KAMARAJ
COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C.Nagar, K.Vellakulam - 625 701, (Near Virudhunagar), Madurai District.

B.E. COMPUTER SCIENCE AND ENGINEERING

Regulation - 2020

AUTONOMOUS SYLLABUS

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABI

(III & IV)

VISION:

To make the Department of Computer Science and Engineering the unique of its kind in the field of Research and Development activities in this part of world.

MISSION:

To impart highly innovative and technical knowledge to the urban and unreachable rural student folks in Computer Science and Engineering through "Total Quality Education".

PROGRAM EDUCATIONAL OBJECTIVES:

PEO 1:

Apply the necessary mathematical tools and fundamental knowledge of computer science & engineering to solve variety of engineering problems.

PEO 2:

Develop software based solutions for real life problems and be leaders in their profession with social and ethical responsibilities.

PEO 3:

Pursue life-long learning and research in selected fields of computer science & engineering and contribute to the growth of those fields and society at large.

PROGRAM OUTCOMES:

After going through the four years of study, the Computer Science and Engineering graduates will have the ability to

	Graduate Attribute	**Programme Outcome**
1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1 :

Professional Skills: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2:

Problem - Solving Skills: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

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SEMESTER III

Sl. No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	MA1371	Multivariate Calculus and Linear Algebra	BS	3	1	0	4	4
2	CS1301	Data Structures using Python	PC	3	0	0	3	3
3	CS1371	Database Management Systems	PC	3	0	0	3	3
4	CS1372	System Programming and Operating Systems	PC	3	0	0	3	3
5	EC1372	Digital System Design and Microprocessors	ES	3	0	0	3	3
PRACTICAL								
6	CS1311	Data Structures Laboratory using Python	PC	0	0	4	4	2
7	CS1381	Database Management Systems Laboratory	PC	0	0	4	4	2
8	EC1381	Digital System Design and Microprocessors Laboratory	ES	0	0	4	4	2
9	HS1321	Interpersonal Skills - Listening and Speaking	EEC	0	0	2	2	1
			TOTAL	**15**	**1**	**14**	**30**	**23**

SEMESTER IV

Sl. No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	MA1473	Probability and Statistics	BS	3	1	0	4	4
2	CS1401	Analysis of Algorithms	PC	3	0	2	5	4
3	CS1402	Software Engineering with UML Design	PC	3	0	0	3	3
4	IT1371	Computer Organization and Architecture	PC	3	0	0	3	3
5	AD1372	Introduction to Artificial Intelligence	PC	3	0	0	3	3
6	GE1471	Professional Ethics and Human Values	HS	3	0	0	3	3
PRACTICAL								
7	CS1411	CASE Tools Laboratory	PC	0	0	4	4	2
8	HS1421	An Introduction to Advanced Reading and Writing	EEC	0	0	2	2	1
			TOTAL	**18**	**1**	**8**	**27**	**23**

MA1371 MULTIVARIATE CALCULUS AND LINEAR ALGEBRA

L	T	P	C
3	1	0	4

OBJECTIVES:

To enable the students to

- Introduce the concepts of graphs of level curves, level surface and differentiability of multi variable function.
- Find extreme values of a function using derivative matrix.
- Explain the concepts of vector space, linear transformations and diagonalization.
- Make them understand the concept of orthogonalization in inner product spaces.

UNIT I MULTI VARIABLE CALCULUS 12

Functions of several variables – Domain, Range – Graphs, Level Curves and Contours of Functions of Two variables – Level Surface – Limits and Continuity in Higher Dimensions – Two – path Test for Nonexistence of a Limit – Partial Derivatives of a Function of Two Variables – Differentiability – The Chain Rule.

UNIT II APPLICATIONS OF MULTIVARIABLE CALCULUS 12

Directional Derivatives and Gradient Vectors - Gradients and Tangents to Level Curves - Tangent Planes and Normal Lines to Surfaces - Extreme Values, Saddle Points and Lagrange Multipliers by matrix method.

UNIT III VECTOR SPACES 12

Vector spaces – Subspaces – Linear combinations of vectors - Linear Span – Linear independence and linear dependence – Bases and dimensions.

UNIT IV LINEAR TRANSFORMATION AND DIAGONALIZATION 12

Linear transformation – Null space and range space – Dimension theorem – Matrix representation of a linear transformation – Eigen values and eigenvectors – Diagonalization of linear transformation – Application of diagonalization in linear system of differential equations.

UNIT V INNER PRODUCT SPACES 12

Inner products spaces – Orthogonal vectors- Gram Schmidt orthogonalization process - Orthogonal complement – Least square approximation - Minimal solution to system of linear equations

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1	Apply the concepts of partial derivatives to find the higher derivatives of multi variable functions.
CO2	Apply the techniques of multi variable calculus to compute the gradients, directional derivative and extreme values
CO3	Test the given system of equation is linearly dependent or independent.
CO4	Apply the concept of eigen values and eigenvectors for Diagonalization of a matrix
CO5	Apply the inner product techniques for finding the orthonormal vector and minimal solution to the system of linear equation

TEXT BOOKS:

1. Thomas', Weir & Hass, 2018, *Calculus*, 13th ed, Pearson.
2. Friedberg, AH, Insel, AJ & Spence, L, 2004, *Linear Algebra*, Prentice Hall of India, New Delhi.

REFERENCES:

1. James Stewart, 2007, *Calculus* (Early transcendentals), Brooks cole.
2. Peter D Lax & Maria shea Terrell, 2018, *Multi variable Calculus with applications*, 6th ed, Springer.
3. Kolman, B & Hill, DR, 2009, *Introductory Linear Algebra*, 1st Reprint, Pearson Education, New Delhi.
4. Kumaresan, S, 2010, *Linear Algebra - A Geometric Approach*, Prentice Hall of India, New Delhi, Reprint.
5. Strang, G, 2005, *Linear Algebra and its applications*, Thomson (Brooks/Cole), New Delhi.

CS1301 DATA STRUCTURES USING PYTHON

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Understand the basic concepts of linear data structures.
- Gain knowledge about non-linear data structures like stack, queue and its applications.
- Be familiar with binary tree concepts and its applications.
- Gain knowledge about graph traversal methods and application of graphs.
- Be familiar with different searching, sorting and hashing techniques.

UNIT I LINEAR DATA STRUCTURES 9

Basic concepts: Introduction to data structures - classification of data structures - operations on data structures - Introduction to Linear and Non Linear data structures - Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation - singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

UNIT II LINEAR DATA STRUCTURES – STACKS AND QUEUES 9

Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression - Queue ADT – Operations - Circular Queue – Priority Queue - deQueue – applications of queues.

UNIT III NON LINEAR DATA STRUCTURES - TREES 9

Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree - Heap – Applications of heap.

UNIT IV NON LINEAR DATA STRUCTURES - GRAPHS 9

Graphs: Basic concept - Graph Representations: Adjacency matrix, Adjacency lists -Types of graph – Graph traversals: Breadth-first traversal, Depth-first - traversal - Application of graphs - Topological Sort – Bi-connectivity – Cut vertex – Euler circuits -Minimum spanning trees – Prims and Kruskal algorithms.

UNIT V SEARCHING, SORTING & HASHING TECHNIQUES 9

Searching - Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort - Quick sort - Heap Sort - Merge Sort -comparison of sorting algorithms - Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1	Explain about the basic concepts of linear data structures.
CO2	Outline the usage of linear data structures like stacks and queues in program design
CO3	Infer knowledge about tree data structure and its applications.
CO4	Summarize about different graph traversal methods and applications of graphs.
CO5	Make use of appropriate searching, sorting and hashing techniques for solving a problem

TEXT BOOKS:

1. Rance D Necaise, *Data Structures and Algorithms using Python*, Wiley Student Edition.
2. Benjamin Baka, David Julian, 2017, *Python Data Structures and Algorithms*, Packt Publishers.

REFERENCES:

1. Lipschutz, S, 2008, *Data Structures*, 1st ed, Tata McGraw Hill Education.
2. Samanta, D, 2004, *Classic Data Structures*, 2nd ed, PHI Learning.

CS1371 DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Learn the fundamentals of data models and to represent a database system using ER diagrams.
- Study SQL and relational database design.
- Understand the internal storage structures using different file and indexing techniques which will help in physical DB design.

- Understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures.
- Learn about file organization and query processing

UNIT I INTRODUCTION TO DATABASE & ER MODEL 9

Introduction to Databases - File System Vs Database System - Database System Architecture- Database Users and Administrator - Data Models - Entity Relationship Model - E-R Diagrams - Design Issues - Extended E-R Features - Introduction to Relational Model - ER to Relational Schema Mapping

UNIT II RELATIONAL MODEL & SQL 9

Structure of Relational Databases - Relational Query Languages - Relational Algebra – SQL: DDL, DML, DCL, TCL - Simple Queries, Complex Nested Queries, Correlated Nested Queries, Joins, Aggregate Functions, Grouping - PL/SQL : Functions, Procedures, Triggers, Views - Embedded SQL - Dynamic SQL

UNIT III NORMALIZATION 9

Pitfalls in Bad Relational database design - Functional Dependencies (Closure of Functional dependencies) - Closure of Attributes - Normal Forms : First, Second, Third, Boyce Codd Normal Form, Multivalued Dependencies : Fourth Normal Form, Join Dependencies : Fifth Normal Form –Domain Key Normal Form

UNIT IV TRANSACTION AND CONCURRENCY CONTROL 9

Transaction processing concepts - Need for concurrency control and recovery - Recoverability – Transaction Recovery – Serializability : Conflict Serializability, View Serializability, Testing for Serializability - Concurrency Control : Lock Based Protocols (Two phase locking Techniques, Strict Two Phase Locking, Deadlocks, Multiple Granularity) Timestamp Based protocol, Validation Based protocol

UNIT V FILE ORGANIZATION & QUERY PROCESSING 9

File Organization: Organization of Records in Files, Indexing and Hashing, Ordered Indices - Query Processing: Measures of Query Cost (Selection, Sorting and Join Operation), Query Tuning, Query Optimization (Transformation of Relational Expressions, Choice of Evaluation Plans, Materialized Views) – No SQL – Mongo DB

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1	Infer the basic concepts of database system and model ER diagram for real time applications
CO2	Use appropriate SQL commands to store and access data from Relational Database
CO3	Construct normalized database for real world scenario using functional dependencies.
CO4	Illustrate the importance of transaction and concurrency control to maintain consistency in a database.
CO5	Interpret the mechanism incorporated in file organization and Query Processing.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F Korth, Sudharshan, S, 2017, *Database System Concepts*, 6th ed, Tata McGraw Hill.
2. Ramez Elmasri, Shamkant B Navathe, 2011, *Fundamentals of Database Systems*, 6th ed, Pearson Education.

REFERENCES:

1. Date, CJ, Kannan, A & Swamynathan, S, 2006, *An Introduction to Database Systems*, 8th ed, Pearson Education.
2. Raghu Ramakrishnan, 2015, *Database Management Systems*, 4th ed, McGraw-Hill College Publications.
3. G.K.Gupta, 2011, *Database Management Systems*, Tata McGraw Hill.

CS1372 SYSTEM PROGRAMMING AND OPERATING SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Understand the basic concepts about system software.
- Know about processes and threads.
- Familiarize with the scheduling algorithms and deadlock handling mechanisms.
- Implement various memory management schemes.
- Explain about file systems.

UNIT I SYSTEM SOFTWARE 9

System Software versus Application Software – Basic System Software: Assembler: Two pass assembler, Loader: Absolute and Bootstrap loader; Key terms: Relocation, linking, Macro Processor, Text Editor, Debugger, Device Driver, Compiler, and Interpreter.

Operating system objectives and functions - Operating System Structure - System Calls, System Programs, OS Generation and System Boot.

UNIT II PROCESS MANAGEMENT 9

Processes - Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; CPU Scheduling - Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues

UNIT III PROCESS SYNCHRONIZATION 9

Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock

UNIT IV STORAGE MANAGEMENT 8

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory

UNIT V FILE SYSTEMS 10

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management. File-System Interface - File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery. I/O Systems – I/O Hardware, Application I/O interface - Kernel I/O subsystem, Streams, Performance.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Explain different types of system software and its use

CO2 Illustrate the concepts of process, threads and CPU scheduling algorithms

CO3 Explain the algorithms used for concurrency and deadlock handling.

CO4 Make use of various memory management schemes

CO5 Demonstrate the concept of file systems.

TEXT BOOKS:

1. Leland L Beck, 1997, *System Software: An Introduction to Systems Programming*, 3rd ed, Pearson Education Asia.
2. Abraham Silberschatz, Peter Baer Galvin & Greg Gagne, 2018, O*perating System Concepts*, 9th ed, John Wiley and Sons Inc.

REFERENCES:

1. Andrew S Tanenbaum, 2004, *Modern Operating Systems*, 2nd ed, Pearson Education.
2. Elmasri, R, Carrick, A & Levine, D, 2010, *Operating Systems – A Spiral Approach*, Tata McGraw Hill Edition.
3. Achyut S Godbole & Atul Kahate, 2016, *Operating Systems*, McGraw Hill Education.
4. Gary Nutt, 2004, *Operating Systems*, 3rd ed, Pearson Education.
5. Harvey M Deitel, 2004, *Operating Systems*, 3rd ed, Pearson Education.
6. Daniel P Bovet & Marco Cesati, 2005, *Understanding the Linux kernel*, 3rd ed, O'Reilly.
7. Neil Smyth, 2011, *iPhone iOS 4 Development Essentials – Xcode*, 4th ed, Payload media.

EC1372 DIGITAL SYSTEM DESIGN AND MICROPROCESSORS

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Understand the concepts of Boolean functions and minimization techniques.
- Summarize the combinational circuits used to perform basic digital operations.

- Develop a synchronous/asynchronous counters and shift registers using sequential logic
- Understand the basic concepts of 8086 microprocessors.
- Gain knowledge in interfacing of I/O devices with 8086 processor

UNIT I DIGITAL FUNDAMENTALS 9

Review of Number systems, Logic gates, Boolean algebra - Boolean postulates and laws - Simplification using Boolean algebra, Canonical forms - Sum of product and Product of sum - Minimization using Karnaugh map - NAND and NOR Implementation

UNIT II COMBINATIONAL CIRCUITS 9

Realization of combinational logic using gates , Design of combinational circuits : Adder , Subtractor, Parallel adder / Subtractor, Magnitude Comparator, Code Converters, Parity generator and checker, Encoder, Decoder, Multiplexer, Demultiplexer - Function realization using Multiplexer, Decoder

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 9

Latches, Flip-Flops - SR, JK, D & T - Master Slave Flip Flops - Shift Registers - SISO, SIPO, PISO, PIPO, Design of synchronous counters - Modulo N counters, Random Sequence counters, Johnson counter, Ring counter

UNIT IV 8086 MICROPROCESSOR 9

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation

UNIT V I/O INTERFACING 9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display and Alarm Controller.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Outline the Boolean functions and various minimization techniques.

CO2 Illustrate the combinational circuits used to perform basic digital operations

CO3 Develop a synchronous/asynchronous counters and shift registers using sequential logic.

CO4 Make use of 8086 processor architecture, addressing mode and instruction set to develop Assembly Language Programming

CO5 Explain interfacing of I/O devices with 8086 processor.

TEXT BOOKS:

1. Morris Mano, M & Michael D Ciletti, 2017, *Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog,* 6th ed, Pearson Education.
2. Nagoor Kani, A, 2017, *Microprocessors and Microcontrollers*, McGraw hill, 2017 edition.
3. Charles H Roth, 2013, *Fundamentals of Logic Design*, 6th ed, Thomson Learning.

REFERENCES:

1. Wakerly JF, 2002, *Digital Design: Principles and Practices*, 2nd Ed, *Prentice-Hall*.
2. Givone, DD, 2003, *Digital Principles and Design*, Tata Mc-Graw Hill, New Delhi.
3. Thomas L Floyd, 2011, *Digital Fundamentals*, 10th ed, Pearson Education Inc.
4. Stephen Brown & Zvonko Vranesic, 2013,*Fundamentals of Digital Logic with Verilog Design*, 3rd ed, McGraw-Hill Higher Education, New Delhi, India.

CS1311 DATA STRUCTURES LABORATORY USING PYTHON

L	T	P	C
0	0	4	2

OBJECTIVES:

To enable the students to

- Understand the basic concepts of linear data structures.
- Gain knowledge about different non-linear data structures and its applications.
- Gain knowledge about different variants of tree structures.
- Be familiar with graph traversal methods and application of graphs.
- Be familiar with different searching, sorting and hashing techniques.

List of Experiments:

1. Basics of Python.
2. Array implementation of Stack and Queue ADTs.
3. Implementation of singly linked list.
4. Linked list implementation of Stack and Queue ADTs.
5. Applications of List ADT.
6. Applications of Stack and Queue ADTs.
7. Implementation of Binary Trees and operations of Binary Trees
8. Implementation of Binary Search Trees.
9. Implementation of AVL Trees.
10. Implementation of Heaps.
11. Graph representation, Traversal algorithms.
12. Applications of Graphs.
13. Implementation of searching and sorting algorithms.
14. Implementation of hashing with collision resolution techniques.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Develop programs to perform operations using stack and queues data structures

CO2 Apply the concepts of linked lists to solve a problem

CO3 Apply the appropriate non-linear data structure for solving the problem.

CO4 Make use of different searching and sorting algorithms

CO5 Build appropriate hash functions that result in a collision free scenario for data storage and retrieval

LIST OF LAB EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

Sl.No	Description of Equipment	Quantity Required
1.	Personal Computers (Intel Core i3, 500 GB, 4 GB RAM)	30
2.	Printer	1
3.	Software: Anaconda IDE	30
4.	Interpreter: Python3	30 users

CS1381 **DATABASE MANAGEMENT SYSTEMS LABORATORY**

L	T	P	C
0	0	4	2

OBJECTIVES:

To enable the students to:

- Learn the commands for creating and manipulating the databases.
- Construct queries for retrieval of required data from database.
- Understand views, sequences and synonyms concepts of SQL.
- Learn the functions, procedures, triggers and exception handling in SQL.
- Develop GUI based application for storage and retrieval of data

LIST OF EXPERIMENTS:

1. **WRITE AND EXECUTE SIMPLE QUERIES USING SQL**
   a. DDL, TCL and DCL commands
   b. DML commands
   c. Aggregate Functions
2. **WRITE AND EXECUTE ADVANCED QUERIES USING SQL**
   a. Nested Queries and Sub queries
   b. SQL Join
3. **WRITE AND EXECUTE VIEWS, SYNONYMS, SEQUENCE**
4. **WRITE AND EXECUTE QUERIES USING PL/SQL**
   a. Simple programs
5. **WRITE AND EXECUTE QUERIES USING ADVANCED CONCEPTS OF PL/SQL**
   a. Cursors and Procedures
   b. Functions
   c. Triggers
   d. Exception Handling
6. **IMPLEMENT DATABASE CONNECTIVITY CONCEPTS**
   a. Design a Front End for a real time application
   b. Connect the database with the application
7. **MINI PROJECT**

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1	Choose appropriate DDL, DML, DCL and TCL commands for creating and manipulating the databases
CO2	Construct appropriate nested queries, sub queries and join queries for efficient retrieval of data
CO3	Organize database using views, sequences, and synonyms
CO4	Implement functions, procedures, triggers and exceptions using PL/SQL
CO5	Develop a GUI based environment for storage and retrieval of data for a real time application

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

S. No.	Description of Equipment	Quantity Required
1.	Personal Computers (Intel Core i3, HDD 500 GB, 4 GB RAM)	30
2.	Printer	1
3.	Software: XAMPP with Apache, MySQL & PHP (or) MySQL & JAVA.	Open source

EC1381 DIGITAL SYSTEM DESIGN AND MICROPROCESSORS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

To enable the students to

- Design and implement the various combinational circuits.
- Design and implement combinational circuits using MSI devices.
- Design and implement sequential circuits.
- Implement and simulate 8086 programs in 8086 kit and MASM Assembler.
- Implement different I/Os with 8086 microprocessor.

LIST OF EXPERIMENTS:

Digital Experiments:

1. Verification of Boolean Theorems using basic gates

2. Design and implementation of combinational circuits using basic gates for arbitrary functions
3. Design and implementation of Half/Full Adder and Subtractor
4. Design and implementation of Encoder, Decoder, Multiplexer and Demultiplexer using logic gates
5. Design and implementation of Shift register (SISO, SIPO, PIPO) using Flip flops
6. Design and implementation of 2 bit Synchronous counters

Microprocessor Experiments:

8086 Programs using kits and MASM

1. Basic arithmetic and Logical operations
2. Move a data block without overlap
3. Code conversion, decimal arithmetic operations

Peripherals and Interfacing Experiments

1. Traffic light control
2. Stepper motor control
3. Keyboard and Display Interface

Mini project

1. Flashing of LEDS using NODE MCU/Arduino
2. Monitoring Temperature using LM35 sensor in NODEMCU/Arduino

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Experiment with the basics of gates.

CO2 Build different combinational circuits

CO3 Construct various sequential circuits

CO4 Experiment with 8086 microprocessor based programs.

CO5 Build different I/Os with 8086 microprocessor

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

S. No.	Description of Equipment	Quantity Required
1.	Digital trainer kits	15
2.	Digital ICs	50

3.	8086 Microprocessor trainer kit with power supply	15
4.	Traffic light control interfacing card compatible with 8086	5
5.	Stepper motor control interfacing compatible with 8086	5
6.	Keyboard & Display interface board compatible with 8086 kits	5

HS1321 INTERPERSONAL SKILLS - LISTENING AND SPEAKING

L	T	P	C
0	0	2	1

OBJECTIVES:

The course will enable learners to

- Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
- Improve general and academic listening skills
- Make effective presentations

UNIT I LISTENING AS A KEY SKILL 6

Listening as a key skill- its importance- speaking – give personal information – ask for personal information – express ability – enquire about ability – ask for clarification - Improving pronunciation– pronunciation basics –– stressing syllables and speaking clearly – intonation patterns – conversation starters: small talk.

UNIT II LISTEN TO A PROCESS INFORMATION 6

Listen to a process information- give information, as part of a simple explanation –– taking lecture notes – preparing to listen to a lecture – articulate a complete idea as opposed to producing fragmented utterances - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics

UNIT III LEXICAL CHUNKING 6

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk – greet – respond to greetings – describe health and symptoms – invite and offer – accept – decline – take leave – listen for and follow the gist- listen for detail

UNIT IV GROUP DISCUSSION **6**

Being an active listener: giving verbal and non-verbal feedback – participating in a group discussion – summarizing academic readings and lectures conversational speech listening to and participating in conversations – persuade- negotiate disagreement in group work**.**

UNIT V GROUP & PAIR PRESENTATIONS **6**

Formal and informal talk – listen to follow and respond to explanations, directions and instructions in academic and business contexts – strategies for presentations and interactive communication – group/pair presentations

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1 Develop their communicative competence in English with specific reference to listening

CO2 Prepare conversation with reasonable accuracy

CO3 Apply lexical Chunking for accuracy in speaking

CO4 Demonstrate their ability to communicate effectively in GDs.

CO5 Explain directions and instructions in academic and business contexts

TEXT BOOKS:

1. Brooks, Margret, 2011, *Skills for Success. Listening and Speaking. Level 4,* Oxford University Press, Oxford.
2. Richards, C, Jack& David Bholke, 2010, *Speak Now Level 3,* Oxford University Press, Oxford.

REFERENCES:

1. Bhatnagar, Nitin & Mamta Bhatnagar, 2010, *Communicative English for Engineers and Professionals,* Pearson, New Delhi.
2. Hughes, Glyn & Josephine Moate, 2014, *Practical English Classroom,* Oxford University Press, Oxford.
3. Vargo, Mari, 2013, *Speak Now Level 4*, Oxford University Press, Oxford.
4. Richards, C, Jack, 2006, *Person to Person (Starter)*, Oxford University Press, Oxford.
5. Ladousse, Gillian Porter, 2014, *Role Play*. Oxford University Press, Oxford.

WEB RESOURCES:

1. https://www.cambridge.org/elt/blog/wp-content/uploads/2019/10/Learning-Language-in-Chunks.pdf
2. https://english.eagetutor.com/english/628-how-to-greet-your-boss-people-in-office.html
3. https://www.groupdiscussionideas.com/group-discussion-topics-with-answers/
4. https://www.bbc.co.uk/worldservice/learningenglish/business/talkingbusiness/unit3presentations/1opening.shtml

SEMESTER IV

MA1473 PROBABILITY AND STATISTICS

L	T	P	C
3	1	0	4

OBJECTIVES:

To enable the students to

- Introduce the basics of random variables and some standard distributions that can describe real life phenomenon.
- Establish the basic concepts of two-dimensional random variables.
- Impart the knowledge of testing of hypothesis for small and large samples.
- Describe the basic principles in the design of simple experiments for comparing pairs of treatments.
- Introduce the basic concepts of statistical quality control that plays a vital role in the field of Engineering and Technology.

UNIT I PROBABILITY AND RANDOM VARIABLES 12

Probability – The axioms of probability – Conditional probability – Baye's theorem – Discrete and continuous random variables – Moments – Moment generating functions – Distributions: Binomial, Poisson, Uniform, Exponential and Normal.

UNIT II TWO-DIMENSIONAL RANDOM VARIABLES 12

Joint distributions – marginal and conditional distributions –covariance – correlation – Karl Pearson's correlation coefficient – Rank correlation – Spearman's rank correlation coefficient – Kendall's rank correlation coefficient - linear regression.

UNIT III TESTING OF HYPOTHESIS 12

Sampling distributions – Statistical Hypothesis – Type I and Type II errors – Tests for single mean and difference of means of large samples (z-test) and Small samples (t-test) – F-test for variance – chi-square test for goodness of fit – independence of attributes – Demo using Excel.

UNIT IV DESIGN OF EXPERIMENTS 12

Basic Principles of experimental design – Completely randomized design – Randomized block design – Latin square design – 2 level factorial design – Demo using Excel.

UNIT V STATISTICAL QUALITY CONTROL 12

Control charts for measurements ($\overline{X}$ and R charts for continuous data) – control charts for attributes (p, c, np and u charts for discrete data) – tolerance limits – Demo using Excel.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Solve various problems using random variables and distributions

CO2 Compute the correlation between two variables and linear regression equation for a set of data

CO3 Apply the concepts of testing of hypothesis for small and large samples in real life problems

CO4 Interpret the data using ANOVA and basic experimental design.

CO5 Apply the techniques of Statistical quality control in industrial Engineering problems

TEXT BOOKS:

1 Devore, J.L., 2017. *Probability and Statistics for Engineering and the Sciences*. Boston, Cengage Learning.

2 Johnson, R.A. and Gupta, C.B., 2017. *Miller and Freund's Probability and Statistics for Engineers*. New Delhi, Pearson India Education.

REFERENCES:

1 Milton, J.S. and Arnold, J.C., 2008. *Introduction to Probability and Statistics*. New Delhi, Tata McGraw Hill.

2 Ross, S.M., 2014. *Introduction to Probability and Statistics for Engineers and Scientists*. New Delhi, Elsevier.
3 Spiegel, M.R., Schiller, J., Srinivasan, R.A. and Goswami, D., 2017. *Introduction to Probability and Statistics for Engineers and Scientists*. New Delhi, Elsevier.
4 Walpole, R.E., Myers, R.H., Myers, S.L. and Ye, K., 2007. *Probability and Statistics for Engineers and Scientists*. Asia, Pearson Education.
5 Gupta, S.C. and Kapoor, V.K., 2020. *Fundamentals of Mathematical Statistics*. Sultan Chand & Sons.

CS1401 ANALYSIS OF ALGORITHMS

L	T	P	C
3	0	2	4

OBJECTIVES:

To enable the students to

- Apply the knowledge of computing and mathematics to algorithm design
- Explain Bruteforce and Divide-and-Conquer techniques
- Identify the algorithm efficiency for Greedy and Dynamic programming techniques
- Be familiar with Iterative improvement techniques
- Understand the limitations of Algorithm power

UNIT I INTRODUCTION 9

Notion of an Algorithm - Fundamentals of Algorithmic Problem Solving - Important Problem Types - Performance analysis - space and time complexity - Growth of function – Big-Oh, Omega, theta notation - Asymptotic Notations and its properties-Recurrent equations and the master theorem - Empirical Analysis - Mathematical analysis for Recursive and Non-recursive algorithms - Visualization

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER 9

Brute Force – String Matching - Closest-Pair and Convex-Hull Problems-Exhaustive Search - Traveling Salesman-Problem - Knapsack Problem - Assignment problem-Divide and conquer methodology – Merge sort – Quick sort – Randomized version of quick sort and analysis – Heap Sort - Binary search – Strassen's matrix multiplication - Closest pair and Convex hull problems

UNIT III GREEDY TECHNIQUE AND DYNAMIC PROGRAMMING 9

Greedy Technique– Container loading problem Minimum cost spanning tree Prim's algorithm-Kruskal's Algorithm-Dijkstra's Algorithm- Job sequencing with deadlines - Huffman Trees - Dynamic programming – Principle of optimality – Coin changing problem-Computing a Binomial Coefficient – Warshall's and Floyd' algorithm – Optimal Binary Search Trees – 0/1 Knapsack Problem and Memory functions

UNIT IV ITERATIVE IMPROVEMENT 9

The Simplex Method-The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs-The Stable Marriage Problem.

UNIT V COPING WITH THE LIMITATIONS OF ALGORITHM POWER 9

Lower-Bound Arguments-Decision Trees-P, NP and NP-Complete Problems-Coping with the Limitations - Backtracking – n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem – Branch and Bound – Assignment problem – Knapsack Problem – Traveling Salesman Problem- Approximation Algorithms for NP – Hard Problems – Traveling Salesman problem – Knapsack problem

THEORY : 45 PERIODS

LIST OF EXPERIMENTS:

1. Implement sorting algorithms and compare the algorithm time complexity for various n values
2. Implementation of Greedy Technique– Container loading problem, Huffman Tree
3. Implementation of Dynamic Programming - 0/1 Knapsack algorithm
4. Implement subset sum problem using backtracking technique
5. Implementation of Iterative improvement technique - Stable marriage problem
6. Implement N-Queens problem using backtracking technique

PRACTICAL : 30 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

S. No.	Description of Equipment	Quantity Required
1.	Personal Computers (Intel Core i3, HDD 500 GB, 4 GB RAM)	30

2.	Printer	1
3.	Software: Python 3.6	Open source

TOTAL : 75 PERIODS

COURSE OUTCOMES:

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

CO1 Identify the time and space complexity of computational problems

CO2 Make use of Bruteforce and Divide and Conquer techniques for sorting and searching Problems

CO3 Apply Greedy and Dynamic Programming techniques for Graph and Combinatorial Problems

CO4 Identify the roles of iterative improvement technique to solve optimization problems.

CO5 Explain the use of Backtracking, Branch & Bound and approximation techniques to overcome the limitations of NP-Complete and NP-Hard Problems

TEXT BOOKS:

1. Anany Levitin, 2012, *Introduction to the Design and Analysis of Algorithms*, 3rd ed, Pearson Education.
2. Ellis Horowitz, Sartaj Sahni & Sanguthevar Rajasekaran, 2007, *Computer Algorithms/ C++*, 2nd ed, Universities Press.

REFERENCES:

1. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest & Clifford Stein, 2012, *Introduction to Algorithms*, 3rd ed, PHI Learning Private Limited.
2. Alfred V Aho, John E Hopcroft & Jeffrey D Ullman, 2006, *Data Structures and Algorithms*, Pearson Education, Reprint.

CS1402 SOFTWARE ENGINEERING WITH UML DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Learn the fundamental concepts of software process and requirements engineering
- Explore UML static modeling

- Explore UML dynamic modeling
- Learn the various management concepts
- Understand the different testing strategies

UNIT I SOFTWARE PROCESS AND REQUIRMENTS ENGINEERING 9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process-Requirements Engineering- Functional and non-functional requirements- The software requirements document-Requirements specification- Requirements engineering processes-Requirements elicitation and analysis- Requirements validation- Requirements management

UNIT II STATIC MODELING 9

Use case Modeling - Relating Use cases – include, extend and generalization - Elaboration - Domain Models - Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class hierarchies - Aggregation and Composition - UML activity diagrams and modeling

UNIT III DYNAMIC MODELING AND IMPLEMENTATION 9

System sequence diagrams – Communication diagrams - Relationship between sequence diagrams and use cases - Logical architecture and UML package diagram – Logical architecture refinement - UML class diagrams – relationship – inheritance – Abstract classes –Operation contracts - Mapping design to code – Test driven development – Refactoring – UML tools and UML as blueprint - UML state machine diagrams and modeling - UML deployment and component diagrams – Designing for visibility - Adopting Agile modeling on an UP project

UNIT IV DESIGN AND MANAGEMENT CONCEPTS 9

Design Process-Design Concepts-Design Model-Software Configuration Management-The SCM Repository-The SCM process – Project Management Concepts: The management Spectrum-People-The Product-The process- The Project-Project Scheduling-Risk Management

UNIT V SOFTWARE TESTING STRATEGIES 9

Test Strategies for Conventional Software-Validation Testing-System Testing- Testing Conventional Applications: White-Box Testing - Basis Path Testing-Control Structure Testing - Black box testing: Equivalence Partitioning-Boundary Value Analysis

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Develop life cycle models for software development

CO2 Model the static features of a system.

CO3 Model the dynamic features of a system.

CO4 Illustrate the different management techniques.

CO5 Demonstrate the various testing methodologies.

TEXT BOOKS:

1. Roger S Pressman, 2014, *Software Engineering: A practitioner's Approach*, 7th ed, McGraw-Hill International Edition.
2. Craig Larman, 2015, *Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design*," 3rd ed, Pearson Publishers.

REFERENCES:

1. Bhuvan Unhelkar, 2018, *Software Engineering with UML*, 1st edition, Auerbach Publications.
2. Martina Seidl, Marion Scholz, Christian Huemer & Gerti Kappel, 2015, *UML @ Classroom: An Introduction to Object-Oriented Modeling,* Springer Verlag.

IT1371 COMPUTER ORGANIZATION AND ARCHITECTURE

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Understand the basic structure, operations and instructions of a digital computer.
- Learn the implementation of fixed point and floating-point arithmetic operations.
- Be familiar with the basic processing unit and multiple functional units in a processor.
- Understand the hierarchical memory system and I/O organization.
- Learn the concepts of instruction-level parallelism, data-level parallelism and loop-level parallelism.

UNIT I BASIC STRUCTURE OF COMPUTERS 9

Functional Units – Basic Operational Concepts – Bus Structures – Software – Performance: Processor Clock, Basic Performance Equation, Clock Rate – Instruction Set: CISC and RISC – Memory Locations and Addresses – Memory Operations – Instructions and Instruction Sequencing – Addressing Modes – Basic Input/output Operations.

UNIT II ARITHMETIC UNIT 9

Addition and Subtraction of Signed Numbers – Design of Fast Adders – Multiplication of Positive Numbers – Signed Operand Multiplication – Fast Multiplication – Integer Division – Floating Point Numbers and Operations.

UNIT III PROCESSING UNIT 9

Basic Processing Unit: Fundamental Concepts – Execution of a complete instruction – Multiple-bus organization – Hardwired Control – Microprogrammed control – Pipelining: Basic Concepts – Data Hazards – Instruction Hazards – Datapath and Control Considerations

UNIT IV MEMORY SYSTEMS & INPUT/OUTPUT ORGANIZATION 9

Memory Systems: Basic Concepts – Cache Memories – Performance Considerations – Virtual Memories – Memory Management Requirements – Secondary Storage – Input / Output Organization: Accessing I/O Devices – Interrupts – Direct Memory Access – Buses – Synchronous Bus – Asynchronous Bus.

UNIT V PARALLEL PROCESSING 9

Instruction-Level Parallelism: Concepts and Challenges – Basic compiler techniques for exposing ILP – Overcoming Data Hazards with Dynamic Scheduling – Dynamic Scheduling: Examples and the Algorithm – Data-Level Parallelism: Introduction – Vector Architecture – Graphics Processing Units – Detecting and Enhancing Loop-Level Parallelism.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Summarize the functionalities of various parts, instruction sets and operations of a digital computer.

CO2 Utilize the logic design for fixed-point and floating point arithmetic.

CO3 Interpret the role of a processing unit and multiple functional units.

CO4 Explain the various elements in memory hierarchy and the basic and complex I/O structures.

CO5 Demonstrate how parallelism is used at instruction-level and data-level parallelism.

TEXT BOOK:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky & Naraig Manjikian, 2012, *Computer Organization and Embedded Systems*, 6th ed, Tata McGraw Hill.

REFERENCES:

1. David A. Patterson & John L. Hennessy, 2014, *Computer Organization and Design: The Hardware/Software Interface*", 5th ed, Morgan Kaufmann / Elsevier.
2. William Stallings, 2010, *Computer Organization and Architecture – Designing for Performance*, 8th ed, Pearson Education.
3. John P. Hayes, 2012, *Computer Architecture and Organization*, 3rd ed, Tata McGraw Hill.

AD1372 INTRODUCTION TO ARTIFICIAL INTELLIGENCE

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Understand the various characteristics of Intelligent agents
- Learn the different search strategies in Artificial Intelligence
- Be familiar with represent knowledge in solving Artificial Intelligence problems
- Understand the agent communication and Trust and Reputation
- Know about the various applications of Artificial Intelligence.

UNIT I INTRODUCTION 9

Introduction–Definition - The Foundations of Artificial Intelligence- Characteristics of Intelligent Agents -Turing test – Agents and Environments - Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents; Problem Solving Approach to Typical AI problems

UNIT II PROBLEM SOLVING USING SEARCHING 9

Problem-Solving Agents, Formulating problems, searching for Solutions, Uninformed Search Strategies, Breadth-first search, Depth-first search, searching with Partial Information, Informed Search Strategies, Greedy best-first search, A* Search-IDA*- Heuristic Functions, Local Search Algorithms and Optimization Problems - Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning.

UNIT III LOGIC AND INFERENCES 9

Propositional Logic - First Order Logic – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories.

UNIT IV AGENT COMMUNICATION 9

Architecture for Intelligent Agents – Agent communication - Agents and Objects – Negotiation and Bargaining –Argumentation among Agents – Trust and Reputation in Multi-agent systems.

UNIT V APPLICATIONS 9

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1 Explain the various characteristics of intelligent agents.

CO2 Interpret appropriate search algorithms for Artificial Intelligence problem.

CO3 Illustrate a Knowledge Representation using first order logic.

CO4 Infer different ways of the agent communication and Trust and Reputation in Multi-agent systems.

CO5 Summarize the various application of AI.

TEXTBOOK:

1. Russell, S & Norvig, P, 2020, *Artificial Intelligence: A Modern Approach,* 4th ed, Prentice Hall.

REFERENCES:

1. Elaine Rich & Kevin Knight, 2008, *Artificial Intelligence*, 3rd ed, Tata McGraw-Hill.
2. Tim Jones, M, 2008, *Artificial Intelligence: A Systems Approach (Computer Science)*, 1st ed, Jones and Bartlett Publishers, Inc.
3. Nils J Nilsson, 2009, T*he Quest for Artificial Intelligence*, Cambridge University Press.
4. Gerhard Weiss, 2013, *Multi Agent Systems*, 2nd ed, MIT Press.
5. David L Poole & Alan K Mackworth, 2010, *Artificial Intelligence: Foundations of Computational Agents*, Cambridge University Press.

GE1471 PROFESSIONAL ETHICS AND HUMAN VALUES

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Create an awareness on Engineering Ethics and Human Values.
- Instill Moral and Social Values and
- Impart Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES 10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue –Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time –Cooperation –Commitment – Empathy – Self-confidence – Character – Spirituality – Stress management Techniques.

UNIT II ENGINEERING ETHICS 9

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg‘s theory – Gilligan‘s theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR)– Discrimination.

UNIT V GLOBAL ISSUES 8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development –Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors –Moral Leadership –Code of Conduct – Corporate Social Responsibility.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Summarize the various Morals, Values, Ethics, Integrity and other Human Values

CO2 Describe the Senses of Engineering ethics, its related Theories and Models of Professional Roles

CO3 Explain the Codes of Ethics for various Engineering Experiments.

CO4 Examine the various Risk, Safety and Risk Benefit Analysis for a Product/Service in an Organization

CO5 Explain the Various Global Issues in Ethics and Review the Responsibilities and Rights of Professionals and Employees in an Organization

REFERENCES:

1. Mike W. Martin & Roland Schinzinger, 2017, *Ethics in Engineering*, 4th ed, McGraw Hill.
2. Govindarajan M, Natarajan S & Senthil Kumar, VS, 2004, *Engineering Ethics*, Prentice Hall of India.
3. Charles B. Fleddermann, 2012, *Engineering Ethics*, 4th ed, Prentice Hall.
4. Charles E Harris, Michael S Pritchard, Raw W James, Elaine E Englehardt & Michael J Rabins, 2019, *Engineering Ethics –Concepts and Cases*, 12th ed, Cengage Learning.

5. John R Boatright & Jeffery Smith, 2016, *Ethics and the Conduct of Business*, 8th ed, Pearson Education.
6. Edmund G Seebauer & Robert L Barry, 2001, *Fundamentals of Ethics for Scientists and Engineers*, South Asia Edition, Oxford University Press.

CS1411 CASE TOOLS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

To enable the students to

- Capture the requirements specification for an intended software system and prepare SRS for a software system.
- Draw the entity relationship diagram and data flow diagram for the application.
- Draw the UML diagrams for the given specification
- Map the design properly to code
- Test the software system thoroughly for any scenarios

LIST OF EXPERIMENTS:

1. Identify the requirements specification for a software system and prepare SRS document for the identified system.
2. Draw the Entity Relationship Diagram and Data Flow Diagram for the selected case study
3. Study the basic concepts and diagrams of UML.
4. Identify use cases and develop the Use Case diagram for a system
5. Identify the conceptual classes and develop a Domain Model for a software system. Draw a Class Diagram for the identified system.
6. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence diagram.
7. Draw the UML Collaboration Diagram for the identified scenarios.
8. Draw relevant State Chart and Activity Diagrams for the same system.
9. Implement the system as per the detailed design
10. Test the software system for all the scenarios identified as per the use case diagram
11. Improve the reusability and maintainability of the software system by applying appropriate design patterns.
12. Implement the modified system and test it for various scenarios

SUGGESTED TOPICS FOR MINI-PROJECT:

1. Passport automation system.
2. Book bank
3. Exam registration
4. Stock maintenance system.
5. Online course reservation system
6. Airline/Railway reservation system
7. Software personnel management system
8. Credit card processing
9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference management system
13. BPO management system
14. Library management system
15. Student information system

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Identify the requirements specification for a software system and prepare SRS for applications.

CO2 Construct the entity relationship diagram and data flow diagram for the application.

CO3 Construct the UML diagrams for the given specification of the software system.

CO4 Utilize the design and map to code.

CO5 Experiment with the developed code using test cases.

LIST OF LAB EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

Sl.No	Description of Equipment	Quantity Required
1.	Hardware Requirements Personal Computers (Intel Core i3, 500 GB, 4 GB RAM)	30
2.	Printer	1
3.	SOFTWARE TOOLS	

	Rational Suite 30 user License Open-Source Alternatives: ArgoUML, Visual Paradigm Eclipse IDE and JUnit, PCs	30

HS1421 AN INTRODUCTION TO ADVANCED READING AND WRITING

L	T	P	C
0	0	2	1

OBJECTIVES:

The course will enable learners to

- To strengthen the reading skills of students of engineering.
- To enhance their writing skills with specific reference to technical writing
- To develop their critical thinking skills.
- To provide more opportunities to develop their project and proposal writing skills

UNIT I EFFECTIVE READING 6

Reading – Strategies for effective reading-Use glosses and footnotes to aid reading comprehension- Read and recognize different text types-Predicting content using photos and title. Reading-Read for details-Use of graphic organizers to review and aid comprehension.

UNIT II CRITICAL READING 6

Reading– Understanding pronoun reference and use of connectors in a passage- speed reading techniques. Reading– Genre and Organization of Ideas- Reading– Critical reading and thinking-understanding how the text positions the reader.

UNIT III PARAGRAPH WRITING 6

Writing-Plan before writing- Develop a paragraph: topic sentence, supporting sentences, concluding sentence.-Write a descriptive paragraph Writing-State reasons and examples to support ideas in writing– Write a paragraph with reasons and examples- Write an opinion paragraph

UNIT IV ESSAY WRITING 6

Writing– Elements of a good essay - Types of essays- descriptive-narrative- issue-based-

argumentative-analytical.

UNIT V EFFECTIVE WRITING 6

Writing– Email writing- visumes – Job application- Report Writing - Project writing-Writing convincing proposals

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1 Understand how the text positions the reader

CO2 Develop critical thinking while reading a text

CO3 Develop a descriptive paragraph

CO4 Make use of sentence structures effectively when creating an essay.

CO5 Demonstrate proper usage of grammar in writing E-Mails, Job application and project proposals

TEXT BOOKS:

1. Gramer, F, Margot & Colin, S, Ward, 2011, *Reading and Writing (Level 3)* Oxford University Press, Oxford.
2. Debra Daise, CharlNorloff, and Paul Carne, 2011, *Reading and Writing (Level 4)* Oxford University Press: Oxford.

REFERENCE BOOKS:

1. Davis, Jason & Rhonda LIss. 2006 *Effective Academic Writing (Level 3)* Oxford University Press: Oxford.
2. E. Suresh Kumar and et al. 2012, *Enriching Speaking and Writing Skills,* Second Edition, Orient Black swan: Hyderabad.
3. Withrow, Jeans and et al. 2004 *Inspired to Write. Readings and Tasks to develop writing skills*, Cambridge University Press: Cambridge.
4. Goatly, Andrew, 2000 *Critical Reading and Writing*, Routledge: United States of America.
5. Petelin, Roslyn & Marsh Durham, 2004 *The Professional Writing Guide: Knowing Well and Knowing Why*, Business & Professional Publishing: Australia.

WEB RESOURCES:

- http://learnenglishteens.britishcouncil.org/skills/reading
- https://learnenglish.britishcouncil.org/skills/reading
- https://www.readingrockets.org/article/25-activities-reading-and-writing-fun
- https://linguapress.com/advanced.htm