Third Semester (Regular)									
S.No.	Course Code	Course		Contact Hours	Total Contact Hours/week	Total credits	Marks		
				L – T - P			CIE	SEE	Total
1	18MATIS31	Statistical- Numerical – Fourier Techniques	BS	4 – 0 – 0	4	4	50	50	100
2	18IS32	Data Structures with C	PC	4 – 0 – 0	4	4	50	50	100
3	18IS33	Digital Electronics	PC	3 – 2 – 0	5	4	50	50	100
4	18IS34	Object Oriented Programming with Java	PC	3 – 0 – 0	3	3	50	50	100
5	18IS35	Computer Organization	PC	3 – 0 – 0	3	3	50	50	100
6	18ISL36	Web Programming (Integrated)	PC	2 – 0 – 2	4	3	25	25	50
7	18ISL37	Data Structures with C Lab	LAB	0 – 0 – 3	3	1.5	25	25	50
8	18ISL38	Object Oriented Programming with Java Lab	LAB	0 – 0 – 3	3	1.5	25	25	50
9	18IS39	Environmental Science	HS	2 – 0 – 0	2	MNC	25	-	25
		Total			31	24	350	325	675

Third Semester (Diploma)									
S.No.	Course Code	Course		Contact Hours	Total Contact Hours/week	Total credits	Marks		
				L – T - P			CIE	SEE	Total
1	18DMATIS31	Calculus, Fourier Analysis and Linear Algebra	BS	4 – 0 – 0	4	4	50	50	100
2	18IS32	Data Structures with C	PC	4 – 0 – 0	4	4	50	50	100
3	18IS33	Digital Electronics	PC	3 – 2 – 0	5	4	50	50	100
4	18IS34	Object Oriented Programming with Java	PC	3 – 0 – 0	3	3	50	50	100
5	18IS35	Computer Organization	PC	3 – 0 – 0	3	3	50	50	100
6	18ISL36	Web Programming(Integrated)	PC	2 – 0 – 2	4	3	25	25	50
7	18ISL37	Data Structures with C Lab	LAB	0 – 0 – 3	3	1.5	25	25	50
8	18ISL38	Object Oriented Programming with Java Lab	LAB	0 – 0 – 3	3	1.5	25	25	50
9	18IS39	Environmental Science	HS	2 – 0 – 0	2	MNC	25	_	25
		Total			31	24	350	325	675

MNC: Mandatory Non-credit course. Pass in this course is mandatory for the award of degree.

Statistical – Numerical – Fourier Techniques (Theory)

Course Code	18MATIS31	**Credits**	4
Course type	BS	**CIE Marks**	50 marks
Hours/week: L-T-P	4– 0– 0	**SEE Marks**	50 marks
Total Hours:	40	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. Learn Numerical methods to solve Algebraic, Transcendental and Ordinary Differential Equations.
2. Understand the concept of Fourier series and apply when needed.
3. Get acquainted with Fourier Transforms and its properties.
4. Study the concept of Random variables and its applications.
5. Get acquainted with Joint Probability Distribution and Stochastic processes.

Pre-requisites : 1. Basic Differentiation and Integration
2. Basic Probabilities
3. Basic Statistics

Unit – I **8 Hours**

Numerical solution of Algebraic and Transcendental equations:

Method of false position, Newton- Raphson method (with derivation), Fixed point iteration method (without derivation).

Numerical solution of Ordinary differential equations: Taylor's Series method, Euler and Modified Euler method, Fourth order Runge–Kutta method.

Unit – II **8 Hours**

Fourier Series: Convergence and Divergence of Infinite series of positive terms (only definitions). Periodic functions, Dirichlet's conditions, Fourier Series, Half Range Fourier sine and cosine Series. Practical examples. Harmonic analysis.

Unit – III **8 Hours**

Fourier transforms : Infinite Fourier Transform and Properties. Fourier Sine and Cosine Transforms Properties and Problems.

Unit – IV **8 Hours**

Probability: Random Variables (RV), Discrete and Continuous Random variables, (DRV,CRV) Probability Distribution Functions (PDF) and Cumulative Distribution Functions(CDF), Expectations, Mean, Variance. Binomial, Poisson, Exponential and Normal Distributions. Practical examples.

Unit – V **8 Hours**

Joint PDF and Stochastic Processes: Discrete Joint PDF, conditional Joint PDF, Expectations (Mean, Variance and Covariance). Definition and classification of stochastic processes. Discrete state and discrete parameter stochastic process, Unique fixed probability vector, Regular Stochastic Matrix, Transition probability, Markov chain.

Text Books

1. B.S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012 and onwards.
2. P.N.Wartikar & J.N.Wartikar– Applied Mathematics (Volume I and II) Pune Vidyarthi Griha Prakashan, 7th Edition 1994 and onwards.
3. B. V. Ramana- Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd.

Reference Books

1. Erwin Kreyszig –Advanced Engineering Mathematics, John Wiley & Sons Inc., 9th Edition, 2006 and onwards
2. Peter V. O' Neil – Advanced Engineering Mathematics, Thomson Brooks/Cole, 7th Edition, 2011 and onwards.
3. Glyn James – Advanced Modern Engineering Mathematics, Pearson Education, 4th Edition, 2010 and onwards.

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Use** Numerical methods and **Solve** Algebraic, Transcendental and Ordinary differential equations.	**L3**
2. **Develop** frequency bound series from time bound functions using Fourier series.	**L3**
3. **Understand** Fourier Transforms and its properties.	**L2**
4. **Understand** the concept of Random variables, PDF, CDF and its applications.	**L2**

5.	**Extend** the basic probability concept to Joint Probability Distribution, Stochastic processes.	**L2**
6.	**Apply** Joint Probability Distribution, Stochastic processes to solve relevant problems.	**L3**

	Program Outcome of this course (POs)	**PO No.**
1.	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**PO1**
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.	**PO2**
3.	**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.	**PO5**

Course delivery methods

1. Chalk and board
2. PPT
3. Video lectures
4. Scilab/Matlab/ R-Software

Assessment methods

1. Internal assessment
2. Assignment
3. Quiz

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks :50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE : 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

Data Structures with C(Theory)

Course Code	18CS32/18IS32	**Credits**	04
Course type	PC4	**CIE Marks**	50 marks
Hours/week: L-T-P	4– 0 – 0	**SEE Marks**	50 marks
Total Hours:	Lecture = 45Hrs; Tutorial = 0Hrs Total = 45Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To learn the fundamentals of data structure and realize their importance in designing variety of applications.
2. To illustrate the implementation of data structures such as stack, queue and linked list and to apply tem for the given problem.
3. To introduce non linear data structures like Binary Tree, Heap, AVL tree and their applications and also to provide insight of advanced searching techniques like Hashing.
4. To create and use appropriate data structures for solving real life problems.

Pre-requisites : Basic computer concepts & C programming.

Unit - I **09 Hours**

Pointers, Structures: Introduction to Pointers, Pointers and Arrays, Pointers to Pointers, **Pointers to functions**, Dynamic memory management in C (malloc(), calloc(), free() and realloc() functions). Introduction to Structures, Declaration, Initialization, Accessing Structures, Internal implementation of Structures, Union and its Definition.

Self-learning topics : Enumerations.

Unit - II **09Hours**

Files, Linked lists:

Files in C: Text input output with respect to files in C, Basic file handling functions in C.

General linear lists: Basic operations, Implementation, List ADT. Complex implementations: circular linked lists, doubly linked lists.

Unit - III **09Hours**

Stacks & Queues:

Stacks: Basic Stack operations, Stack ADT, Stack linked list Implementation, Stack applications: Conversion of Expression (Infix to Postfix), Evaluation of Expressions.

Queues: Queues, Queue ADT, Circular Queues Linked list design, Queue applications.

Self-learning topics: : Implementation of stacks and queues using arrays

Unit - IV **09Hours**

Trees: Basic tree concepts, Binary trees, Binary search tree ADT, general trees, Binary search tree (BST) concept, BST operations, BST Applications. AVL trees basic concepts.

Unit - V **09Hours**

Heaps and Hashing

Heap: Basic concepts, Heap implementation, Heap ADT, Heap applications

Hashing: Basic concept, Hashing methods, collision resolution.

Books

Text Books:

1. Richard.F.Gilberg, Behrouz.A. Forouzan, Data Structures: A Pseudocode Approach with C, Cengage Learning, 2nd edition 2007 and onwards
2. Horowitz, Sahni, Anderson-Freed, Fundamentals of Data Structures in C, Universities Press, 2nd Edition, 2007 and onwards.

Reference Books:

1. Yedidyah, Augenstein, Tannenbaum: Data Structures Using C and C++, Pearson Education, 2nd Edition and onwards.
2. ReemaThareja, Data structures using C, Oxford Higher Education, 1st edition, 2011 onwards

E-resourses

1. **NPTELcourse link** : https://nptel.ac.in/courses/106102064/
2. **SWAYAM course link:** https://swayam.gov.in/course/1407-programming-and-data-structures
3. **edx course link:** https://www.edx.org/course/data-structures-fundamentals

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Explore** the fundamental concepts of various data structures.	L1
2.	**Analyze** and represent various data structures.	L3
3.	**Design** algorithms for different data structures like Stack, Queue, List, Tree and Hashing.	L3
4.	**Develop** programs with suitable data structures based on requirements of real world applications.	L3

	Program Outcome of this course (POs)	**PO No.**
1.	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
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.	**2**
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.	**3**
4.	Life-long learning: Recognize the need for, have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	**12**

	Course delivery methods		**Assessment methods**
1.	Chalk and board	1.	Internal assessment
2.	PPT	2.	Assignment
3.	Video lectures	3.	Quiz

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks :50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE : 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

Digital Electronics (Theory)

Course Code	18CS33/18IS33	**Credits**	04
Course type	PC	**CIE Marks**	50 marks
Hours/week: L-T-P	3 – 2 – 0	**SEE Marks**	50 marks
Total Hours:	Lecture = 40Hrs; Tutorial = 08Hrs Total= 48Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. Introduce the basics of Minimizing Boolean functions by using various techniques like K-Map and Quine Mclusky methods and implement by using suitable Logic gates and MSI chips.
2. Discuss the combinational logic circuits like Full Adder, Subtractor, Magnitude Comparators, Code Converters etc. and implement by using logic gates/ ICs.
3. Present the working of sequential circuits like Flip- Flops, Registers, Counters, ADC/DAC and their applications.
4. Understand the concept of HDL programming and realize Boolean functions and data processing circuits.

Pre-requisites : Basic Electronics

Unit – I 08 Hours

Revision of Logic gates and Boolean algebra, Simplification of Boolean functions using Basic Logic gates, Universal Gates, SOP, POS form, K-Map Simplification (up to 4 variables), Don't-care Condition, Quine McClusky method to generate Prime Implicants, Prime Implicants chart, problem solving with multiple methods.

Tutorial: Implementation of SOP/POS Boolean function using Universal gates.

Unit – II **08 Hours**

Data Processing Circuits: Multiplexers, De-multiplexers, Decoder, Encoders and implementation of Boolean functions using multiplexer and Decoders, Parity Generators and Checkers using XOR gates Magnitude Comparators (1 bit and 2 bit), PLA, PAL, Adder / Subtracter.

Tutorial: Implementation of Boolean functions using Multiplexer/Decoder, Realization of Adder/Substracter using logic gates.

Unit – III **08 Hours**

Clocks and Flip Flops: Clock waveforms, TTL clock, RS Flip Flops, Gated flip-flops, Edge triggered RS Flip-Flops, Edge triggered D Flip-Flops, and Edge triggered JK Flip-Flops, JK master slave Flip Flops, various representations of Flip Flops.

Tutorial: Implementation of flip flops using logic gates.

Unit – IV **08 Hours**

Analysis of Sequential Circuits: Conversion of flip flops: A synthesis example, Types of Shift Register, SISO, SIPO, PISO and PIPO, Applications of Shift Registers as Ring Counter, Johnson Counter, Serial Adder.

Counters: Asynchronous counters (4 bit), Synchronous Counters (4 bit), Changing the counter Modulus, Decade counter (using IC 7490).

Tutorial: Application of IC 7490, Design and implementation of MOD-N counter

Unit – V **08 Hours**

DAC, ADC and Introduction to HDL: Variable, Resistor Networks, Binary Ladders, D/A converters, D/A Resolution and Accuracy, A/D converters: Simultaneous Conversion, Successive Approximation and Counter type, A/D Resolution and Accuracy.

Introduction to HDL: Types of Model, Syntax for Data Flow model.

Tutorial: Simple programs for SOP equation, Multiplexer, Decoder and Adder using Verilog.

Books

Text Books:

1. Donald P Leach, Albert Paul Malvino and Goutam Saha: Digital Principles and Applications, 7th Edition and onwards, Tata McGraw Hill, 2011.

Reference Books:

1. Donald Givone: Digital Principles and Design, Palgrave Macmillan, 2003 and onwards.
2. R D Sudhaker Samuel: Illustrative Approach to Logic Design, Sanguine-Pearson, 2012 and onwards.
3. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss: Digital Systems Principles and Applications, 10th Edition, Pearson Education, 2007 and onwards.

E-resourses (NPTEL/SWAYAM.. Any Other)- mention links

1. **https://nptel.ac.in/courses/117106086/**

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Analyze** different simplification methods for Boolean functions and design the logic circuits.	**L4**
2. **Realize** the combinational and sequential logic circuits by using various logical blocks	**L3**
3. **Design** synchronous counters and develop sequential circuit applications using flip flop and registers.	**L4**
4. **Develop** simple HDL programs for combinational logic circuits.	**L3**

Program Outcome of this course (POs)	PO No.
1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
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	**2**
3. **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	**5**
4. **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.	**12**

Course delivery methods	Assessment methods
1. Chalk and board	1. Internal assessment
2. PPT	2. Assignment
3. Video lectures	3. Quiz
	4. Seminar / project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks :50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE : 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

Object Oriented Programming with Java (Theory)

Course Code	18CS34/18IS34	**Credits**	03
Course type	PC	**CIE Marks**	50 marks
Hours/week: L-T-P	3 – 0 – 0	**SEE Marks**	50 marks
Total Hours:	Lecture = 40 Hrs; Tutorial = 00 Hrs Total = 40 Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. Understand the fundamentals of object-oriented programming in Java.
2. Demonstrate the features of object-oriented programming such as encapsulation, inheritance and polymorphism to design and develop programs in Java.
3. Understand exception handling mechanism supported in Java to handle run time errors.
4. Understand the concept of packages and interfaces in Java.
5. To introduce the design of Graphical User Interface (GUI) programming through Java Swing.

Pre-requisites: Basics programming concepts.

Unit – I 08 Hours

OOP Paradigm: The key attributes of object-oriented programming.

Java basics: The Java language, JDK, arrays, multidimensional arrays, alternative array declaration, assigning array references, using the length member, the for-each loop, Strings, using the command line arguments.

Introducing classes and objects: Class fundamentals, how objects are created, reference variables and assignment.

Unit – II 08 Hours

Methods and classes: methods, returning from a method, returning a value, using parameters, constructors, parameterized constructors, the new operator revisited, garbage collection and finalizers, this keyword. controlling access to class members, pass objects to methods, argument passing,

returning objects, method overloading, recursion, static, nested and inner classes, varargs.

Unit – III **08 Hours**

Inheritance: Inheritance basics, member access and inheritance, constructors and inheritance, using super, multilevel hierarchy, when are constructors executed, superclass reference and subclass objects, method overriding, polymorphism, using abstract classes, using final, the Object class.

Interfaces: interface fundamentals, creating, implementing and using interfaces, implementing multiple interfaces, constants in interfaces, extending interfaces and nested interfaces.

Unit – IV **08 Hours**

Packages: Package fundamentals, packages and member access, importing packages, static import.

Exception handling: the exception hierarchy, exception handling fundamentals, uncaught exceptions, handle errors gracefully, multiple catch, catching subclass exceptions, nested try, throwing exception, throwable, using finally and throws, built-in exceptions, new exception features in JDK7, creating exception subclasses.

String Handling: String fundamentals, constructors, String related language features, length(), obtaining characters within a String, String comparison, indexOf() and lastIndexOf(), obtaining a modified String, Changing Case, StringBuffer and StringBuilder.

Unit – V **08 Hours**

Swing fundamentals: origins and design philosophy, components and containers, layout managers, event handling, push button, JTextField, anonymous inner classes.

Swing Controls: JLabel and ImageIcon, Swing Buttons, Trees.

Books

Text Books:

1. Herbert Schildt& Dale Skrien, "Java Fundamentals A Comprehensive Introduction", TMH. Special Indian edition.

Reference Books:

1. 1. Kathy Sierra & Bert Bates, "Head First Java", O'Reilly, 2nd Edition and onwards.

E-resourses (NPTEL/SWAYAM.. Any Other)- mention links

Course Outcome (Cos)

	At the end of the course, the student will be able to:	Bloom's Level
1	**Identify** classes, objects, members of a class and relationships among them needed for a specific problem	**L2**
2	**Write** Java application programs using OOP principles and proper program structuring	**L3**
3	**Demonstrate** the concepts of polymorphism and inheritance	**L3**
4	**Write** Java programs to implement error handling techniques using exception handling	**L3**
5	**Create** and design GUI using Java Swing.	**L4**

	Program Outcome of this course (POs)	**PO No.**
1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
2	**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.	**3**
3	**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.	**12**

Course delivery methods	**Assessment methods**
1. Lecture & Board	1. Assignments
2. Power-point Presentation	2. Quizzes
3. Online Videos / Learning	3. Internal Assessment
4. Class Room Exercises	

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks :50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE : 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

Computer Organization

(Theory)

Course Code	18CS35/18IS35	**Credits**	03
Course type	PC	**CIE Marks**	50 marks
Hours/week: L-T-P	3 – 0 – 0	**SEE Marks**	50 marks
Total Hours:	Lecture = 40 Hrs; Tutorial = 0 Hrs Total = 40 Hrs	**SEE Duration**	3 Hours for 100 marks

Course Learning Objectives

1. To understand the operation of CPUs including I/O, Processor, Memory systems, Busses and Computer Arithmetic
2. To understand the different ways of communicating with I/O devices and to introduce the hierarchical memory system including cache memories
3. To understand the implementation of different computer arithmetic algorithms for various arithmetic operations
4. To study the internal functional units of processor and understand the generation of internal functions to execute instructions, pipelining and embedded systems.

Pre-requisites : Digital Electronics

Unit - I **08 Hours**

Basic Structure of Computers:

Functional Units, Basic Operational Concepts, Bus Structures, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement, Machine Instructions and Programs: Numbers, Arithmetic Operations and Characters, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing. Addressing Modes.

Self learning topics: Computer Types, Historical Perspective

Unit - II **08 Hours**

Input / Output Organization:

Accessing I/O Devices, Program controlled I/O, Memory mapped I/O, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Direct Memory Access, Bus Arbitration Techniques: Centralized & Distributed, Buses : Synchronous & Asynchronous

Unit - III **08 Hours**

Memory System

Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories–Mapping Functions: Direct Mapping, Associative Mapping, Set-Associative Mapping.

Unit - IV **08 Hours**

Arithmetic:

Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division.

Application of the algorithms for arithmetic operations.

Self learning topics: Floating-point Numbers and Operations

Unit – V **08 Hours**

Basic Processing Unit:

Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control.

Self learning topics: Embedded Systems

Books

Text Books:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002.Chapter 1, 2, 4, 5, 6, 7 & 9.

Reference Books:

1. Computer Architecture, A Quantitative Approach – John L. Hennessey and David A. Patterson: 5th Edition, Elsevier.
2. William Stallings: Computer Organization & Architecture, 8th Edition, PHI, 2006.

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Identify** the functional units of the processor and the factors affecting the performance of a computer	L1
2.	**Explain** the addressing modes and instructions sets.	L2
3.	**Discuss** the algorithms for computer arithmetic operations and learn the working of those algorithms for arithmetic operations	L3

4.	**Infer** the internal functional units of processor and generate sequence of signals to execute different instructions	L4

	Program Outcome of this course (POs)	**PO No.**
1.	**Engineering Knowledge**: Apply the knowledge of mathematics , science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems	**1**
2.	**Conduct investigation 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 conclusion.	**4**

	Course delivery methods		**Assessment methods**
1.	Power Point Presentation	1.	**Assignment**
2.	Chalk & Talk	2.	**Quiz**

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks :50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE : 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

Web Programming (Integrated)

Course Code	18CSL36/18ISL36	**Credits**	03
Course type	PC	**CIE Marks**	25 marks
Hours/week: L-T-P	2 – 0 – 2	**SEE Marks**	25 marks
Total Hours:	Lecture =20 Hrs; Practical = 20 Hrs Total = 40 Hrs	**SEE Duration**	3 Hours for 50 marks

Course learning objectives

1. To introduce the fundamentals of world wide web.
2. To develop client based web pages using HTML5, CSS3, JavaScript, Jquery and AngularJS.
3. To develop responsive web pages using Bootstrap.

Pre-requisites : Computer Concepts and C Programming

Unit – I 08 Hours

Introduction: The Internet Versus the Web, Serving Up Your Information, Web Page Addresses (URLs), The Anatomy of a Web Page, A Dizzying Multitude of Devices, Sticking with the Standards, Progressive Enhancement, Responsive Web Design, Accessibility, Site Performance, Steps to becoming a web developer, skills and tools, Dos and Don'ts, career trends

Self learning topics: Web history, web standards

Unit – II 08 Hours

HTML5: Basic Elements, drag and drop, File upload, Dropdown menu, audio player, local storage, graphics and animation, Geolocation and form validation, CSS3: Basic properties, Inheritance, Multiple classes, Box model, Effects.

Self learning topics: HTML5 code validation

Unit – III 08 Hours

Basics of JavaScript: Dialog boxes, Conditional statements, loops, arrays, objects, events, Jquery: Add/Remove class, UI Datepicker, File upload, Autocomplete

Self learning topics: JavaScript Code Validation, JQuery basics

Unit – IV **08 Hours**

Basics of AngularJS: Form validation, Routing, Controller, Table, Data binding

Self learning topics: AgularJS API, W3.CSS, Includes

Unit – V **08 Hours**

Basics of Bootstrap: Grid, Navbar, Table, Dropdown, Form, Layout, Tooltip, Panel, Pop-over, Tabs, Modals

Self learning topics: Concepts of responsive design, BS4 basic template

PART A

List of experiments

1. Create multi column article using HTML tags. Integrate social sharing feature. Implement both web view and mobile view.
2. Implement HTML5 dropdown menu with CSS3 and bootstrap.
3. Implement HTML5 Local Storage.
4. Form Validation using HTML5, JavaScript, angularJS and Bootstrap.
5. Implement AngularJS Routing and AngularJS Controller.
6. Implement UI Datepicker using Jquery.
7. Implement Drag and drop using, HTML5 and Jquery.
8. Implement UI Autocomplete using Jquery

PART B

An Individual student needs to formulate a problem definition in consultation with the guide for the Project component and work towards completion after approval. Project report has to be submitted by each student.

Books

1. Jennifer Niederst Robbins, Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics, O'reilly, 4th Edition, 2012
2. Cody Lindley, jQuery Cookbook, O'Reilly Media, 2009
3. Matt Frisbie, AngularJS Web Application Development Cookbook, Packt Publishing, 2014
4. Syed Fazle Rahman, Jump Start Bootstrap, SitePoint, 2014

E-Resourses

1. www.w3schools.com
2. www.tutorialspoint.com

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Explain** basic concepts and principles of world wide web.	L2
2. **Apply** design principles for interactive client side web pages	L3
3. **Design** and **develop** responsive website for a given application.	L5

Program Outcome of this course (POs)	PO No.
1. **Individual and team work:** An ability to visualize and work on multidisciplinary tasks.	**5**
2. **Use of engineering tools:** An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.	**6**
3. **Communication skills:** An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.	**8**
4. **Life-long learning:** An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.	**12**

Assessment methods

1. **I A Test**
2. **Mini Project**
3. **Periodic Journal Evaluation**

Scheme of Continuous Internal Evaluation (CIE):

Components	IA test*	Journal and lab test and Project report and intermediate evaluation	Total Marks
Maximum marks :50	30	20	50

*IA test could be two tests each of one hour duration or only one test of 2 hours duration.

Submitting Journal/ Project report is compulsory.

Minimum marks required to qualify for SEE : 20 out of 50 marks

Semester End Examination (SEE):

<table>
<tr><td>1.</td><td colspan="3">It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.</td></tr>
<tr><td rowspan="3">2.</td><td>Initial write up stating the objectives, methodology and the outcome</td><td>10 marks</td><td rowspan="3">50 marks</td></tr>
<tr><td>Presentation (PPT) of the project</td><td>15 marks</td></tr>
<tr><td>Hardware project: Exhibiting and demonstration of working of project.

Software project: Demonstration of the programming capabilities by writing flowchart, algorithm and codes related to a section of the project.</td><td>25 marks</td></tr>
<tr><td>3.</td><td colspan="3">Minimum passing marks to be scored in SEE: 20 out of 50 marks</td></tr>
</table>

Data Structures with C Lab

Course Code	18CSL37/18ISL37	**Credits**	1.5
Course type	Lab	**CIE Marks**	25 marks
Hours/week: L-T-P	0 – 0 – 3	**SEE Marks**	25 marks
Total Hours:	30	**SEE Duration**	3 Hours for 50 marks

Course learning objectives

1. Demonstrate the abstract properties of various data structures such as stacks, queues, lists, and trees.
2. Compare different implementations of data structures and recognize the advantages and disadvantages of the different implementations
3. Able to demonstrate features of different data structures such as Linked List, Hash Table, Queues to solve real world problems.

Pre-requisites : C programming Skills

List of experiments

1. Write a C program to merge contents of two files containing USNs of students in a sorted order in to the third file such that the third file contains Unique USNs. Program should also display common USNs in both the files.
2. Consider a calculator that needs to perform checking the correctness of parenthesized arithmetic expression and convert the same to postfix expression for evaluation. Develop and execute a program in C using suitable data structures to perform the same and print both the expressions. The input expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) and / (divide).
3. A calculator needs to evaluate a postfix expression. Develop and execute a program in C using a suitable data structure to evaluate a valid postfix expression. Assume that the postfix expression is read as a single line consisting of non-negative single digit operands and binary arithmetic operators. The arithmetic operators are + (add), - (subtract), * (multiply) and / (divide).
4. Write a C program to simulate the working of Messaging System in which a message is placed in a Queue by a Message Sender, a message is removed from the queue by a Message Receiver, which can also display the contents of the Queue.
5. Consider a super market scenario where sales manager wants to search for the customer details using a customer-id. Customer information like (custid, custname, &custphno) are

   stored as a structure, and custid will be used as hash key. Develop and execute a program in C using suitable data structures to implement the following operations:

   a. Insertion of a new data entry.
   b. Search for customer information using custid.
   c. Display the records. (Demonstrate collision and its handling using linear probing

method).

6. Consider a warehouse where the items have to be arranged in an ascending order. Develop and execute a program in C using suitable data structures to implement warehouse such that items can be traced easily.

7. Consider a polynomial addition for two polynomials. Develop and execute a program in C using suitable data structures to implement the same.

8. Develop and execute a program in C to perform following operations on binary search tree:

    a. To count number of non terminal nodes.
    b. To count number of terminal nodes.
    c. To count nodes with degree 2.
    d. To count total number of nodes.

9. Develop and execute a program in C using suitable data structures to create a binary tree for an expression. The tree traversals in some proper method should result in conversion of original expression into prefix, infix and postfix forms. Display the original expression along with the three different forms also.

10. Develop and execute a program in C using suitable data structures to perform Searching a data item in an ordered list of items in both directions and implement the following operations:

    a. Create a doubly linked list by adding each node at the start.
    b. Insert a new node at the end of the list.
    c. Display the content of a list.

    Consider an integer number as a data item.

Books

1. Richard.F.Gilberg, Behrouz.A. Forouzan, Data Structures: A Pseudo code Approach with C, Cengage Learning, 2nd edition 2007 and onwards.

2. Horowitz, Sahni, Anderson-Freed, Fundamentals of Data Structures in C, Universities Press, 2nd Edition, 2007 and onwards.

E-Recourses

1. https://www.geeksforgeeks.org/

2. https://www.sanfoundry.com/c-programming-examples-data-structures/

3. https://www.programmingsimplified.com/c/data-structures/c-program-implement-linked-list

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Demonstrate** the understanding of structured programming.	L3
2. **Analyze** the problem statement and able to choose right data structure for implementation.	L4
3. **Develop** an ability to construct robust, maintainable programs which satisfy the requirements of user.	L3

	Program Outcome of this course (POs)	PO No.
1.	**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.	**3**
2.	**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.	**4**
3.	**Modern tool usage:** Create, select, and apply appropriate techniques resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.	**5**
4.	**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.	**12**

Assessment methods

1. Periodic journal evaluation
2. I.A Test
3. Viva Voce

Scheme of Continuous Internal Evaluation (CIE):

Components	Attendance/conduct of lab	Journal	Lab project	Total Marks
Maximum marks :25	10	10	5	25
Submission and certification of journal is compulsory to qualify for SEE Minimum marks required to qualify for SEE : 10 out of 25 marks				

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Only one experiment to be conducted. In case, there are two parts then one experiment from each part.		
3.	Initial write up (Algorithm/Flowchart/Numerical Analysis/Tracing)	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
4.	Viva voce is conducted for individual student and not in group		
5.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

Object Oriented Programming with Java Lab

Course Code	18CSL38/18ISL38	**Credits**	1.5
Course type	L1	**CIE Marks**	25 marks
Hours/week: L-T-P	0 – 0 – 3	**SEE Marks**	25 marks
Total Hours:	40	**SEE Duration**	3 Hours

Course learning objectives (CLOs):

1. To introduce Java compiler and the NetBeans IDE.

2. To learn and apply the object-oriented approach to developing software programs.

2.Design,using good design principles simple software programs to solve problems.

3.Analyse and implement a given problem using Java with the specified concept.

Pre-requisites: Basics of C and Object-Oriented Programming.

List of Experiments:

The students are required to develop and execute the following programs in Java:

1. Write a program to demonstrate the implementation of 2-dimension array.
2. Write a program to demonstrate the implementation of class and its member methods.
3. Write a program to demonstrate the implementation of parameterized:
    a. Methods.
    b. Constructor.
4. Write a program to demonstrate the implementation of inheritance.
5. Write a program to demonstrate the implementation of method:
    a. Overloading.
    b. Overriding.
6. Write a program to demonstrate the implementation of interface.
7. Write a program to demonstrate the implementation of packages.
8. Write a program to demonstrate the implementation of customized exception handling.

9. Write a program to demonstrate the implementation of string handling.

10. Write a program to demonstrate the implementation of JAVA swings.

Course Outcome (Cos)

At the end of the course, the student will be able to:		Bloom's Level
1.	Use the NetBeans IDE to write and execute Java programs.	**L3**
2.	Write Java application programs using OOP principles and proper program structuring.	**L3**
3.	Identify classes, members of a class and relationships among them needed for a specific problem	**L2**
3	Write Java programs to demonstrate error handling techniques using exception handling.	**L3**
4	Write Java programs to demonstrate packages and interfaces and String handling.	**L3**
5	Use Swing concept to develop simple GUI applications.	**L3**

	Program Outcome of this course (POs)	**PO No.**
1.	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
2.	**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.	**3**
3.	**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.	**5**
4.	**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.	**12**

Books

Text Books:

1. Herbert Schildt& Dale Skrien, "Java Fundamentals A Comprehensive Introduction", TMH. Special Indian edition.

Reference Books:

1. Kathy Sierra & Bert Bates, "Head First Java", O'Reilly, 2nd Edition and onwards.

Assessment methods

1. Regular Journal Evaluation and Attendance Monitoring.
2. Lab Internal Assessment.

Scheme of Continuous Internal Evaluation (CIE):

Components	Attendance/conduct of lab	Journal	Lab project	Total Marks
Maximum marks :25	10	10	5	25
Submission and certification of journal is compulsory to qualify for SEE Minimum marks required to qualify for SEE : 10 out of 25 marks				

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Only one experiment to be conducted. In case, there are two parts then one experiment from each part.		
3.	Initial write up (Algorithm/Flowchart/Numerical Analysis/Tracing)	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
4.	Viva voce is conducted for individual student and not in group		
5.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

Calculus, Fourier Analysis and Linear Algebra

(All Branches)

Course Code	18DMATIS31	**Credits**	4
Course type	BS	**CIE Marks**	50 marks
Hours/week: L-T-P	4–0– 0	**SEE Marks**	50 marks
Total Hours:	50	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

Students should

1. Learn the concept of series expansion using Taylor's and Maclaurin's series and get acquainted with the polar curves and partial differentiation.
2. Learn Differential Equations of first order and higher order and apply them.
3. Get acquainted with Fourier transforms and its properties.
4. Learn numerical methods to solve algebraic, transcendental and ordinary differential equations.
5. Understand and interpret the system of equations and various solutions.

Pre-requisites :

1. Basic differentiation and integration
2. Trigonometry
3. Matrix and determinant operations
4. Vector algebra

Unit – I 10 Hours

Differential Calculus: Taylor's and Maclaurin's theorems for function of one variable (statement only)-problems. Angle between polar curves. **Partial Differentiation:** Definition and problems. Total differentiation- problems. Partial differentiation of composite functions- problems.

Unit – II 10 Hours

Laplace Transforms: Definition, Laplace transforms of elementary functions. Laplace transforms of $e^{at} f(t)$, $t^n f(t)$, $\int_0^t f(t)\,dt$, $\frac{f(t)}{t}$ (without proof), Inverse Laplace transforms: Inverse Laplace transforms -problems, applications to solve linear differential equation.

Unit –III **10 Hours**

Fourier Analysis: Fourier Series: Fourier series, half range Fourier sine and cosine series. Practical examples. Harmonic analysis.

Fourier Transforms: Infinite Fourier transform and properties. Fourier sine and cosine transforms. Properties and problems.

Unit – IV **10 Hours**

Numerical Techniques: Numerical solution of algebraic and transcendental equations: Method of false position, Newton- Raphson method, fixed point iteration method (without derivation).

Numerical solution of ordinary differential equations: Taylor's series method, Euler and modified Euler method, fourth order Runge-Kutta method (without derivation).

Unit – V **10 Hours**

Linear Algebra: Rank of a matrix by elementary transformation, solution of system of linear equations-Gauss elimination method and Gauss-Seidal method. Eigen value and eigen vectors – Rayleigh's Power method.

Books

Text Books:

1. B.S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012 and onwards.
2. Erwin Kreyszig –Advanced Engineering Mathematics, John Wiley & Sons Inc., 9th Edition, 2006 and onwards.
3. B. V. Ramana - Higher Engineering Mathematics, Tata McGraw-Hill Education Private Limited, Tenth reprint 2010 and onwards.

Reference Books:

1. P. N. Wartikar & J. N. Wartikar – Applied Mathematics (Volume I and II) Pune Vidyarthi Griha Prakashan, 7th Edition 1994 and onwards.
2. Peter V. O' Neil –Advanced Engineering Mathematics, Thomson Brooks/Cole, 7th Edition, 2011 and onwards.
3. Glyn James –Advanced Modern Engineering Mathematics, Pearson Education, 4th Edition, 2010 and onwards.

Course Outcome (COs)

At the end of the course, the student will be able to		**Bloom's Level**
1.	**Develop** the Taylors and Maclaurins series using derivative concept.	L1, L2
2.	**Demonstrate** the concept and use of Partial Differentiation in various problems.	L1, L2
3.	**Classify** Laplace transforms of various categories and **apply** them to solve relevant problems**.**	L1, L3
4.	**Develop** frequency bond series from time bond functions using Fourier series.	L3
5.	**Use** numerical methods and **Solve** algebraic, transcendental and ordinary differential equations	L1, L2
6.	**Interpret** the various solutions of system of equations and **Solve them.**	L2

Program Outcome of this course (POs)	PO No.
Students will acquire	
1. An ability to apply knowledge of mathematics, science and engineering.	**PO1**
2. An ability to identify, formulate and solve engineering problems.	**PO5**
3. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.	**PO11**

Course delivery methods	Assessment methods
1. Black board teaching	1. Internal Assessment Tests
2. Power point presentation	2. Assignments
3. Scilab/ Matlab/ R-Software	3. Quizes

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments /matlab/Scilab activity	Quiz/Seminar/Course Project	Total Marks
Maximum marks :50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE : 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

Environmental Studies (MNC)

Subject Code:	18IS39	Credits:	MNC
Course Type:	HS	CIE Marks:	25 marks
Hours/week: L – T – P	2– 0– 0	SEE Marks:	-
Total Hours:	28	SEE Duration:	-

Course Learning Objectives (CLOs)

1. To understand the scope of Environmental Engineering.
2. Identify the Environmental impact due to Human activities.
3. To understand the concept of Disaster Management.
4. Identify the renewable and non renewable sources of energy.
5. Identify the various Legal aspects in Environmental Protection.

Pre-requisites: NIL

UNIT I

Definition of Environment, Ecology and Eco-system, Structure and functions of ecosystem, balanced ecosystem, Introduction to Environmental Impact Assessment.

Natural Resources: Material Cycles - Oxygen, Carbon, Nitrogen and Hydrological cycle. Importance of water quality, Water borne diseases, Water induced diseases, Significance of Fluoride in drinking water.

06 Hours

UNIT II

Energy - Different types of energy, Conventional and Non - Conventional sources – Advantages and Limitations of Wind Mills, Hydro Electric, Fossil fuel, Nuclear, Solar, Biomass and Bio-gas, Geothermal energy.

06 Hours

UNIT III

Disasters - Natural Disasters: Meaning and nature of natural disasters, their types and effects (Floods, drought, cyclone, earthquakes, Tsunami). Man Made Disasters: Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution and marine pollution.

06 Hours

UNIT IV

Disaster Management: International strategy for disaster reduction. Concept of disaster management and national disaster management framework

05 Hour

UNIT V

Environmental Protection: Role of Government, Legal aspects, Initiatives by Non - Governmental Organizations (NGO), Environmental Education, Women Education. E waste and solid waste management rules

05 Hours

Text Books:

1. Benny Joseph, "**Environmental Studies**", Tata McGraw - Hill Publishing Company Limited (2005).
2. Ranjit Daniels R.J. and Jagdish Kirshnaswamy, "**Environmental Studies**", Wiley India Private Ltd., New Delhi (2009).
3. Rajagopalan R. "**Environmental Studies – From Crisis to Cure**", Oxford University Press (2005).
4. Sanjay K. Sharma, "**Environment Engineering and Disaster Management**", USP (2011).
5. Harsh K. Gupta, "**Disaster Management**", Universities Press (India) Pvt. Ltd (2003).

Reference Books:

1. Raman Sivakumar, "**Principles of Environmental Science and Engineering**", Second Edition, Thomson Learning, Singapore (2005).
2. Meenakshi P., "**Elements of Environmental Science and Engineering**", Prentice Hall of India Private Limited, New Delhi (2006).
3. Prakash S.M., "**Environmental Studies**", Elite Publishers, Mangalore (2007).
4. Erach Bharucha, "**Text Book of Environmental Studies**", for UGC, Universities Press (2005).
5. Tyler Miller Jr. G., "**Environmental Science – Working with the Earth**", Tenth Edition, Thomson Brooks/Cole (2004).

Course Outcomes (COs)

	At the end of the course, the student will be able to	Bloom's Level
1	**Explain** the importance of the Environment	**L2**
2	**Evaluate** Environmental disasters caused by human activities	**L5**
3	**Outline** the water stress problems and energy crisis in present era.	**L2**
4	**Explain and classify** the Renewable and Non Renewable sources of energy.	**L2**
5	**Summarize** the various Legislations related to Environment.	**L2**

Program Outcomes (POs)

1	Graduates shall be able to understand and apply the basic mathematical and scientific concepts that underlie the field of Civil Engineering**.**	**PO 1**
2	Graduates shall continue to upgrade the skills and possess the motivation for continuing education and professional growth	**PO 8**
3	Graduates shall maintain an awareness of contemporary issues and arrive at the environmentally sustainable solutions	**PO 9**
4	Graduates shall be proficient in the core principles of Civil Engineering such as Environmental Engineering, Geotechnical Engineering, Structural Engineering and Water Resources Engineering, and shall be able to apply these principles in Engineering practice.	**PO 10**

Content Delivery/Assessments methods and Scheme of Evaluation:

Course delivery methods	**Assessment methods**
1. Lecture and Board	1. Assignments and Open Book Assignment
2. NPTEL/ Edusat	2. Quizzes
3. Power Point Presentation	3. Internal Assessment Tests
4. Videos	4. Semester End Examination

Scheme of Continuous Internal Evaluation (CIE):

Components	**Addition of two IA tests**	**Quiz/Assignment/Activity**	**Total Marks**
Maximum marks: 25	10+10 = 20	05	25
•Writing two IA tests is compulsory. •Minimum marks required: 10 out of 25 marks			