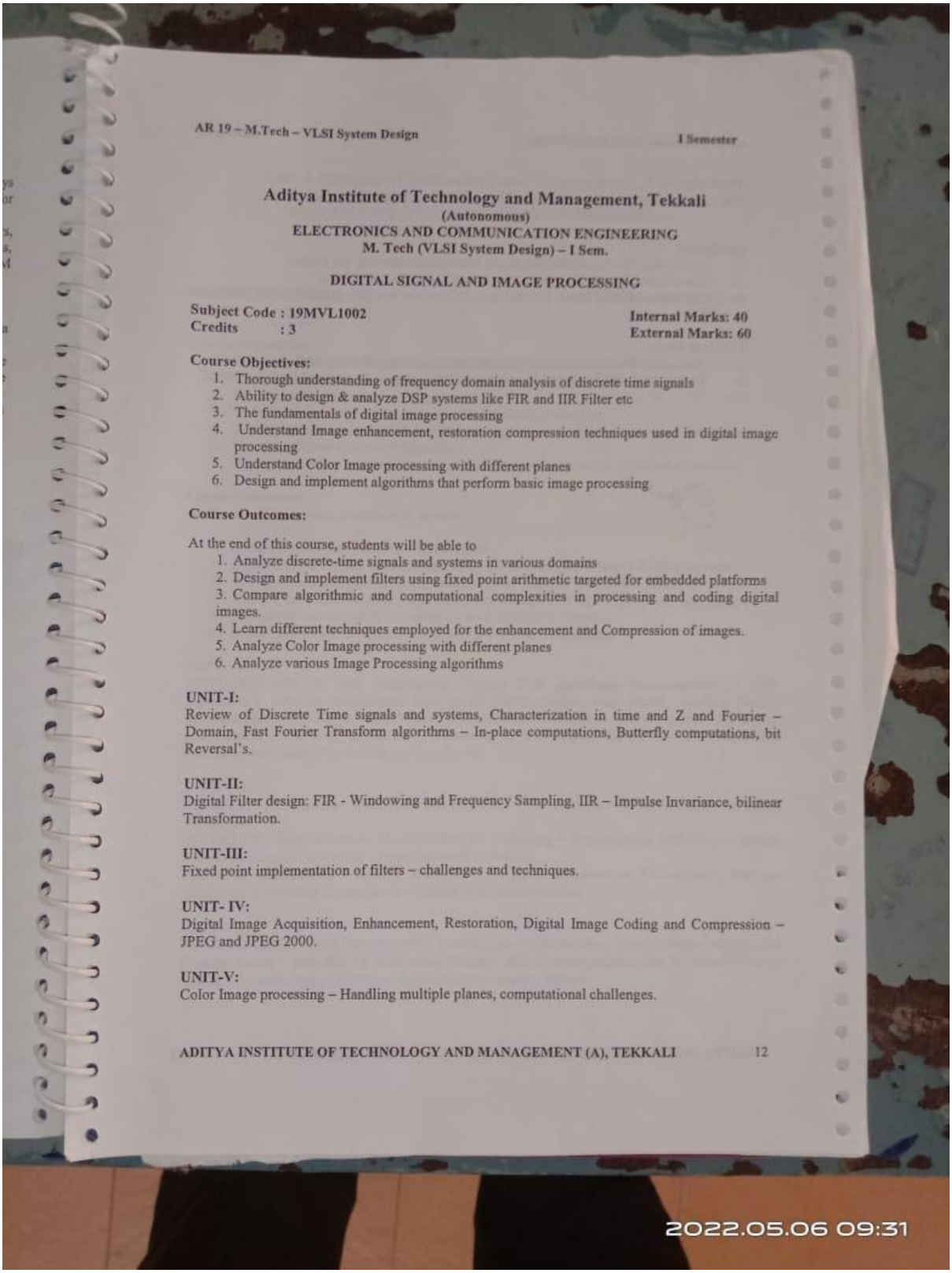
Mechanics of Fluids and Hydraulic Machinery Lab

Department of Civil Engineering
AITAM,TEKKALI

List of Experiments

1. Calibration of Venturimeter & Orifice meter (CO1)
2. Determination of Coefficient of discharge for a small orifice by a constant head method. (CO1)
3. Determination of Coefficient of discharge for an external mouth piece by variable head method. (CO2)
4. Calibration of contracted Rectangular Notch and /or Triangular Notch (CO3)
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.(CO1)
6. Verification of Bernoulli's equation. (CO1)
7. Impact of jet on vanes (CO4)
8. Study of Hydraulic jump.(CO4)
9. Performance test on Pelton wheel turbine (CO4)
10. Performance test on Francis turbine. (CO4)
11. Efficiency test on centrifugal pump. (CO5)
12. Efficiency test on reciprocating pump.(CO5)

M.TECH.: VLSI



Aditya Institute of Technology and Management, Tekkali
(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING
M. Tech (VLSI System Design) – I Sem.

DIGITAL SIGNAL AND IMAGE PROCESSING

Subject Code : 19MVL1002 **Internal Marks: 40**
Credits : 3 **External Marks: 60**

Course Objectives:

1. Thorough understanding of frequency domain analysis of discrete time signals
2. Ability to design & analyze DSP systems like FIR and IIR Filter etc
3. The fundamentals of digital image processing
4. Understand Image enhancement, restoration compression techniques used in digital image processing
5. Understand Color Image processing with different planes
6. Design and implement algorithms that perform basic image processing

Course Outcomes:

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

1. Analyze discrete-time signals and systems in various domains
2. Design and implement filters using fixed point arithmetic targeted for embedded platforms
3. Compare algorithmic and computational complexities in processing and coding digital images.
4. Learn different techniques employed for the enhancement and Compression of images.
5. Analyze Color Image processing with different planes
6. Analyze various Image Processing algorithms

UNIT-I:
Review of Discrete Time signals and systems, Characterization in time and Z and Fourier – Domain, Fast Fourier Transform algorithms – In-place computations, Butterfly computations, bit Reversal's.

UNIT-II:
Digital Filter design: FIR - Windowing and Frequency Sampling, IIR – Impulse Invariance, bilinear Transformation.

UNIT-III:
Fixed point implementation of filters – challenges and techniques.

UNIT- IV:
Digital Image Acquisition, Enhancement, Restoration, Digital Image Coding and Compression – JPEG and JPEG 2000.

UNIT-V:
Color Image processing – Handling multiple planes, computational challenges.

Aditya Institute of Technology and Management, Tekkali
(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING
M. Tech (VLSI System Design) – I Sem.

DIGITAL SIGNAL AND IMAGE PROCESSING LAB

Subject Code : 19MVL1102 **Internal Marks: 40**
Credits : 2 **External Marks: 60**

Course Objectives:

Understand the basic digital signal, image and video processing algorithms and their implementation in C or MATLAB.

Course Outcomes:

1. Understand the fundamentals of image and video signal processing and associated techniques.
2. Understand how to solve practical problems with some basic image and video signal processing techniques.
3. Have the ability to design simple systems for realizing some multimedia applications with some basic image and video signal processing techniques.

The students are required to simulate the following experimental parts on the MATLAB environment by consider the relevant application based examples.

PART-1: Digital Signal Processing

1. Discrete-time Signals and Systems in the time domain.
2. z-Transforms and inverse z-Transforms.
3. The Discrete Fourier Transform properties.
4. FIR Filter Design.
5. IIR Filter Design.
6. Applications in Adaptive Filtering.

PART-2: Image Processing

1. Image Enhancement in Spatial Domain
2. Fourier Transform of an Image
3. Enhancement in Frequency Domain.
4. Image segmentation
5. Image Compression.

PART-3: Video Processing

1. Divide 1sec video into frames
2. Filter operations on video(Smoothing and Sharpening)
3. Motion estimate of an object in a video.

Aditya Institute of Technology and Management, Tekkali
(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING
M. Tech (VLSI System Design) – II Sem.

COMMUNICATION BUSES AND INTERFACES

Subject Code : 19MVL1014 **Internal Marks: 40**
Credits : 3 **External Marks: 60**

Course Objectives:
1. Learn different types of Serial Busses and its features
2. Understand the Architecture, Data transmission, Layers, Frame formats of CAN
3. Explain APIs for configuration, reading and writing data onto serial bus.
4. Describe and develop peripherals that can be interfaced to desired serial bus.
5. Describe various PCI protocols & applications
6. Understand the Serial Communication Protocols

Course Outcomes:
At the end of the course, students will be able to:
1. Select a particular serial bus suitable for a particular application.
2. Describe Architecture, Data transmission, Layers, Frame formats of CAN
3. Develop APIs for configuration, reading and writing data onto serial bus.
4. Design and develop peripherals that can be interfaced to desired serial bus.
5. Analyze Data Streaming Serial Communication Protocol
6. Analyze various PCI protocols & applications

UNIT – I:
Serial Busses- Physical interface, Data and Control signals, features

UNIT – II:
limitations and applications of RS232, RS485, I2C, SPI

UNIT – III:
CAN - Architecture, Data transmission, Layers, Frame formats, applications

UNIT – IV:
PCIe - Revisions, Configuration space, Hardware protocols, applications

UNIT – V:
USB - Transfer types, enumeration, Descriptor types and contents, Device driver

UNIT – VI:
Data Streaming Serial Communication Protocol- Serial Front Panel Data Port (SFPDP) using fibre optic and copper cable

Text Books:
1. Jan Axelson, "Serial Port Complete - COM Ports, USB Virtual Com Ports, and Ports for
2. Embedded Systems ", Lakeview Research, 2nd Edition
3. Jan Axelson, "USB Complete", Penram Publications
4. Mike Jackson, Ravi Budruk, "PCI Express Technology", Mindshare Press

M.TECH.: Power Electronics

POWER ELECTRONIC CONTROL OF DC DRIVES

L	P	C	INT	EXT
3	0	3	40	60

19MPE1001

Course Objectives:

The main objective of the course is to:

- Provides basic understanding of main principles of DC drives, various modes of operation, control from converters and choppers, and also modeling of DC machines.

Course Outcomes:

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

CO1: Able to understand the concept of modeling and analysis of DC motors.
CO2: Able to design controllers for closed loop and open loop transfer function of DC motor drives.
CO3: Able to analyze the controlled converter and DC chopper circuits.
CO4: Able to Analyze the Dual Converter Control of DC motor
CO5: Able to Distinguish the difference between PWM controller and hysteresis controller

UNIT I:

Modeling of DC Machines: Theory of operation-Equivalent Circuit and Electromagnetic Torque- Electromechanical Modeling- State space modeling-Block diagram and Transfer functions.

UNIT II:

Single Phase Controlled DC Motor Drives: Principle of DC Motor Speed Control- Armature control-Field Control-armature and field controls. Single –phase semi converter and single-phase full converter fed Separately excited DC motor for continuous and discontinuous modes of operation- Problems.

UNIT III:

Three Phase Controlled DC Motor Drives: Three-phase semi converter and three- phase full converter Separately excited DC motor- for continuous and discontinuous modes of operation-Problems-Four Quadrant Operation using Dual Converters-Control modeling of three- phase converter-Two quadrant Three Phase Converter Controlled DC Motor Drive-Transfer Functions of the subsystems.

UNIT IV:

Design of Controllers: Current controller-First order Approximation of Inner Current Loop-speed controller- Simulation of one quadrant DC Motor Drive-The Motor equations-field in the speed feedback loop-Speed Controller- Current Reference Generator-Current Controller- Flow Chart for Simulation.

UNIT V:

Chopper controlled DC Motor drives-I: Principle of operation of the chopper – four quadrant chopper circuit – chopper for inversion –chopper with other power devices – model of the chopper – input to the chopper – steady state analysis of chopper controlled DC motor drives – rating of the devices.

UNIT VI:

Chopper controlled DC Motor drives-II: Closed loop operation of DC Motor drives- Speed controlled drive system current control loop – pulse width modulated current controller – hysteresis current controller – modeling of current controller – design of current controller, analysis of Chopper controlled DC Motor drives.

TEXT BOOKS:

1. R.Krishnan, "Electric motor drives modeling, Analysis and control" 1st ed., Prentice Hall India
2. Shepherd, Hulley, Liang, "Power Electronics and motor control", 2nd ed., Cambridge University Press

REFERENCE BOOKS:

1. M.H. Rashid, "Power Electronic circuits, Devices and applications", 1st ed., PHI, 1995
2. G.K. Dubey, "Fundamentals of Electric Drives", Narsa Publications, 1995.
3. Power Electronics- Ned Mohan, Tore M.Undelan and William P.Robbins –John Wiley & Sons -2nd Edition.

SWITCHED MODE POWER CONVERTERS

L	P	C	INT	EXT
3	0	3	40	60

19MPE1010

Course Objectives:

The main objective of the course is to:

- Understand the concepts and basic operation of efficient switched-mode power electronic converters including basic circuit operation and magnetic circuit design and transformer isolation in switched-mode power converters.
- Understand how to analyze power circuit and steady-state analysis of Forward and fly-back converters and push pull topologies.
- Understand how to analyze power circuit and steady-state analysis of half bridge and full-bridge converters.
- Understand the averaged circuit models of dc-dc converters and small-signal model and converter transfer functions.
- Understand concept of bode plot, phase and gain margins, bandwidth, controller specifications.
- Understand how to analyze resonant converters and Quasi-Resonant Converters i.e. ZCS and ZVS resonant converters.

Course Outcomes:

CO1: Understand of the basic principles of switch mode power conversion and design Forward and fly- back converters and push pull topologies.

CO2: Analyze and design the half bridge and full-bridge converters.

CO3: Design Small-Signal Model Development and Analysis for switched-mode dc-dc converters using averaging techniques, including the derivation and visualization of converter small-signal transfer functions.

CO4: Analyze the P, PI, PID controller.

CO5: Analyze, modeling and design resonant converters and Quasi-Resonant Converters i.e. ZCS and ZVS resonant converters.

UNIT I:

Single-switch Isolated converters & Push-Pull Converters: Requirement for isolation in the switch-mode converters, transformer connection,Forward and fly-back converters, utilization of magnetic circuits in single switch and push-pull topologies, power circuit and steady-state analysis.

UNIT II:

Isolated Bridge converters: Half bridge and full-bridge converters, Power circuit and steady-state analysis, utilization of magnetic circuits and comparison with previous topologies.

UNIT III:

Dynamic Analysis of dc-dc converters: Formulation of dynamic equation of buck and boost converters, averaged circuit models, linearization technique, small-signal model and converter transfer functions.

UNIT IV:

Controller Design: Review of frequency-domain analysis of linear time-invariant systems, concept of bode plot, phase and gain margins, bandwidth, controller specifications, proportional(P), proportional plus integral (PI), proportional plus integral plus integral controller (PID), selection of controller parameters.

UNIT V:

Resonant Converters:

Classification of Resonant converters-Basic resonant circuits- Series resonant circuit- parallel resonant circuits- Resonant switches.

UNIT VI:

Quasi Resonant Converters: Quasi-Resonant Converters-I: Concept of Zero voltage switching, principle of operation, analysis of M-type and L-type Buck or boost Converters. Quasi-Resonant Converters-II: Concept of Zero current switching, principle of operation, analysis of M-type and L-type Buck or boost Converters.

TEXT BOOKS:

1. Fundamentals of Power Electronics – Robert Erickson and Dragon Maksivimovic, Springer Publications.
2. Power Electronics–Issa Batarseh- John Wiely

REFERENCE BOOKS:

1. Elements of Power Electronics - Philip T.Krein – Oxford University Press
2. Power Electronics, L. Umanand, Tata Mc-Graw Hill.

M.Tech: Thermal Engineering

AR-19
I-I

M. Tech., I Semester

IC ENGINES AND COMBUSTION

SUBJECT CODE: 19MTE1001

L	T	P	C
4	-	-	3

COURSE OUTCOMES:

On completion of this course, students should be able to

CO 1. Analyze air standard, fuel air and actual air cycles in terms of various losses. Understand construction, working and mechanism of engine subsystems.

CO 2. Describe combustion processes occurring in SI engines. Identify the factors affecting flame speed, ignition lag, flame propagation and knocking.

CO 3. Describe processes of combustion in CI engine and effect of various parameters. Explain diesel knock reduction methods like swirl and auto-ignition.

CO 4. Calculate engine performance using various parameters and heat balance sheet.

CO 5. Describe different types of emission norms.

CO 6. Student should understand types of alternate fuels and its advantages over conventional fuels.

UNIT - I

Classification: Classification based on fuel, working cycle, method of fuel supply. Ignition and Governing. Scavenging of two stroke engines. Fuel – air cycles & actual air cycles and their analysis.

UNIT - II

Spark Ignition Engines: Flame speed-effect of turbulence and other parameters. Normal and abnormal combustion. Auto ignition and Pre ignition. Fuel requirements, knock ratings, combustion chambers. Carburetion-mixture strength requirements. Simple carburettor-limitations, compensating arrangements. Gasoline injection systems.

UNIT - III

Compression Ignition Systems: Low and high speed types,Air utilization and output. Combustion process-Ignition delay. Knocking and effect of variables. Fuel requirements and rating. Combustion chambers. Fuel injection systems.

Super Charging: Types of engine supercharging. Engine supercharging devices. Turbo charging.

UNIT-IV

Performance of IC Engines: Measurement of engine power, analysis of engine performance. Factors effecting efficiency and power, heat loss, pumping loss. Geometry, Speed, Air/Fuel ratio. Heat balance test. BIS standards for testing and rating. Modern Developments: Wankel engine. Stratified charge engine. Dual-fuel engines. HCCIconcept.

UNIT - V

Engine Emissions: SI and CI engine emissions. Harmful effects. Emissions measurement methods. Methods for controlling emissions. EURO and BHARAT emission norms.

UNIT - VI

Alternate Fuels For IC Engines: Need for use of alternate fuels. Use of alcohol fuels. Biodiesel. Biogas and Hydrogen in engines.

M. Tech., I Semester

TEXT BOOKS:

1. Ganesan V., Internal Combustion Engines, Tata McGraw Hill Publishing Company, 2007.
2. Mathur, M.L., and Sharma, R.P., A Course in Internal Combustion Engines, Dhanpat Rai and Sons, 2008.

REFERENCE BOOKS:

1. John, B.H., Internal Combustion Engine Fundamentals, McGraw Hill, 1988.
2. IC engines by Mathur and Sharma
3. Advance Engineering Thermodynamics by Holmans.

AR-19
I-II

ADVANCED HEAT TRANSFER

SUBJECT CODE: 19MTE1007

L	T	P	C
4	-	-	3

COURSE OUTCOMES:
At the end of the course:
CO 1. Understand physics and mathematical treatment of heat and mass transfer.
CO 2. Apply the principles of heat transfer in the analysis of steady and transient conduction problems.
CO 3. Formulate and solve convective heat transfer problems for internal and external flows.
CO 4. Analyze free and forced convection problems involving complex geometries.
CO 5. To understand boundary layers and to formulate pool and flow boiling correlations.
CO 6. Apply the concepts of radiation heat transfer for enclosure analysis.

UNIT - I
Brief Introduction to different **modes of heat transfer**; Conduction: General heat conduction equation- Initial and Boundary conditions
Steady State Heat Transfer: Simplified heat transfer in 1D and 2D – Fins

UNIT - II
Transient heat conduction; Lumped system analysis- Heisler's charts-semi infinite solid-use of shape factors in conduction - 2D transient heat conduction – problem solutions
Forced Convection: Equations of Fluid Flow – Concepts of Continuity, momentum equations – Derivation of Energy equation – Dimensional Analysis and Similitude

UNIT - III
External flows: Flow over a flat plate: Critical Reynolds Number - - Methods to determine heat transfer coefficient: Analogy between heat and momentum transfer - Similarity Parameters - Analytical Methods - Exact and Integral methods – Integral method for laminar heat transfer coefficient for different velocity and temperature profiles. Application of empirical relations to various geometries for Laminar and Turbulent flows.

UNIT - IV
Internal flows: Fully developed flow: Laminar heat transfer coefficient for Constant Wall Temperature and Constant Heat Flux Boundary Conditions - Hydrodynamic and thermal entry lengths; use of empirical correlations. Reylolds – Colburn Analogy - Application of empirical relations to various geometries for Laminar and Turbulent flows.

UNIT - V
Free convection: Integral analysis on laminar free convective heat transfer – Different geometries – combined free and forced convection
Boiling and condensation: Pool Boiling–Boiling regimes-Correlations. Nusselt's theory of film condensation on a vertical plate – Assumptions and correlations of film condensation for different geometrics.

UNIT - VI
Radiation Heat Transfer: Radiant heat exchange in grey, non-grey bodies, with transmitting, reflecting and absorbing media, specular surfaces, gas radiation – radiation from flames.

M. Tech., II Semester

TEXT BOOKS:

1. J.P. Holman, "Heat Transfer", McGraw Hill Book Company, New York, 1990.
2. Incropera and Dewitt, "Fundamentals of Heat and Mass Transfer", John Wiley and Sons, NewYork, 2000.
3. Frank Kreith, "Principles of Heat Transfer", Harper and Row Publishers, New York, 1973.
4. Donald Q. Kern "Process Heat Transfer", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1975.

REFERENCES BOOKS:

1. Gupta and Prakash, "Engineering Heat Transfer", New Chand and Bros, Roorkee (U.P.) India, 1996.
2. R.C. Sachdeva "Fundamentals of Engineering Heat and Mass Transfer", Wiley Eastern Ltd., India,

AR – 19 –MBA **I MBA I SEM**

MANAGEMENT THEORY AND ORGANIZATIONAL BEHAVIOR

SUBJECT CODE: 19MBA1001

L	T	P	C	INT	EXT
4	-	-	4	40	60

OBJECTIVES:

1. To develop an understanding of management concepts with a focus on Management functions and its implications on Organizations.
2. To enable students understanding the importance of planning, organizing, staffing, directing and controlling.
3. To instill the abilities of motivation, communication and leadership.
4. To Identify and properly use vocabularies within the field of management to articulate one's own position on a specific management issue and communicate effectively with varied audiences.
5. To Evaluate leadership styles to anticipate the consequences of each leadership style.
6. To Gather and analyze both qualitative and quantitative information to isolate issues and formulate best control methods.

OUTCOMES:

1. Helps the student to learn how to practice Management concepts and functions.
2. Facilitates the students to gain practical knowledge in Decision Making, Delegation of Authority, decentralisation and departmentation.
3. Enables the students to become skilled at how to manage the conflicts and improve the negotiation skills.
4. Specify how the managerial tasks of planning, organizing, and controlling can be executed in a variety of circumstances.
5. Determine the most effective action to take in specific situations.
6. Emphasizes on developing analytical skills, presentation skills, problem solving skills by discussing relevant case studies in the class room.

UNIT - I.

Nature of Management– definitions, scope and importance – managerial roles and functions– development of management thought - approaches to management - Managing for competitive advantage
- the Challenges of Management.

UNIT - II.

Planning: Nature and principles of planning - The Planning Process-MBO. Decision-making: role significance-process-modern approaches under uncertainty. Coordination-principles.

AR – 19 –MBA **I MBA II SEM**

FINANCIAL MANAGEMENT

L	T	P	C	INT	EXT
4	-	-	4	40	60

SUBJECT CODE: 19MBA2001 OBJECTIVES:

1. To develop an understanding of Financial Management.
2. To provide the necessary basic financial tools for the students.
3. To understand the short term and long term finance needs of the organization.
4. To understand the practices for dividend decisions and debt management.
5. To understand the applications of financial planning with reference to the current asset management.
6. To bridge the gap between theory and practice by discussing and analyzing relevant Case studies.

OUTCOMES:

1. Help Students to learn the overview of Financial Management and time value of money.
2. Define and describe the process and the practice of financial planning.
3. Develop problem solving and prompt decision making for long term projects.
4. Define and describe the process of dividend decisions
5. Student can able to understand effective working capital management practices.
6. Emphasize on developing analytical skills, presentation skills, problem solving skills by discussing relevant case studies in the class room.

UNIT-I

The Finance Function: Objective: Profit or Wealth Maximization and EPS Maximization, An overview of Managerial Finance functions- Time value of money, present value, future value of money and the basic valuation of stocks and bonds.

UNIT-II

Cost of Capital: Concept and measurement of cost of capital, Debt vs. Equity, Different types of Cost of Capital, Importance of cost of capital in capital budgeting decisions

Capital structure Decisions: Capital structure vs financial structure - Capitalisation, financial leverage, operating leverage and composite leverage. EBIT-EPS Analysis, Indifference Point/Break even analysis of financial leverage, Capital structure theories.

UNIT-III

Investment decisions: Nature of Capital Budgeting decisions - techniques of capital budgeting: Pay back method, Average rate of return and Time-Adjusted methods: IRR and NPV, profitability index, and excess present value index. Advanced problems and cases in capital budgeting.

UNIT-IV

Dividend Decisions: Dividends and value of the firm - Relevance of dividends, the MM hypothesis, Factors determining Dividend Policy-dividends and valuation of

AR-19 –MBA **II MBA III SEM**

CORPORATE STRATEGY AND BUSINESS ETHICS SUBJECT CODE: 19MBA3001

L	T	P	C	INT	EXT
4	-	-	4	40	60

OBJECTIVES:

1. To understand the basics of Strategic Management concepts, research and Process.
2. To identify the External and Internal Environmental factors and relate to know strengths, weakness, Opportunity and Threats.
3. To understand the need for types of strategies and select certain techniques to choose the best strategy.
4. To understand the procedure for strategy implementation and select criteria for strategy evaluation and control.
5. To understand the need and importance of Business Ethics including Marketing Ethics, Finance Ethics and HR Ethics and relate its relevance in ethical decision making in India and glob
6. To bridge the gap between theory and practice by discussing relevant Case Studies.

OUTCOMES:

After completion of this course, the student will be able to

1. Define Strategic Management process and explain the External and internal factors and perform SWOT analysis.
2. Identify strategic alternatives and choose the best strategy for Corporate as well as Strategic Business unit.
3. Implement the chosen strategy and evaluate &control the strategy for best possible results.
4. Explain the overview of Business Ethics and its relevance in decision making.
5. Implement Marketing Ethics, Finance Ethics and HR Ethics in Business and appreciate the relevance of personal values in the business/workplace setting.
6. Analyse relevant Case studies through Presentation and problem solving skills in the class room.

UNIT-I

Introduction And Strategic Management Process: Concept & definition of Strategy and Strategic Management. Decision making and Strategic Decision-Making. Strategic Management Process- Strategic Intent- Vision, Mission-Business goals. Role of the Manager: Role of the Strategist: Board of Directors, the CEO and Executives in Strategic Management.

UNIT-II

Environmental Analysis: External Environment Analysis– Social, Technological, Economical, Political, Legal, Environmental factors and ETOP. Industry Analysis and Competitor Analysis. Internal Environment Analysis- Production, Finance, Human Resource, Marketing, Research & Development, Organizational capability factors and SAP. Value Chain Analysis and 7S Framework. SWOT Analysis of any manufacturing and Service enterprise.

AR-19 –MBA **II MBA IV SEM**

GLOBAL MARKETING

SUBJECT CODE: 19MBA4001

L	T	P	C	INT	EXT
4	-	-	4	40	60

OBJECTIVES:

1. To understand the definition, nature, scope and significance of Global Marketing.
2. To explain various global marketing environment.
3. To understand the global market opportunities & research.
4. To explain the international product and brand management.
5. To discuss on global logistics, pricing and promotion in detail.
6. To analyze relevant case studies in every units to bridge the gap between theories and practice.

OUTCOMES:

On completion of this course the Students will be able to

1. To Describe concept on global marketing, internationalization of business and dimension of global market.
2. To Explain the global market environment in detail.
3. To Describe global marketing research, marketing information sources, marketing information system, market analysis foreign market entry strategies.
4. To Explain the concept on international product and brand management.
5. To Describe on global logistics, pricing and promotion in detail. .
6. To Emphasize on developing analytical skills, presentation skills, and problem solving skills by analysing relevant case studies in Global Marketing.

UNIT -I

Introduction to Global Marketing: Definition, Nature, scope and significance of Global Marketing, Dimensions of Global Marketing, Domestic v/s Global Marketing, Process of Internationalization of Business, Benefits of Global Marketing.

UNIT -II

Global Market Environment: Introduction to global environment, Social & cultural Environment, Political, legal environment and regulatory environment, Technological Environment, Business Customs in International Market, International market segmentation and targeting.

UNIT -III

Global Market Opportunities & Research: International Marketing Research, Marketing Information Sources, Marketing Information System, Market Analysis Foreign Market Entry Strategies – Exporting, Licensing, Joint Ventures, Strategic Alliances, Acquisitions Franchising, Assembly Operations, Management Contracts, Turnkey Operations, Free Trade Zones, Entry Strategies of Indian Firms.

UNIT -IV

International Product and Brand Management: Product Design and Standardization, Developing an International Product Line, Foreign Product Diversification, International Packaging, International Warranties and Services, International product positioning, Product saturation Levels in global Market, International product life cycle, Geographic