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**Supporting Document for 1.1.2**

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# Syllabus Revision carried out in 2019

**Program: B.Tech.- Computer Science and Systems Engineering**

**Regulations : SVEC-19**

*This document details the following:*

1. Courses where syllabus has been changed 20% and more.
2. Course-wise revised syllabus with changes highlighted.

**Note:** *For SVEC-19 revised syllabus, SVEC-16 (previous syllabus) is the reference.*

# List of Courses where syllabus has been changed (20% and more)

| Course Code | Name of the course | Percentage of Syllabus changed | Page Number in which Details are Highlighted |
|---|---|---|---|
| 19BT21501 | Object Oriented Programming through Java | 30 | 4 |
| 19BT21531 | Object Oriented Programming through Java Lab | 70 | 8 |
| 19BT31501 | Data Structures and Algorithms | 40 | 14 |
| 19BT31503 | System Programming | 100 | 18 |
| 19BT31531 | Data Structures and Algorithms Lab | 50 | 22 |
| 19BT31532 | Operating Systems Lab | 30 | 26 |
| 19BT31533 | Workshop in Computer Science and Systems Engineering | 100 | 30 |
| 19BT315AC | Design Thinking | 100 | 33 |
| 19BT41531 | Design and Analysis of Algorithms Lab | 100 | 35 |
| 19BT1AC01 | Spoken English | 100 | 37 |
| 19BT1BS02 | Biology for Engineers | 100 | 39 |
| 19BT1HS01 | Communicative English | 20 | 41 |
| 19BT1BS03 | Engineering Physics | 40 | 45 |
| 19BT1BS31 | Engineering Physics Lab | 30 | 51 |
| 19BT1BS04 | Engineering Chemistry | 50 | 55 |
| 19BT1BS32 | Engineering Chemistry Lab | 25 | 61 |
| 19BT2BS01 | Transformation Techniques and Linear Algebra | 20 | 65 |
| 19BT4BS01 | Material Science | 100 | 70 |
| 19BT4HS05 | Gender & Environment | 100 | 73 |
| 19BT4HS09 | Life Skills | 100 | 76 |
| 19BT4HS11 | Professional Ethics | 100 | 78 |
| 19BT4HS12 | Women Empowerment | 100 | 80 |
| 19BT40107 | Sustainable Engineering | 100 | 82 |
| 19BT10501 | Programming for Problem Solving | 37.7 | 85 |
| 19BT10531 | Programming for Problem Solving Lab | 50 | 89 |
| 19BT40532 | Database Management Systems Lab | 41 | 95 |

| Course Code | Name of the course | Percentage of Syllabus changed | Page Number in which Details are Highlighted |
|---|---|---|---|
| 19BT31202 | Software Engineering | 20 | 105 |
| 19BT31232 | Software Engineering Lab | 100 | 110 |
| 19BT10201 | Basic Electrical and Electronics Engineering | 100 | 113 |
| 19BT10231 | Basic Electrical and Electronics Engineering Lab | 100 | 115 |
| 19BT50409 | Green Technologies | 35 | 117 |
| Average | | 63.29 | |
| Total No. of Courses in the Program | | 48 | |
| No. of Courses where syllabus (more than 20%) has been changed | | 33 | |
| Percentage of Syllabus changed in the Program | | 43.51 | |

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# I B. Tech. – II Semester
## (19BT21501) OBJECT ORIENTED PROGRAMMING THROUGH JAVA
### (Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 3 | | | 3 |

**PRE-REQUISITES:** A course on Programming for Problem Solving

**COURSE DESCRIPTION:** Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Applets, Swings, Event handling.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

**CO1:** Demonstrate knowledge on object oriented programming constructs to solve programming problems.

**CO2:** Analyze object oriented programming features – polymorphism, inheritance, exception handling and multithreading for reusability.

**CO3:** Develop user interfaces using GUI programming techniques.

## DETAILED SYLLABUS:
### UNIT I : INTRODUCTION          (9 periods)

Introduction to Object Oriented Programming, Java Buzzwords, History, Java Environment, Java Components, Programming Paradigms, Naming Conventions.

**Classes and Objects:** Introduction to classes, objects, Constructors, Garbage Collection, this keyword, Access Control, Features of Object Oriented Programming.

### UNIT II: DATA TYPES, CONTROL STATEMENTS, POLYMORPHISM     (9 periods)

Data Types, Variables, Type Conversions (Boxing and Unboxing/Wrapping and Unwrapping) and Casting, Arrays, Operators, Decision Making Statements, Looping Statements, Methods, Recursion, Method Overloading, Constructor Overloading, Parameter Passing, String Class, Final Keyword.

**Utility Classes:** String Tokenizer, Scanner, Random, Bit Set.

### UNIT III : INHERITANCE, PACKAGES, INTERFACES     (9 periods)

**INHERITANCE:** Introduction, Classification, Abstract Classes, Final keyword with Inheritance.

**PACKAGES:** Basics, Creating and Accessing a package, CLASSPATH, Importing packages.

**INTERFACES:** Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

### UNIT IV: EXCEPTION HANDLING, MULTITHREADING, COLLECTION FRAMEWORK     (9 periods)

**EXCEPTION HANDLING:** Exception, Types of Exception, Keywords: try, catch, throw, throws and finally, Built-in Exceptions, User Defined Exceptions.

**MULTITHREADING:** Process, Thread, Thread Model, Creating a thread, Priorities, Thread Synchronization, Inter-thread Communication.

**COLLECTION FRAMEWORK:** Framework Hierarchy, ArrayList, LinkedList, HashSet.

**UNIT V – APPLETS, SWINGS, EVENT HANDLING**          **(9 periods)**

**APPLET CLASS:** Basics, Types, Architecture, Skeleton, Parameter passing to applets.

**SWINGS:** Introduction, Features, Hierarchy, Swing GUI Components, Packages in Swings, Swing Control Classes and Methods.

**EVENT HANDLING:** Event Classes, Event Listener Interfaces - Mouse and Key, Adapter Classes.

                                              **Total Periods: 45**

*Topics for self-study are provided in the lesson plan*

**TEXT BOOKS:**

1. Herbert Schildt, *Java the Complete Reference*, 9th edition, Oracle Press, 2014.

**REFERENCE BOOKS:**

1. Sachin Malhotra and Saurab Choudhary, *Programming in Java*, 2nd edition, Oxford University press, 2014.
2. Y. Daniel Liang, *Introduction to Java Programming*, Pearson Education.
3. T. Budd, *Understanding Object-Oriented Programming with Java*, Pearson Education.

**ADDITIONAL LEARNING RESOURCES**

https://docs.oracle.com/javase/tutorial/index.html

# II B. Tech. – I Semester
## (16BT41202) JAVA PROGRAMMING

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 30 | 70 | 100 | | 3 | 1 | - | 3 |

**PRE-REQUISITE:** A course on Object Oriented Programming through C++.

**COURSE DESCRIPTION:** Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.

**COURSE OUTCOMES:**
*On successful completion of this course, students will be able to:*

CO1.   Demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2.   Analyze complex engineering problems using object oriented concepts.

CO3.   Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.

CO4.   Apply AWT and Applets to create interactive Graphical User Interfaces.

CO5.   Use advanced programming languages to develop web applications.

CO6.   Build Java Applications suitable for societal requirements.

**DETAILED SYLLABUS:**

**UNIT I: INTRODUCTION                           (10 Periods)**
Data types, Variables, Arrays, Operators, Control statements.
**Classes and Objects:** Concepts of Classes, Objects, Constructors, Methods, this keyword, Garbage collection, Overloading Methods and Constructors, Parameter passing, Access control, Recursion, String Class.

## UNIT II: INHERITANCE, PACKAGES AND INTERFACES
### (09 Periods)

**Inheritance:** Inheritance basics, Super keyword, Multi-level hierarchy, Abstract classes, Final keyword with inheritance.
**Packages:** Definition, Creating and accessing a package, Understanding CLASSPATH, Importing packages.
**Interfaces:** Definition, Implementing interfaces, Nested interfaces, Applying interfaces, Variables in interface and Extending interfaces.

## UNIT III: EXCEPTION HANDLING AND MULTITHREADING
### (08 Periods)

**Exception Handling:** Concepts of exception handling, Exception types, Usage of Try, Catch, Throw, Throws and Finally, Built in exceptions, Creating own exception sub classes.
**Multithreading:** Java thread model, Creating threads, Thread priority, Synchronizing threads, Inter-thread communication.

## UNIT IV: COLLECTION CLASSES, THE APPLET CLASS AND AWT
### (10 Periods)

**Collection Classes:** ArrayList Class, LinkedList Class, Hashset Class, LinkedHashSet Class, TreeSet Class, PriorityQueue Class, EnumSet Class.
**The Applet Class:** Types of applets, Applet basics, Applet architecture, Applet skeleton, Passing parameters to applets.
**AWT Control Fundamentals:** User interface components, Layout managers.

## UNIT V: EVENT HANDLING AND SERVLETS     (08 Periods)

**Delegation event model:** Event classes, Event Listener Interfaces – Mouse and Key; Adapter classes.
**Servlets:** Life cycle of a servlet, Using Tomcat for Servlet development, Create and compile the servlet source code, Servlet API, Javax.Servlet package.

**Total Periods: 45**

### TEXT BOOK:
1.     Herbert Schildt, *Java the Complete Reference*, Oracle Press, 9th Edition, 2014.

### REFERENCE BOOK:
1.     Sachin Malhotra and Saurab Choudhary, *Programming in Java*, Oxford University press, 2nd Edition,  2014.

# I B. Tech. – II Semester

# (19BT21531) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 50 | 50 | 100 | | - | 1 | 2 | 2 |

**PRE-REQUISITES**: A course on OOPS through Java.

**COURSE DESCRIPTION:** Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; Applets, swings.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

**CO1:** Apply syntactic constructs of the JAVA programming language to solve logic based problems

**CO2:** Develop application programs using concepts of object oriented programming.

**CO3:** Function effectively as an individual and on terms to solve problems with effective communication.

**CO4:** Write and prepare mini project reports/ documents effectively.

## LIST OF EXERCISES:

**1**      Demonstrate the following programs using command line arguments:

     A      Write a program that computes the sum of all its integer arguments

     B      Write a program to input n integers and perform sorting between them.

**2**      A      The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 0, 1. Every subsequent value is the sum of the 2 values preceding it. Write a Java program that uses both recursive and non-recursive functions to print the nth value of the Fibonacci sequence?

     B      Write a program to define a class student with name, registration number and marks for three subjects as instance variables and describe a constructor to initialize them. Also define a method display to print all the values.

**3**      A      Write a program to print the element of an array that has occurred highest number of times.

     B      Write a program that displays a menu with options 1. Add 2. Sub. Based on the options chosen, read 2 numbers and perform the relevant operation. After performing the operation, the program should ask the user if he wants to continue. If the user presses y or Y, then the program should continue displaying the menu else the program should terminate. [Use Scanner class]

**4**      A      Write a Program to count tokens- number of words and characters in a string.

     B      Write and test overloaded methods to find sum of three integers, sum of three double values and sum of four integers.

**5**      A      Write a program to create an abstract class named Shape that contains an empty method named numberOfSides ( ). Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method number Of Sides ( ) that shows the number of sides in the given geometrical figures.

| | B | Write a program that imports the User-defined package P1 and access the member variables and methods of classes that contained in the package P1. |
|---|---|---|
| 6 | | A University awards some grace marks to students who participate in the Inter University games. Therefore, total marks awarded = Exam_Marks +Sports_Grace_Marks. If total marks scored are greater than maximum marks, then the final marks awarded will be equal to the maximum marks. An Object Oriented based implementation will contain a class called Results, which extends a class called Exam, which itself extends a class called Student. It will also contain an interface called Sports, which is implemented by the Results class. The Results class will be responsible for computing the final marks scored by the students. Write a Java program along with an interactive driver class. |
| 7 | A | Write a program to handle Arithmetic Exception, Array Out Of Bounds Exception using try and multiple catch statements. |
| | B | Write a java program to throw a user defined exception called Negative, if the entered input is a negative number. |
| 8 | A | Write a Java program that creates three threads. First thread displays - Good Morning for every one second, the second thread displays - Hello for every two seconds and the third thread displays - Welcome for every three seconds. |
| | B | Write a Java program that correctly implements producer consumer problem using the concept of inter-thread communication. |
| 9 | A | Write a program create a class "Book" with name, id, author, publisher and quantity as instance variables and a constructor to initialize them. Create a HashSet object of type Book and three Book instances b1, b2 and b3. Add these instances into HashSet and display them. |
| | B | Develop an Applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked. |
| 10 | A | Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box. |
| | B | Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No light is on when the program starts. |
| 11 | | Write a java program that handles all mouse and key events and shows the event name at the center of the window when mouse event is fired (Use Adapter classes). |

**REFERENCE BOOKS:**

1. Herbert Schildt, *Java the Complete Reference*, Ninth Edition, Oracle Press, 2014.
2. Sachin Malhotra and Saurab Choudhary, *Programming in Java*, Second Edition, Oxford University Press, 2014.

**SOFTWARES/Tools used:**

Java SE 12.0.1

**ADDITIONAL LEARNING RESOURCES**

Problems to be considered from Hackerearth and CodeChef platforms

# II B. Tech. – I Semester
## (16BT31231) JAVA PROGRAMMING LAB

| Int. Marks | Ext. Marks | Total Marks | L | T | P | C |
|---|---|---|---|---|---|---|
| 50 | 50 | 100 | - | - | 3 | 2 |

**PRE-REQUISITE:** A course on Java Programming.

**COURSE DESCRIPTION:** Hands on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; AWT; Applets; Servlets.

**COURSE OUTCOMES:**
*On successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge on basic concepts of Java programming.
CO2. Design and develop efficient programs with multitasking ability and handle exceptions.
CO3. Demonstrate independent problem solving skills in developing interactive applications.
CO4. Apply object oriented approach to develop user friendly interface and learn how to communicate with systems over the network.
CO5. Build Java applications suitable for societal requirements.
CO6. Work effectively as an individual and as a member in team for case studies implementation.
CO7. Demonstrate communication skills, both oral and written for preparing and presenting reports.

**LIST OF EXERCISES:**
1. a. Write a Program to accept two integers through the command line arguments    and print the sum of the two numbers.
   b. Write a Program to accept a String as a Command line argument and the program should print a Welcome message.
2. Write a program that displays a menu with options 1. Add 2. Sub. Based on the options chosen, read 2 numbers and perform the relevant operation. After performing the operation, the program should ask the user if he wants to continue. If the user presses y or Y, then the program should continue displaying the menu else the program should terminate.[Use Scanner class]

3. a. Write a program to print the element of an array that has occurred highest number of time.
   b. Write a program to find greatest number in a 3*3 array. The program is supposed to receive 9 integer numbers as command line arguments.
4. a. Create a class "Amount In Words" to convert the amount into words. (Consider the amount to be not more than 100000.)
   b. Write a Program to count tokens- number of words and characters in a string.
5. Implement any one of the case study with the specifications given below:
   a) Create classes, objects and their properties.
   b) Add methods to classes and implement them.
   c) Refine the objects by adding constructors and local variables.
   d) Show communication between the objects by calling instance of one object from another class.
   e) Handle Exceptions and Implement relationships like inheritance.

**Case study 1: Banking Application:**
The banking application consists of five divisions. They are customer details, creating a new account, withdrawing money, loan details and depositing money. The customer details consist of customer name, address, phone number, account number. To withdraw money checks the balance in the account and then get the money. The loan details consist of loan types like home loans, car loans, education loans etc. To deposit money enter the account number and give the account to be deposited.

**Case study 2: Library Application:**
The Library Application consists of Student, faculty and book details, Issue book, and return book. The student and faculty details consist of name, ID, Branch and maximum number of books can be issued to them. The book details consist of ID, Book name and Author name. To Issue a book to members, the librarian checks the availability of book and if the book is not available, then an error message will be displayed. To return the book, the librarian verifies the validity and if the validity is expired then the fine amount message will be displayed. The student and faculty can view the book details issued to them and also can check the count of remaining books that can be taken for issue.

6. A. Write a program that correctly implements producer consumer problem using the concept of inter-thread communication.

B. Write a program that demonstrates time slicing among equal priority threads, show that a lower priority thread's execution is deferred by the time slicing of higher-priority threads.

7. Develop an Applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked.

8. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result.

9. Create a Servlet that recognizes first time visitor to web application and responds by saying "Welcome to new user" otherwise "welcome back".

**REFERENCE BOOKS:**

1. Herbert Schildt, *Java the Complete Reference*, Oracle Press, 9th Edition, 2014.
2. Sachin Malhotra and Saurab Choudhary, *Programming in Java*, Oxford University press 2nd Edition, 2014.

# II B. Tech. – I Semester
## (19BT31501) DATA STRUCTURES AND ALGORITHMS

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 3 | 1 | - | 4 |

**PRE-REQUISITES:** A Course on "Object Oriented Programming"

**COURSE DESCRIPTION:**

Algorithm Analysis; Linked Lists; Stacks and Queues; Trees; Binary search trees; AVL trees; Heaps; Multiway search trees; Graphs; Sorting and Searching; Hashing

**COURSE OUTCOMES:** After successful completion of this course, the students will be able to:

**CO1:** Understand the fundamental concepts of data structures, asymptotic notations and Algorithm analysis techniques to measure the performance of an algorithm.

**CO2:** Analyze performance of sorting and searching algorithms by making use of time and space complexity.

**CO3:** Design algorithms to solve societal problems by applying contextual knowledge on linked lists

**CO4:** Solve computational problems by using stacks and queues

**CO5:** Apply suitable data structure to perform operations on trees and graphs

**CO6:** Construct hash tables by using Hash functions and relevant collision resolution technique.

**DETAILED SYLLABUS:**

**UNIT I– Introduction, Sorting and Searching**                 (11 periods)

**Introduction:** Introduction to data structures, Introduction to Algorithm, Performance Analysis- Space Complexity, Time Complexity, Asymptotic Notation- Big Oh, Omega, Theta notations, Guidelines for Asymptotic Analysis, Algorithms Analysis: Problems & Solutions.

**Sorting:** Bubble Sort, Insertion sort, Selection Sort, Shell Sort, Radix sort and their performance analysis

**Searching:** Linear Search, Binary Search and their performance analysis

**UNIT II – Linked List**                                       (8 periods)

Single Linked List, Circular Linked List, Double Linked List, Circular Double Linked List, Applications of Linked List- Sparse Matrix Representation and its performance analysis, Addition of Polynomials and its performance analysis

**UNIT III – Stacks and Queues**                                (8 periods)

**Stacks:** Introduction, Definition, Implementation of stacks using arrays, Implementation of stacks using linked list, Applications of Stacks

**Queues:** Introduction, Definition, Implementation of queues using arrays, Implementation of queues using linked list, Circular Queue, Deque, Priority Queue, Applications of Queues

## UNIT IV – Trees, Search Trees and Heaps           (9 periods)

**Trees:** Basic Terminologies, binary trees, Properties of binary tree, Representation of Binary Tree, Binary tree traversals.

**Search Trees:** Binary Search Trees, Operations on Binary Search Trees, AVL Trees and Operations on AVL trees

**Heap:** Heap Trees, Implementation of Heap Trees, Applications of Heap – Heap Sort and Its performance Analysis

## UNIT V – Multi way Trees, Graphs and hashing           (9 periods)

**Multiway Trees:** M-way search trees, B-trees, Operations on B-trees, B+-trees

**Graphs:** Introduction, Basic Terminologies, Representation of Graphs, Breadth First Search and its Complexity Analysis, Depth First Search and its Complexity Analysis

**Hashing:** Introduction, Hash Table Structure, Hash Functions, Linear Open Addressing, Chaining and their performance analysis.

**Total Periods: 45**

*Topics for self-study are provided in the lesson plan*

### TEXT BOOKS:

1. Debasis Samanta, Classic Data Structures, PHI Learning private limited, Second Edition, 2017
2. Narasimha Karumanchi, Data Structures and Algorithms made easy, Career Monk, 5th Edition, 2017

### REFERENCE BOOKS:

1. G A V Pai, Data Structures and Algorithms: Concepts, Techniques and Applications,Mc graw Hill Edition
2. Satraj Sahani, Data Structures, Algorithms and Applications in Java, Universities Press, Second Edition, 2008
3. Michael T. Goodrich, Roberto Tamassia, Data Structures and Algorithms in java, Wiley India, Second Edition, 2007

### ADDITIONAL LEARNING RESOURCES:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/lecture-videos
2. http://nptel.ac.in/courses/106106127/
3. http://www.nptel.ac.in/courses/106102064

## II B. Tech. – I Semester
## (16BT30502) DATA STRUCTURES
### (Common to CSE, IT and CSSE)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 30 | 70 | 100 | | 3 | 1 | - | 3 |

**PRE-REQUISITE:** A course on Programming in C

**COURSE DESCRIPTION:**
Linked Lists; Type of lists; Operations and Applications; Stacks and Queues; Operations and Applications; Trees, Search trees and Heaps; Multi-way Trees and Graphs; Searching and Hashing.

**COURSE OUTCOMES:**
*On successful completion of this course, students will be able to:*
CO1.    Demonstrate knowledge on
- Principles of Data Structures.
- Linear and Non-linear Data Structures.
- Sorting and hashing techniques.

CO2.    Analyze and Identify suitable data structure for computational problem solving.
CO3.    Design solutions for complex engineering problems using linear and non-linear data structures.
CO4.    Develop solutions for Complex computational problems by conducting explorative analysis.
CO5.    Apply appropriate data structure to provide solutions for real time problems by using C Language.
CO6.    Apply contextual knowledge of data structures to design applications for societal applications like payroll systems, web applications, banking and financial systems.

**DETAILED SYLLABUS:**

**UNIT I: LINKED LISTS                    (08 Periods)**
Pointers, Operations, Linked List definition, Single Linked Lists, Circular Linked List, Doubly Linked List, Circular Doubly Linked List, Application of Linked Lists.

**UNIT II: STACKS AND QUEUES                (08 Periods)**
**Stacks:** Stack operations, Stack Linked List, Implementation, Stack applications.
**Queues:** Queue operations, Queue Linked List design, Queue applications.

## UNIT III: TREES, SEARCH TREES AND HEAPS    (10 Periods)
**Trees:** Tree concepts, Binary Trees.
**Binary Search Trees (BST):** Basic concepts, BST operations, BST applications.
**AVL Search Trees:** Basic concepts, AVL Tree implementations.
**Heaps:** Basic concepts, Heap implementation, Heap applications.

## UNIT IV: MULTIWAY TREES AND GRAPHS       (10 Periods)
**Multiway Trees:** B-Trees, Simplified B-Trees, B-Tree variations.
**Graphs:** Basic concepts, Operations, Graph storage structures, Graph algorithms - Create graph, Insert vertex, Delete vertex, Retrieve vertex, Depth-first traversal, Breadth-first traversal.

## UNIT V: SORTING AND HASHING                 (09 Periods)
**Internal Sorting:** Quick Sort, Shell Sort, Merge Sort, Heap Sort.
**External Sorting:** Introduction, External storage device and sorting with tapes, Balanced Merge.
**Hashing:** Introduction, Hash Table structure, Hash functions, Linear Open Addressing, Chaining, Applications.

**Total Periods: 45**

**TEXT BOOKS:**
1.    Richard Gileberg and Behrouz A. Forouzan, *Data Structures: A Pseudo-code Approach with C*, Cengage Learning, 2nd Edition, 2007.
2.    G.A.V. Pai, *Data Structures and Algorithms*, Tata McGraw Hill, 2nd Edition, 2009.

**REFERENCE BOOKS:**
1.    Debasis Samanta, *Classic Data Structures*, PHI Learning, 2nd Edition, 2009.
2.    Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, *Data Structures Using C,* Pearson Education, 2005.

# II B. Tech. – I Semester
## (19BT31503) SYSTEM PROGRAMMING

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|------------|------------|-------------|---|---|---|---|---|
| 40 | 60 | 100 | | 3 | - | - | 3 |

**PRE-REQUISITES:- -**

**COURSE DESCRIPTION:** Synchronized I/O, Direct I/O, Buffered I/O, Scatter/Gather I/O, I/O Schedulers, Device Drivers, Kernel Modules, Debugging System

**COURSE OUTCOMES:**

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

**CO1:** Apply system programming APIs for performing operations on files.

**CO2:** Implement buffer through streams for interactive I/O management.

**CO3:** Analyze I/O performance using synchronous and asynchronous operations

**CO4:** Identify classes of device drivers and its security issues in kernel development

**CO5:** Build running modules for setting up a system using module parameters in the user space

**CO6:** Analyze different I/O operations and debugging techniques in the design of char drivers.

**DETAILED SYLLABUS:**

**UNIT I: FILE I/O** (8 periods)

Systems Programming, APIs, ABIs, Standards, Opening Files, Reading via read(),Writing with write(),Synchronized I/O, Direct I/O, Closing Files, Seeking with lseek(),Positional Reads and Writes, Truncating Files, Multiplexed I/O, Kernel Internals

**UNIT II: BUFFERED I/O** (9 periods)

User-Buffered I/O, Standard I/O, Opening Files, Opening a Stream via File Descriptor, Closing Streams, Reading from a Stream, Writing to a Stream, Sample Program Using Buffered I/O, Seeking a Stream, Flushing a Stream, Errors and End-of-File, Obtaining the Associated File Descriptor, Controlling the Buffering, Thread Safety, Critiques of Standard I/O

**UNIT III: ADVANCED FILE I/O** (8 periods)

Scatter/Gather I/O, The Event Poll Interface, Mapping Files into Memory, Advice for Normal File I/O, Synchronized, Synchronous, and Asynchronous Operations, I/O Schedulers and I/O Performance

**UNIT IV:DEVICE DRIVERS AND RUNNING MODULES** (10 periods)

The role of Device Driver, Splitting the kernel, Classes of Devices and Modules, Security Issues. Building and Running Modules: Kernel Modules versus Applications,The Kernel Symbol Table, Preliminaries, Initialization and shutdown, Doing it in user space.

## UNIT V: CHAR DRIVERS AND DEBUGGING TECHNIQUES     (10 periods)

The Design of Scull, Some Important Data Structures, Char Device Registration, Open and Release, Scull's Memory Usage, Read and Write. Debugging Techniques: Debugging support in the Kernel, Debugging System faults, Debuggers and Related Tools.

**Total Periods: 45**

*Topics for self-study are provided in the lesson plan*

### TEXT BOOKS:

1. Robert Love, Linux System Programming, O'Reilly Media, 2007.
2. Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman, LINUX Device Drivers, O'Reilly Media, Year: 2005

### REFERENCE BOOKS:

1. 1.Dayanand Ambawade, Deven Shah, "Linux Labs and Open Source Technologies", Dreamtech Press, 2014.
2. 2.Venkateswaran S, "Essential Linux Device Drivers", Pearson Education, 2008

# III B. Tech. - I Semester
## (16BT51502) SYSTEMS SOFTWARE

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 30 | 70 | 100 | | 3 | 1 | - | 3 |

**PRE-REQUISITE:** A course on Operating Systems.

**COURSE DESCRIPTION:**
Kernel and Shell; The shell interpretive cycle ; Shell scripts; System calls for the File System - Open, Read, Write, File and record locking ; Process states and transitions;Process Creation; TCP/IP Basics; Resolving IP Addresses, Maintaining Security.

**COURSE OUTCOMES:**
*On successful completion of this course, students will be able to*
CO1. Demonstrate knowledge on commands for text processing and Files.
CO2. Analyze and Interpret process and System management techniques used in System Software
CO3. Use inbuilt UNIX system APIs to control system and its process.
CO4. Apply algorithms to manipulate the process context in system Software.
CO5. Perform effective troubleshooting using system error defines available with the operating system.

**DETAILED SYLLABUS:**
**UNIT I:  UNIX ARCHITECTURE AND COMMAND USAGE**
**(09 Periods)**
**Division of Labor** : Kernel and Shell, The file and process, The System calls, Features of UNIX, Internal And External Commands, Command Structure, General Purpose Utilities: cal, date, echo, printf, bc, script, Email Basics, mailx, passwd, who, uname, tty, sty.
**Handling Files:** The file, File Name, The parent child relationship, The home variable, pwd, cd, mkdir, rmdir, ls, cat, cp, rm, mv, more, file, wc, od, cmp, comm, diff, gzip, gunzip, tar, zip and unzip.

**UNIT II: UNIX KERNEL AND SYSTEM CALLS    (09 Periods)**
Introduction to system concepts, Kernel Data Structures, System Administration
**System calls for the File System:** Open, Read, Write, File and record locking, Adjusting the position of file I/O, Close, File

creation, Creation of special files, Change directory and change root, Change owner and change mode, Stat and fstat , Pipes, Dup, Mounting and unmounting file systems, Link, Unlink, File system abstractions, File system maintenance

## UNIT III: PROCESS DESCRIPTION                (09 Periods)
Process states and transitions, Layout of system memory, The context of a process, Saving the context of process, Manipulation of the process address, Sleep

## UNIT IV:   PROCESS CONTROL                (08 Periods)
Process creation, Signals, Process termination, Awaiting process termination, Invoking other programs, The user id of a process, Changing the size of a process, The shell, System boot and init process.

## UNIT V:  ADVANCED SYSTEM MANAGEMENT
(10 Periods)
**Networking Tools:** TCP/IP Basics, Resolving IP Addresses, The Applications, Ping: Checking the Network, telnet:Remote Login, ftp:File Transfer Protocol, SSH: The Secure Shell, The SSH Tools, The Domain Name System(DNS).
Maintaining Security, Partitions and File Systems, The Standard File Systems and Their Types, fdisk: Creating Partitions, mkfs: Creating a File System, Mounting and Unmounting File Systems, fsck: File System Checking.

**Total Periods: 45**

**TEXT BOOKS**:
1.   Sumitabha Das, *Unix Concepts and Applications*, TMH, 4th Edition, 2006.
2.   Maurice J. Bach, *The Design Of The Unix Operating System*, PHI, 2008.

**REFERENCE BOOKS**:
1.   Graham Glass, King Ables, *Unix for programmers and users*, Pearson, 3rd Edition, 2009.
2.   N.B Venkateswarlu, *Advanced Unix programming*, BS Publications, 2nd Edition, 2010.
3.   Yashwanth Kanitkar, *Unix Shell programming,* BPB Publications, 2010.

# II B. Tech. – I Semester
## (19BT31531) DATA STRUCTURES AND ALGORITHMS LAB

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 50 | 50 | 100 | | - | - | 2 | 1 |

**PRE-REQUISITES:** A course on "Data Structures and Algorithms"

**COURSE DESCRIPTION:**

Sorting and Searching; Linked Lists; Stacks and Queues; Binary Search Trees; AVL trees; Graph Traversing Techniques; Collision Resolution Techniques

**COURSE OUTCOMES:** After successful completion of this course, the students will be able to:

**CO1:** Implement sorting and searching algorithms using suitable data structure.

**CO2:** Develop algorithms to solve real time problems using Linked lists

**CO3:** Solve computational problems using stacks and queues

**CO4:** Develop algorithms to perform operations on trees and graphs

**CO5:** Build solution for collisions in hash tables using suitable data structure

**CO6:** Work independently and in team to solve problems with effective communication

**List of Exercises/List of Experiments:**

1. Implement following sorting algorithms
   a) Bubble Sort
   b) Insertion sort
   c) Selection sort

2. Store roll numbers of students who attended placement training program in random order in an array.
   a) Write a program to search whether a particular student attended training or not using linear search
   b) Write a program to search whether a particular student attended training or not using binary search

3. a) Department of CSSE has readers club named 'Prerana'. Students of all years can be granted membership on request and they can get books. Similarly one may cancel the membership of club. First node is reserved for head of readers club and last node is reserved for in-charge of readers club. The student's information in each node consisting of name of the student and roll no of the student. Develop a program to perform following operations on readers club member's information using singly linked list.
   i) Add and delete the members as well as head or even in-charge.
   ii) Compute total number of members in readers club
   iii) Display members in readers club
   iv) Display list in reverse order using recursion
   v) Sort the list using name and display it.

   b) A Company has N employees and it maintains each employee data with the following attributes like: emp_id, emp-dept,emp_sal, emp_mobileno. Use a menu driven Program to perform following operations on employee's data using DoublyLinked List (DLL).
   i) Create a DLL of N Employees Data by using end insertion.
   ii) Display the status of DLL and count the number of nodes in it

iii) Perform Insertion and Deletion at End of DLL
iv) Perform Insertion and Deletion at Front of DLL
v) Perform Insertion and Deletion at any user specified position of DLL
vi) Exit

4. a) Implement a menu driven Program for the following operations on stack using arrays.
   i) Push an Element on to Stack
   ii) Pop an Element from Stack
   iii) Demonstrate how Stack can be used to check Palindrome
   iv) Display the elements of a Stack
   v) Exit
   b) Develop a menu driven program to implement queue operations using arrays

5. a) Write a program to implement stack using linked list
   b) Write a program to implement queue using linked list

6. a) Develop a program to convert an infix expression to postfix expression using stack
   b) Write a program to evaluate given postfix expression using stack

7. Develop a menu driven program to perform the following operations on a binary search tree
   a) Create a binary search tree
   b) Insert an element into a binary search tree
   c) Delete an element from binary search tree
   d) Traverse the binary search tree in Inorder, Preorder and post order

8. Write a program to perform the following operations on AVL tree
   a) Insert an element into AVL tree
   b) Delete an element from AVL tree
   c) Display the elements of AVL tree in ascending order

9. a) Develop a program to implement Breadth first search traversal.
   b) Develop a program to implement Depth first search traversal.

10. Write a program to implement hashing with
    a) Separate Chaining Method
    b) Open Addressing Method

**REFERENCE BOOKS/LABORATORY MANUALS:**

1. Debasis Samanta, Classic Data Structures,PHI Learning private limited, Second Edition, 2017
2. Robert Lafore, Data Structures & Algorithms in Java, Second Edition, Pearson Education (2008)

**ADDITIONAL LEARNING RESOURCES:**

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/lecture-videos
2. http://nptel.ac.in/courses/106106127/
3. http://www.nptel.ac.in/courses/106102064

# II B. Tech. – I Semester
## (16BT30531) DATA STRUCTURES LAB
(Common to CSE, IT and CSSE)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 50 | 50 | 100 | | - | - | 3 | 2 |

**PRE-REQUISITES:** A course on Data Structures

**COURSE DESCRIPTION:**
Hands on practice on Linked Lists; Type of lists; Stacks and Queues; Trees and Search trees; Graphs; Searching and Hashing.

**COURSE OUTCOMES:**
*On successful completion of this course, students will be able to:*
CO1.  Demonstrate practical knowledge on Stacks, Queues, Linked lists, Trees Sorting and Hashing Techniques.
CO2.  Analyze suitable data structure to solve real world computing problems.
CO3.  Design solutions for complex computational problems using linear and non-linear data structures.
CO4.  Solve for Complex computational problems by conducting explorative analysis.
CO5.  Use C language for implementing linear and non-linear data structures.
CO6.  Apply contextual knowledge of data structures to design applications for societal requirements.
CO7.  Communicate effectively using data structures with engineering community, being able to comprehend and write effective programs and Prepare Reports.
CO8.  Engage in learning advances in Data structures.

**LIST OF EXERCISES:**
1. Write program to implement the following data structures:
   (a) Single Linked List
   (b) Double Linked List
   (c) Circular Linked List
2. Write a program to implement Stack and Queue using Linked List.
3. Write a program to evaluate a given postfix expression using Stack.
4. Write a program to convert a given infix expression to postfix form using Stack.

5. Write a program to implement
    (a) Stack using two Queues
    (b) Queue using two Stacks
6. Write a program to implement In-order, pre-order, post-order tree traversal of Binary Trees.
7. Write a program to perform operations on a Binary Search Tree (BST).
8. Write programs for implementation of graph traversals by applying:
    (a) Breadth First Search
    (b) Depth First Search
9. Implement the following sorting algorithms:
    (a) Merge Sort
    (b) Heap Sort
    (c) Quick Sort
10. Write a program to implement hashing with
    (a) Separate Chaining Method
    (b) Open Addressing Method

**REFERENCE BOOKS:**
1.    Richard Gileberg and Behrouz A. Forouzan, *Data Structures: A Pseudocode Approach with C,* Cengage Learning, 2nd Edition, 2007.
2.    G.A.V. Pai, *Data Structures and Algorithms,* Tata McGraw Hill, 2nd Edition, 2009.

## II B. Tech. – I Semester
## (19BT31532) OPERATING SYSTEMS LAB
(Common to CSE, CSSE, CSE (AI) and CSE (DS))

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 50 | 50 | 100 | | - | - | 2 | 1 |

**PRE-REQUISITES:** A course on "Operating Systems."

**COURSE DESCRIPTION:** Hands-on practice in simulating algorithms for CPU Scheduling, Memory Management, I/O Management, Deadlock Handling mechanisms; Implementing Synchronization problems;

**COURSE OUTCOMES:** *On successful completion of this course, the students will be able to:*

**CO1:** Analyze process scheduling problems by applying contextual knowledge on CPU scheduling algorithms.

**CO2:** Apply memory management and disk scheduling algorithms to attain optimal solutions.

**CO3:** Devise solution for deadlock avoidance using banker's algorithm.

**CO4:** Design solutions for process synchronization problems using semaphores and monitors.

**CO5:** Apply file allocation strategies to achieve optimal disk utilization.

**CO6:** Work independently and in team to solve problems with effective communication

**LIST OF EXPERIMENTS:**

1   Simulate the following

    a) Process System Calls.

    b) I/O System Calls.

2   Simulate multi-level queue scheduling algorithm by considering the following scenario. All the processes in the system are divided into two categories – system processes and user processes. System processes are to be given higher priority than user processes. The priority of each process ranges from 1 to 3. Use fixed priority scheduling for all the processes.

3   Demonstrate File Permissions.

4   Simulate the following CPU Scheduling Algorithms:

    a) FCFS b) SJF (Preemptive) c) Priority d) Round Robin

5   Design solutions for the following synchronization problems:

    a) Producer Consumer Problem b) Dining Philosophers Problem.

6   Design Banker's Algorithm for Deadlock Avoidance. Find the safe sequence. If Maximum request of any one process is changed, detect whether a deadlock has occurred or not. Consider the number of resources are three and Jobs are five.

7   Simulate the following Algorithms:

a) First Fit    b) Best Fit    c) Worst Fit

8     Simulate the following Page Replacement Algorithms

a) FIFO    b) LFU    c) LRU    d) Optimal

9     Simulate the following Disk Scheduling Algorithms

a) FCFS    b)SSTF    c) SCAN    d) CSCAN

10    Simulate the following file allocation strategies:

a) Contiguous Allocation    b) Linked Allocation

## REFERENCE BOOKS:

1. Herbert Schildt, *Java the Complete Reference*, Ninth Edition, Oracle Press, 2014.

2. Sachin Malhotra and Saurab Choudhary, *Programming in Java*, Second Edition, Oxford University press, 2014.

## SOFTWARES/TOOLS USED:

- Software:J2SDK1.7

  -Eclipse or NetBeans IDE

- Java compatible web browser

# II B. Tech. - I Semester
# (16BT31531) OPERATING SYSTEMS LAB
(Common to CSE, IT and CSSE)

| Int. Marks | Ext. Marks | Total Marks | L | T | P | C |
|---|---|---|---|---|---|---|
| 50 | 50 | 100 | - | - | 3 | 2 |

**PRE-REQUISITE:** A course on Operating Systems.

**COURSE DESCRIPTION:** Hands on practice in simulating algorithms for CPU Scheduling, Memory Management, I/O Management, Deadlock Handling mechanisms; Implementing Synchronization problems; practice on UNIX commands.

**COURSE OUTCOMES:**
*On successful completion of this course, students will be able to:*
CO1.    Demonstrate knowledge of the following algorithms to solve problems:
      i.      CPU Scheduling
      ii.     Memory Management
      iii.    I/O Management
CO2.    Formulate and analyze solutions to problems pertaining to Memory and I/O.
CO3.    Designing models for deadlock handling mechanisms.
CO4.    Develop skills in basic UNIX commands.
CO5.    Use appropriate APIs' available in modern operating systems (such as threads, system calls, semaphores, etc...) for software development.
CO6.    Communicate effectively on complex operating system problems with implication to User-friendliness.
CO7.    Develop and demonstrate user defined libraries to communicate with the kernel or effective implementation of projects across multidisciplinary environments

**LIST OF EXPERIMENTS:**
1. Write a program to implement the following system calls:
    a) fork b) exec c) getpid d) wait
2.    a. Write a program to demonstrate File Permissions.
    b. Write a program to implement named and unnamed pipes.
3.    Implement the following CPU Scheduling Algorithms:
    a) FCFS b) SJF (Preemptive) c) Round Robin d) Priority. Use the following set of processes, compare the performance of above scheduling policies

| Process Name | Arrival Time | Processing Time | Priorities |
|---|---|---|---|
| A | 0 | 3 | 2 |
| B | 1 | 5 | 4 |
| C | 3 | 2 | 1 |
| D | 9 | 5 | 5 |
| E | 12 | 5 | 3 |

4. Implement the following synchronization problems:

    a) Producer Consumer Problem

    b) Dining Philosopher's Problem.

Implement Banker's Algorithm for Deadlock Avoidance and Detection. Find the safe sequence. If Max. request of any one process is changed, detect whether deadlock is occurred or not. Consider number of resources are three and Jobs are five as shown in the figure:

| Process | Allocation | | | Max | | | Available | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | A | B | C | A | B | C |
| P0 | 0 | 1 | 0 | 7 | 5 | 3 | | | |
| P1 | 2 | 0 | 0 | 3 | 2 | 2 | | | |
| P2 | 3 | 0 | 2 | 9 | 0 | 2 | 3 | 3 | 2 |
| P3 | 2 | 1 | 1 | 2 | 2 | 2 | | | |
| P4 | 0 | 0 | 2 | 4 | 3 | 3 | | | |

6. Implement the following Algorithms:
    a) First Fit  b) Best Fit  c) Worst Fit

7. Implement multiprogramming with fixed number of tasks and variable number of tasks. The size of the memory is 1000K. Operating system size is 200K. Number of processes are P1, P2, P3 with sizes 150K, 100K and 70K.

8. Implement the following Page Replacement Algorithms:
    a) FIFO    b) LFU    c) LRU    d) Optimal
Consider number of frames are three and Reference string is
2 3 2 1 5 2 4 5 3 2 4 2 4 5

# II B. Tech. – I Semester

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 50 | 50 | 100 | | - | - | 2 | 1 |

**PRE-REQUISITES:** A course on "Programming for Problem Solving"

## COURSE DESCRIPTION:

Hands-on practice PC Hardware; Installation of Operating System; Software and Hardware Troubleshooting; Microsoft Office- Word and Excel; C Language- Operators, Expressions, Decision Making Statements, Looping Statements, Arrays and Functions.

## COURSE OUTCOMES:

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

**CO1:** Devise solutions to the basic problems using C Language constructs.

**CO2:** Solve problems by applying functions, structures, dynamic memory allocation and pointers.

**CO3:** Develop, maintain and modify Web pages effectively using markdown.

**CO4:** Design personal portfolioin customized style by using git and Jekyll themes.

**CO5:** Build simple mobile applications using MIT App inventor.

**CO6:** Work independently and communicate effectively in oral and written forms.

## LIST OF EXPERIMENTS:

### I: C Programming:

1. **A** Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.

    i) $(ax+b)/(ax-b)$      ii) $2.5logx+Cos32^{o}+|x^{2}+y^{2}|+2xy$
    iii) $x^{5}+10x^{4}+8x^{3}+4x+2$      iv) $ae^{kt}$

   **B** Write a program to calculate commission for the input value of sales amount. Commission is calculated as per the following rules:

    i) Commission is **NIL** for sales amount Rs. 5000.

    ii) Commission is 2% for sales when sales amount is >Rs. 5000 and <= Rs. 10000.

    iii) Commission is 5% for sales amount >Rs. 10000.

2. **A** Write a program to find the grace marks for a studentusing switch. The user should enter the class obtained bythe student and the number of subjects he has failed in.

   Use the following rules:

    i. If the student gets first class and the number of subjectsfailed is >3, then no grace marks are awarded. If thenumber of subjects failed is less than or equal to '3' thenthe grace is 5 marks per subject.

    ii. If the student gets second class and the number of subjectsfailed in is >2, then no grace marks are awarded. If thenumber of subjects failed in less

than or equal to '3' thenthe grace is 4 marks per subject.

iii. If the student gets third class and the number of subjectsfailed in is >1, then no grace marks are awarded. If thenumber of subjects failed in is equal to '1' then the graceis 5 marks per subject

**B** Write a program to find the sum of individual digits of a positive integer using for loop

**3** **A** Write a program to generate all the prime numbers between 1 and N using while loop

**B** Write a program to generate Fibonacci sequence for N numbers using do-while loop.

**4** **A** Write a program to perform the following: i) Addition of two matrices.

ii) Multiplication of two matrices.

**B** Write a program to implement (i) Call by value (ii) Call by reference.

**5** **A** Write a program to find factorial of a given number using recursion.

**B** Write a program that uses functions to perform the followingoperations:

Write a program to determine whether the given string ispalindrome or not.

**6** Define a structure to store employee's data with the following specifications:

Employee-Number, Employee-Name, Basic pay, Date of Joining

i. Write a function to store 10 employee details.

ii. Write a function to implement the following rules while revising the basic pay.

If Basic pay<=Rs.5000 then increase it by 15%.

If Basic pay> Rs.5000 and <=Rs.25000 then it increase by 10%.

If Basic pay>Rs.25000 then there is no change in basic pay.

Write a function to print the details of employees who have completed 20 years of service from the date of joining.

**7** **A** Write a Program to calculate the sum of n numbers entered by the user using dynamic memory allocation functions.

**B** Write a Pointer Program to swap two numbers without using the 3rd variable.

## II: Source Code Management Using Git and GitHub:

**8** Installing Git, Configuring Git, Creating a Git repository, Creating and editing files, Adding files to Git repository, Making changes and tracking them, Synchronizing local Git repository with GitHub, Deleting and renaming files.

**9** Markdown Syntax: Adding text of various styles and formats, Adding images along with text, Creating Ordered/Unordered list,

Adding videos/ pdfs to the markdown file, adding links in the markdown file.

**10** GitHub Pages: Creation of personal portfolio site- Creating a GitHub Page using Markdown and Jekyll themes forrepositories.

## III: Build Apps with MIT App Inventor:

**11** Building the App "HelloCodi": Select components to design app, Programming with the Blocks Editor, Playing the Sound, Packaging app.

**12** Building the simple Game APP "BallBounce".

**13** Building the Drawing App "DigitalDoodle".

**REFERENCE BOOKS:**

**MIT App Inventor:**

1. http://appinventor.mit.edu/

**GIT Hub:**

1. Scott chacon, Ben Straub, "**Pro Git**", Second Edition, APress open, 2014.

**C LANGUAGE:**

1. Behrouz A. Forouzan and Richard F. Gilberg, "**A Structured Programming Approach using C**," Third Edition, Cengage Learning, New Delhi, 2007.
2. PradipDey and ManasGhosh, "**Programming in C,**" Second Edition, Oxford University Press, New Delhi, 2007.

**SOFTWARES/Tools used:**

System Software: C Compiler/Code Blocks, MIT App Inventor, Git hub.

## II B.Tech. I Semester
## (19BT315AC) DESIGN THINKING
(Audit Course)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| - | - | - | | 2 | - | - | - |

**PRE-REQUISITES: -**

**COURSE DESCRIPTION:** Design thinking process, Design thinking phases, empathy tools; Idea generation, visualizing and empathizing; Fidelity for prototypes, prototyping; prototyping for physical products.

**COURSE OUTCOMES:** After successful completion of this course, the students will be able to:

**CO1:** Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.

**CO2:** Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.

**CO3:** Develop innovative products or services for a customer base using ideation techniques.

**CO4:** Build prototypes for complex problems using gathered user requirements.

**CO5:** Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market.

**CO6:** Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

**DETAILED SYLLABUS:**

**UNIT I: INTRODUCTION TO DESIGN THINKING** (6 Periods)

Design Thinking Process: Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Design vs Design thinking, Problem solving, Understanding design thinking and its process model, Design thinking tools.

**UNIT II: EMPATHIZE** (6 Periods)

Design thinking phases, How to empathize, Role of empathy in design thinking, purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding empathy tools : Customer Journey Map, Personas.

**UNIT III: IDEATION** (6 Periods)

Challenges in idea generation, need for systematic method to connect to user, Visualize, Empathize, and Ideate method, Importance of visualizing and empathizing before ideating, Applying the method, Ideation Tools: How Might We? (HMW), Story board, Brainstorming.

## UNITI V: PROTOTYPING                                    (6 Periods)

What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype

## UNIT V: TESTING PROTOTYPES                              (6 Periods)

Prototyping for digital products: What's unique for digital, Preparation; Prototyping for physical products: What's unique for physical products, Preparation; Testing prototypes with users.

**Total Periods: 30**

*Topics for self-study are provided in the lesson plan*

## TEXTBOOKS:

1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking",Tata Mc Graw Hill, First Edition,2019.
2. Kathryn McElroy, "Prototyping for Designers: Developing the best Digital and Physical Products", O'Reilly,2017.

## REFERENCE BOOKS:

1. Michael G. Luchs, Scott Swan , Abbie Griffin,"Design Thinking – New Product Essentials from PDMA", Wiley, 2015.
2. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", 2012.

## ADDITIONAL LEARNING RESOURCES:

1. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
2. https://www.ibm.com/design/thinking/page/toolkit
3. https://www.interaction-design.org/literature/article/define-and-frame-your-design-challenge-by-creating-your-point-of-view-and-ask-how-might-we
4. https://www.culturepartnership.eu/en/article/ten-tools-for-design-thinking
5. https://nptel.ac.in/courses/109/104/109104109/
6. https://nptel.ac.in/courses/110106124/

# II B. TECH. – II Semester

## (19BT41531) DESIGN AND ANALYSIS OF ALGORITHMS LAB

| Int. Marks | Ext. Marks | Total Marks | L | T | P | C |
|---|---|---|---|---|---|---|
| 50 | 50 | 100 | - | - | 2 | 1 |

**PRE-REQUISITES:** A course on "Design and Analysis of Algorithms"

**COURSE DESCRIPTION:** Divide and conquer; Quick Sort; Merge Sort; Kruskal's Algorithm; Prim's Algorithm; Dijkstra's Algorithm; Dynamic Programming; Greedy method; Back tracking method; Floyd's Algorithm

**COURSE OUTCOMES:** After successful completion of this course, the students will be able to:

CO1: Analyze the performance of Merge sort and quick sort algorithms using divide and conquer technique

CO2: Develop algorithms to solve knapsack problem using greedy and dynamic programming methods

CO3: Devise solutions for finding minimum cost spanning tree by using kruskal's and prim's algorithms

CO4: Solve different shortest path problems by applying Floyd's and Dijkstra's algorithms

CO5: Implement algorithms to solve real world problems using Dynamic Programming and backtracking methods

CO6: Work independently and communicate effectively in oral and written forms.

### List of Exercises/List of Experiments:

1. Sort a given set of n integer elements using Quick Sort and merge sort methods and compute its time complexities. Run the programs for varied values of n >1000 and record the time taken to sort. Plot a graph of the time taken versus n for both algorithms. The elements can be read from a file or can be generated using the random number generator. Demonstrate how the divide and conquer method works along with its time complexity analysis: worst case, average case and best case.

2. Write a program to implement knapsack problem using greedy method.

3. a) Write a program to find minimum cost spanning tree using Kruskal's Algorithm

   b) Write a program to find minimum cost spanning tree using Prim's Algorithm

4. Write a program to find shortest paths to other vertices using Dijkstra's algorithm from a given vertex in a weighted connected graph.

5. Write a program to implement 0/1 Knapsack problem using Dynamic Programming method.

6. Write a program to implement All-Pairs Shortest Paths problem using Floyd's algorithm.

7. Write a program to implement Travelling Sales Person problem using Dynamic programming method.

8. Write a program to implement backtracking algorithm for the N-queens problem.

9. Write a program to find a subset of a given set S = {Sl, S2,.....,Sn} of n positive integers whose SUM is equal to a given positive integer d. For example, if S ={1, 2, 5,

6, 8} and d= 9, there are two solutions {1,2,6}and {1,8}. Display a suitable message, if the given problem instance doesn't have a solution.

10. Write a program to find all Hamiltonian Cycles in a connected undirected Graph G of n vertices using backtracking principle.

## REFERENCE BOOKS/LABORATORY MANUALS:

1. Ellis Horowitz, Satraj Sahni and Rajasekharam, Fundamentals of Computer Algorithms, Galgotia Publications Pvt. Ltd, New Delhi, 2nd Edition, 2007.

## SOFTWARE/Tools used:

**Software:** JDK 1.8

**Operating System:** Windows/ Linux

## ADDITIONAL LEARNING RESOURCES:

- NPTEL course on Design and Analysis of Algorithms
  URL: https://nptel.ac.in/courses/106/101/106101060/

## (19BT1AC01) SPOKEN ENGLISH

### (Audit Course)

| Int. Marks | Ext. Marks | Total Marks | L | T | P | C |
|---|---|---|---|---|---|---|
| - | - | - | 2 | - | - | - |

**PRE-REQUISITES: -**

**COURSE OBJECTIVES:**

- To impart the knowledge of day to day conversational expressions.
- To enhance contextual vocabulary and technical jargon for effective usage of language.
- To improve functional grammar for speaking and writing without errors.
- To acquaint with appropriate conversational and narrating techniques for effective communication.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

CO1. Analyze the techniques of listening, speaking, reading, writing and apply through functional English to communicate effectively with the engineering community and society.

**DETAILED SYLLABUS:**

**UNIT I - FUNCTIONAL ENGLISH:**                                         **(6 periods)**

Introduction - Functional Spoken English; Just a Minute; **Listening – Speaking:** Do's and Don'ts; **Expressing:** Ability/ Admiration/ Agreement/ Anger/ Annoyance/ Appreciation/ Pleasure/ Sarcasm/ Satisfaction/ Surprise/ Approval/ Capability/ Certainty/ Condolences/ Doubt/ Fear/ Gratitude/ Possibility/ Worry; **Asking for:** Advice/ Clarification/ Direction/ Information/ Permission/ Predictions/ a recommendation

**UNIT II - VOCABULARY BUILDING:**                                         **(6 periods)**

Vocabulary for day-to-day conversations; Introduction: Vegetables/ Groceries/ Fruits/ Weather; Parts of a Human body/ Dresses/ Furniture/ Relations; Birds/ Cries of Animals; Food/ Hospitality/ Houses/ Rooms/ Tools; Airport/ News Paper/ Books/ Gems; Corporate Vocabulary/ Jobs/ Occupations/ Diseases; British/ American spelling; Slang Words and Technical Jargon

**UNIT III - FUNCTIONAL GRAMMAR - I:**                                         **(6 periods)**

English Grammar and the Indian Student; Introduction: Parts of Speech, Verb forms; Tenses; Voice; Speech

**UNIT IV** - **FUNCTIONAL GRAMMAR - II**:                                    **(6 periods)**

Universal Auxiliaries; Sentence making for an effective communication; Sentence Structure -WH- Questions - How to frame Questions and give answers; Question Tags; Subject and verb agreement; Spotting Errors

**UNIT V** – **COMMUNICATION SKILLS**:                                        **(6 periods)**

Polite, Courteous and diplomatic terms; Useful daily expressions; Courtesy, Good manners and Etiquette; Conversation Techniques; Narrating/ Reading/ Listening to stories; Telling Stories

**Total Periods: 30**

**TEXT BOOKS:**

1**.** L. Adinarayana and V. Prakasam, *Spoken English*, Neelkamal Publications Pvt. Ltd., New Delhi, 2008
2**.** Ram Bhasker Raju, *The Complete Book on Spoken English*, Goutham Buddha Publications, Hyderabad, 2002.

**REFERENCE BOOKS :**

1. Sabina Pillai, *Spoken English for my World,* Oxford University Press, New Delhi, 2016.

2**.** K. R. Lakshminarayanan, *Speak in English,* Scitech Publications, Chennai, 2009.

**ADDITIONAL LEARNING RESOURCES**

- https://www.britishcouncil.in/programmes/english-partnerships/state/skills-projects/AP-English-Skills.
- https://www.fluentu.com/blog/english/websites-to-learn-english/

# I- B. Tech - I/II Semester
## (19BT1BS02) BIOLOGY FOR ENGINEERS
(Common to All Branches)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|:---:|:---:|:---:|---|:---:|:---:|:---:|:---:|
| 40 | 60 | 100 | | 2 | - | - | 2 |

**PRE REQUISITE**:   --

**COURSE OBJECTIVES:**
- To introduce the molecular basis of life and provide the basis for classification of living organisms

- To describe about biomolecules, enzymes, genes and the transfer of genetic information.

- To introduce the techniques used for modification of living organisms and applications of biology.

**COURSE OUTCOMES:**  After successful completion of the course, students will be able to:

CO1. Apply the basic knowledge of biology to understand the significance of various biological techniques.

CO2. Identify the role of DNA in the molecular basis of information transfer and understand single gene disorders related to the health perspective.

CO3. Apply the basic knowledge of bio-analytical devices and methods to address societal, health and legal issues.

**DETAILED SYLLABUS:**

**UNIT I – LIVING ORGANISMS                                          (6 Periods)**

Comparison of biological organisms with manmade systems,  Classification of living organisms, Cellular basis of life, differences between prokaryotes and eukaryotes, classification on the basis of carbon and energy sources, molecular taxonomy

**UNIT II – PROTEINS, NUCLEIC ACIDS AND ENZYMES                (6 Periods)**

Biomolecules, structure and functions of proteins and nucleic acids, Industrial applications of enzymes, Fermentation and its industrial applications

**UNIT III – GENETICS AND MOLECULAR BIOLOGY                     (6 Periods)**

Mendel's laws, single gene disorders in humans, Genetic code, DNA replication, Transcription, Translation.

## UNIT IV – RECOMBINANT DNA TECHNOLOGY                                    (6 Periods)

Recombinant DNA Technology: recombinant vaccines, transgenic microbes, plants and animals, animal cloning, biosensors, biochips

## UNIT V –HUMAN PHYSIOLOGY AND APPLIED BIOLOGY                 (6 Periods)

Fundamentals of Human physiology, neurons, synaptic and neuromuscular junctions, Introduction to EEG, DNA fingerprinting, DNA Micro array and Genomics.

**Total Periods: 30**

**TEXT BOOKS**:

1. N. A. Campbell, J. B. Reece, et al., *Biology: A global approach*, Pearson Education Ltd, 2018.
2. S. Sing and T. Allen, *Biology for Engineers*, Vayu Education of India, 2014.

**REFERENCE BOOKS**:

1. B. Alberts, A. Johnson et al., *The molecular biology of the cell*, Garland Science, 6th edition, 2014.

2. A. T. Johnson, *Biology for Engineers*, CRC press, 2011.

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 3 | 0 | -- | 3 |

**PRE-REQUISITES: -**

**COURSE OBJECTIVES:**

1. To acquaint with the nuances of effective communication correlating with academic content.
2. To understand and interpret the importance of listening techniques for effective communication.
3. To develop reading and writing techniques for effective technical communication.
4. To make use of speaking techniques to communicate effectively in formal and informal situations.

**COURSE OUTCOMES**: After successful completion of this course, students will be able to:

CO1. Analyze the modes and techniques of listening, speaking, reading, writing and apply appropriately to communicate effectively with the engineering community and society.

**DETAILED SYLLABUS:**

**UNIT I** - **INTRODUCTION TO COMMUNICATION**                    **(9 periods)**

Introduction – Language as a Tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Modes of Communication – Barriers to Communication (classification) - Case study

**UNIT II** - **ACTIVE LISTENING**                          **(9 periods)**

Introduction –Traits of a Good Listener – Listening Modes  – Types of Listening – Barriers to Effective Listening – Listening for General Content and Specific Information - Case study

**UNIT III** - **EFFECTIVE SPEAKING**                        **(9 periods)**

Introduction – Achieving Confidence, Clarity and Fluency – Paralinguistic Features             – Barriers to Speaking – Types of Speaking – Conferences; significance, planning and preparation and procedure – Symposia and Seminars - Persuasive Speaking - Case study

**UNIT IV** - **READING** (9 periods)

Introduction – Reading and Interpretation – Intensive and Extensive Reading – Critical Reading ––Techniques for Good Comprehension- SQ3R Reading Technique –Study Skills - Case study

**UNIT V** – **TECHNICAL WRITING** (9 periods)

Introduction – Language – Elements of Style – Techniques for Good Technical Writing    – Paragraphs Construction – Essays: types, Steps to Essay Writing and Checklist – Précis Writing - Case study

**Total Periods: 45**

**TEXT BOOKS**:

**1.** Meenakshi Raman & Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.

**2.** Ashraf Rizvi*, Effective Technical Communication*, McGraw-Hill Education (India) Pvt. Ltd., New Delhi, 2018.

**REFERENCE BOOKS**:

**1.** Sanjay Kumar & Pushp Lata, *Communication Skills*, Oxford University Press, New Delhi, 2013.

**2.** Rajendra Pal and J. S. Korlahalli, *Essentials of Business Communication*, Sultan Chand and Son, New Delhi, 2010.

**ADDITIONAL LEARNING RESOURCES**

1. https://www.skillsyouneed.com/ips/active-listening.html: A useful summary of what active listening skills are.
2. https://en.wikipedia.org/wiki/Active_listening: Wikipedia entry about active listening.
3. https://www.forbes.com/sites/womensmedia/2012/11/09/10-steps-to-effective-listening/#4b27a2503891: Ten steps to Active Listening (by Forbes magazine).
4. https://goo.gl/t1Uqrt: 20 tips for organizing a conference.
5. https://goo.gl/kPMr9u: 10 important issues for speakers at a conference.
6. https://goo/gl/C5bDvv: Wikihow guide to organizing a conference.

**I B. Tech. – I Semester (CSE, CSSE, IT, CE & ME)**

**I B. Tech. – II Semester   (ECE, EEE & EIE)**

**(16BT1HS01) TECHNICAL ENGLISH**

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 30 | 70 | 100 | | 3 | 1 | -- | 3 |

**PRE-REQUISITES:** English at Intermediate level

**COURSE DESCRIPTION:** Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.

**COURSE OBJECTIVES:**

**CEO1.** To impart knowledge of the nuances of communication.
**CEO2.** To develop Listening, Speaking, Reading and Writing skills in order to use language effectively in distinct situations.
**CEO3.** To imbibe an attitude of assimilating language skills in the sequence of locating, retrieving, reporting, evaluating, integrating, and accurately citing in the required context.

**COURSE OUTCOMES:** On successful completion of this course, the students will be able to

**CO1:** Demonstrate knowledge in

  ➢ Process of communication
  ➢ Modes of listening
  ➢ Paralinguistic features
  ➢ Skimming and Scanning
  ➢ Elements of style in writing

**CO2:** Analyze the possibilities and limitations of language, understanding
  ➢ Barriers to Communication
  ➢ Barriers to Effective Listening
  ➢ Barriers to Speaking
  ➢ Formal and metaphorical language

**CO3:** Design and develop functional skills for professional practice**.**

**CO4:** Apply writing skills in preparing and presenting documents

**CO5:** Function effectively as an individual and as a member in diverse teams.

**CO6***:* Communicate effectively with the engineering community and society in formal and informal situations**.**

**DETAILED SYLLABUS:**

**UNIT I** - **INTRODUCTION TO COMMUNICATION:**                              **(9 periods)**

Introduction –Language as a Tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Modes of Communication – Barriers to Communication (classification)

**UNIT II** - **ACTIVE LISTENING:** **(9 periods)**

Introduction – Reasons for poor Listening – Traits of a Good Listener – Listening Modes – Types of Listening – Barriers to Effective Listening – Listening for General Content and Specific Information

**UNIT III** - **EFFECTIVE SPEAKING:** **(9 periods)**

Introduction – Achieving Confidence, Clarity and Fluency – Paralinguistic Features – Barriers to Speaking – Types of Speaking – Persuasive Speaking

**UNIT IV** - **READING**: **(9 periods)**

Introduction and Reading Rates – Reading and Interpretation – Intensive and Extensive Reading – Critical Reading – Reading for Different Purposes – SQ3R Reading Technique – Study Skills

**UNIT V** – **WRITING**: **(9 periods)**

Introduction – Language – Elements of Style – Techniques for Good Technical Writing – Referencing and Styling – Right Words and Phrases – Sentences

**Total Periods: *45***

**TEXT BOOKS**:

1. Meenakshi Raman & Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.

**REFERENCE BOOKS**:

1. Ashraf Rizvi*, Effective Technical Communication*, McGraw-Hill Education (India) Pvt.Ltd., New Delhi, 2015.

2. Sanjay Kumar & Pushp Lata, *Communication Skills*, Oxford University Press, New Delhi, 2013.

3. Teri Kwal Gamble and Michael Gamble, *Communication Works*, Tata Mc Graw-Hill, New Delhi, 2010.

4. Rajendra Pal and J.S. Korlahalli, *Essentials of Business Communication*, Sultan Chand and Son, New Delhi, 2010.

**(**19BT1BS03**) ENGINEERING PHYSICS**
(Common to CSE, CSSE, ECE, EEE, EIE & IT Branches)

| Int. Marks | Ext. Marks | Total Marks | L | T | P | C |
|---|---|---|---|---|---|---|
| 40 | 60 | 100 | 3 | 0 | -- | 3 |

**PRE-REQUISITES: -**

**COURSE OBJECTIVES:**

1  To impart knowledge in basic concepts of wave optics, electromagnetic theory and fiber optics.
2  To identify the importance of semiconductors in the functioning of opto-electronic devices.
3  To familiarize the properties and applications of dielectric, magnetic , superconducting and
   nanomaterials relevant to engineering branches.

**COURSE OUTCOMES:**  After successful completion of the course, a student will be able to:

**CO1.**  Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.

 **CO2.**  Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.

**CO3.**  Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.

**CO4.** Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.

**CO5.** Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

**DETAILED SYLLABUS:**

**UNIT-I: WAVE OPTICS                                                          (09 periods)**

Interference:  Principle of superposition - Interference of light - Theory of interference fringes - Conditions for sustained interference - Interference in thin films (reflected light) - Newton's rings - Determination of wavelength.

Diffraction: Fraunhofer diffraction - Single slit diffraction - Diffraction grating - Grating spectrum - Determination of wavelength.

Polarization: Polarization by reflection, refraction and double refraction - Nicol's prism - Half wave and Quarter wave plate - Engineering applications of interference, diffraction and polarization.

## UNIT-II: ELECTROMAGNETIC WAVES AND FIBER OPTICS          (10 periods)

Divergence, Curl of Electric and Magnetic Fields - Maxwell's Equations (qualitative) - Electromagnetic wave propagation (conducting and non conducting media).

Introduction to fiber optics - Total Internal Reflection - Critical angle of propagation - Acceptance angle, Acceptance cone - Numerical Aperture - Classification of fibers based on Refractive index profile, modes - Attenuation losses - Dispersion - Propagation of electromagnetic wave through optical fiber - Block diagram of fiber optic communication - Applications of an optical fiber - Fiber optic Sensors (temperature, displacement).

## UNIT-III: SEMICONDUCTORS          (10 periods)

Origin of energy bands - Classification of solids based on energy bands - Intrinsic semiconductors - Density of electrons in intrinsic semiconductor - Density of holes in intrinsic semiconductor (qualitative) - Intrinsic carrier concentration - Fermi energy - Electrical conductivity of intrinsic semiconductors - Extrinsic semiconductors - Density of charge carriers in n-type - Density of charge carriers in p-type (qualitative) - Direct and Indirect band gap semiconductors - Hall effect, Hall coefficient - Applications of Hall effect - Drift and Diffusion currents - pn junction - Semiconducting materials for optoelectronic devices : Photodiode and Semiconductor diode laser.

## UNIT-IV: DIELECTRICS AND MAGNETISM          (09 periods)

Introduction to dielectrics - Electric polarization - Dielectric polarizability, susceptibility and dielectric constant - Types of polarizations (qualitative) - Frequency dependence of polarization - Lorentz (internal) field - Dielectric break down - Piezoelectricity - Applications of dielectrics.

Introduction to magnetics - Magnetic dipole moment, magnetization, magnetic susceptibility and permeability - Origin of magnetic moment - Classification of magnetic materials - Hysteresis loop - Soft and hard magnetic materials.

## UNIT-V: SUPERCONDUCTORS AND NANOMATERIALS          (7 periods)

Introduction to Superconductors, Properties - Critical parameters of Superconductors - Meissner effect - Penetration depth - Types of Superconductors - BCS Theory - Josephson effect (AC & DC) - High $T_C$ Superconductors - Applications.

Basic principles of nanomaterials - Synthesis of nanomaterials by PLD method - Properties of nanomaterials - Applications of nanomaterials.

**Total Periods: 45**

**TEXT BOOKS:**

1. M.N. Avadhanulu, P.G.Kshirsagar & T.V.S Arun Murthy, *A Text book of Engineering Physics*, S. Chand Publications, 11$^{th}$ edition, 2019.
2. P. K. Palaniswamy, *Engineering Physics*, Scitech Publications India Private Limited, 2$^{nd}$ edition, 2009.

**REFERENCE BOOKS:**

1. K. Thyagarajan, *Engineering Physics*, McGraw-Hill Education (India) Pvt. Ltd, 2016.
2. R.K. Gaur and S.L. Gupta, *Engineering Physics*, Dhanpat Rai Publications (P) Ltd, 2015.

## (16BT1BS02)  ENGINEERING PHYSICS

(Common to all branches)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 30 | 70 | 100 | | 3 | 1 | -- | 3 |

**PRE-REQUISITES:**  Intermediate / senior secondary Physics

**COURSE DESCRIPTION:**

Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.

**COURSE OBJECTIVES:**

CEO1 : To provide the basic knowledge of architectural acoustics, quantum mechanics, lasers, superconductors, optical fibers, semiconductors and nanotechnology.

CEO2 : To develop skills in using semiconductor devices, lasers, and optical fibers.

**COURSE OUTCOMES:** After completion of the course, a successful student will be able to:

CO1:  Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors,    and superconductors, acoustic of buildings, crystallography and nanomaterials.
CO2:  Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.
CO3:  Gain skills in designing of lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.
CO4:   Develop problem solving skills in engineering context.
CO5:   Use relevant techniques for assessing ball milling, pulsed laser deposition, pn-junction, Laser

**DETAILED SYLLABUS:**
**UNIT I – LASERS AND FIBER OPTICS                    (11periods)**

**Lasers:** Introduction, characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein's coefficients – condition for amplification, population inversion, Nd:YAG laser, Helium-Neon laser, semiconductor laser and applications of lasers.

**Fiber optics:** Introduction, principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, classification of optical fibers optical fiber communication system and applications of optical fibers.

## UNIT II – PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS
**(07 periods)**

**Principles of Quantum Mechanics:** Introduction, de-Broglie's hypothesis, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment).

**Band Theory of Solids:** Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy bands formation in solids, distinction between conductors, semiconductors and insulators based on band theory.

## UNIT III – SEMICONDUCTORS AND DIELECTRIC PROPERTIES OF MATERIALS

**(13 periods)**

**Semiconductors:** Introduction, types of semiconductors, intrinsic carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein's relation, Hall effect and its applications, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, LED, photo diode and Solar cell.

**Dielectric Properties of Materials:** Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, frequency dependence of polarizability (qualitative treatment), ferroelectricity.

## UNIT IV – ACOUSTICS OF BUILDINGS AND SUPERCONDUCTIVITY    (07 periods)
**Acoustics of Buildings:** Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.

**Superconductivity:** Introduction, General properties - Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory (qualitative treatment), applications of superconductors.

## UNIT V – CRYSTALLOGRAPHY AND NANOMATERIALS                (07 periods)
**Crystallography:** Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law-powder method.  **Nanomaterials:** Introduction, principles of nanomaterials, properties of nanomaterials, synthesis of nanomaterials by ball milling and pulsed laser deposition and applications of nanomaterials.

**Total Periods:  45**

**TEXT BOOKS**:
1. P. K. Palaniswamy, ***Engineering Physics***,  Scitech Publications India Private Limited, 2nd Edition, 2009

**REFERENCE BOOKS**:

1. Dr. S. Mani Naidu*, Engineering Physics*, Pearson Education, 1$^{st}$ Edition, 2013.
2. M.N. Avadhanulu,P.G.Kshirsagar, *A textbook of Engineering Physics*, S.Chand & Company Ltd. Revised edition 2014.
3. K. Thyagarajan*, Engineering Physics-I*, McGraw-Hill Education (India) Pvt.Ltd. 2015

**(19BT1BS31) ENGINEERING PHYSICS LAB**
(Common to CSE, CSSE, ECE, EEE, EIE & IT Branches)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 50 | 50 | 100 | | - | - | 2 | 1 |

**PRE REQUISITE:**    --
**COURSE OBJECTIVES**:
1  To impart knowledge in basic principles of optical, electrical and electronic instrumental techniques.
2  Develop skills in the design and functioning of components in the electronic circuits.
3  Develop the practical skills in analyzing optical, electrical and electronic properties of materials using different instruments for engineering applications.
4  Imbibe scientific attitude in applications of various experiments.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

**CO1.** Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
**CO2.** Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, Hysteresis losses, and acceptance angle of an optical fiber.
**CO3.** Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
**CO4.** Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
**CO5:** Work independently and in teams to solve problems with effective communication.

A minimum of any **Ten** experiments are to be conducted among the following:
**LIST OF EXPERIMENTS:**

1.      Determine the thickness of the wire using wedge shape method.
2.      Determination of wavelength of light source by Newton's ring method.
3.      Determination of wavelength by plane diffraction grating method.
4.   Estimation of magnetic field along the axis of a circular coil carrying current.
5.  Study the variation of Magnetic field induction (B) vs Magnetic field strength (H) by magnetizing the magnetic material (B-H Curve).
6. Determination the numerical aperture of a given optical fiber and hence to estimate its acceptance angle.
7. Determination of number of charge carriers and Hall coefficients of a given semiconductor using Hall Effect.
8. Determine the resistivity of semiconductor by Four probe method.
9.   Determine the energy gap of a semiconductor.
10. Study the I-V characteristics of pn junction diode.
11. Estimation of threshold voltages of different LED's.
12. Study the characteristics of Photodiode.
13. Determination of wavelength of laser by using diffraction grating.

**REFERENCES:**

1. S. Balasubramaniah and M.N. Srinivasan, *A Text book of practical physics*, S Chand Publications, 2017.
2. *http://vlab.amrita.edu/index.php* - Virtual Labs, Amrita University.

**(16BT1BS32)   ENGINEERING PHYSICS LABORATORY**
(Common to all Branches)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|:---:|:---:|:---:|---|:---:|:---:|:---:|:---:|
| 30 | 70 | 100 | | 0 | 0 | 3 | 2 |

**PRE-REQUISITES:**  Intermediate / senior secondary Physics.

**COURSE DESCRIPTION:**

Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber.  Determination of frequency of electrically vibrating tuning fork and a.c source using a.c sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.

**COURSE OBJECTIVES:**

CEO 1: Develop skills in the design and functioning of components in the electronic circuits.

CEO 2: Develop the practical skills in analyzing optical, electrical, electronic and mechanical

properties of materials using different instruments for engineering applications.

CEO 3: Imbibe scientific atitude in applications of various experiments.

**COURSE OUTCOMES:**   After completion of the course, a successful student will be able to:
**CO1:** Acquire basic knowledge about semiconductor materials, magnetic materials and
  lasers.
**CO2:** Acquire analytical skills in the estimation of carrier concentration of semiconductor
   materials and characterization of p-n junction.
**CO3:**  Develop skills in designing electronic circuits using semiconductor components.
**CO4:** Acquire skills to use instrumental techniques in ac sonometer and Melde's
experiment.
**CO5**: Apply diffraction techniques for determination of size of tiny particles and wave length
of lasers.

**LIST OF EXCERSICES:**

Conduct a minimum of any **Ten** of the following experiments.

1.  Determination of wavelength of a laser source using Diffraction Grating.

2.  Determination of particle size by using a laser source.

3.  Determination of Numerical aperture and acceptance angle of an optical fiber.

4.  Melde's experiment - transverse & longitudinal modes.

5.  Magnetic field along the axis of a current carrying coil- Stewart and Gee's method.

6. Calculation of ac frequency using sonometer.
7. I-V Characteristics of a p-n Junction diode.
8. Energy gap of a material of a p-n Junction.
9. Characteristics of LED source.
10. Characteristics of Photo diode.
11. Hall Effect.
12. Determination of rigidity modulus of the material of the wire using torsional pendulum.

## I B. Tech. - I/II Semester
## (19BT1BS04) ENGINEERING CHEMISTRY
(Common to All Branches)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|:---:|:---:|:---:|---|:---:|:---:|:---:|:---:|
| 40 | 60 | 100 | | 3 | - | - | 3 |

**PRE REQUISITE**: -

**COURSE OBJECTIVES:**

1    To provide basic knowledge in quantum-mechanical model of atom, bonding theories, water treatment, electrochemistry, corrosion, instrumental methods, fuels and lubricants.

2    To develop skills in identification of molecular shapes, measurement of hardness of water, calculation of cell potential, calorific value of fuels.

3    To impart basic knowledge pertains to various instrumental methods, their applications and characterization of molecular structures using instrumental methods.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

CO1. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.

CO2. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.

CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.

CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.

CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

**DETAILED SYLLABUS:**

**Unit I: Atomic Structure and Bonding Theories                    (9 periods)**

Quantum-mechanical model of atom, Schrodinger wave equation, significance of $\Psi$ and $\Psi^2$ , applications to particle in a box and hydrogen atom;  Molecular orbital theory – bonding in homo and hetero nuclear diatomic molecules – energy level diagrams of $N_2$, $O_2$, NO and CO; $\Pi$-molecular orbitals of butadiene and benzene; VSEPR theory and molecular shapes.

**Unit II: Water Treatment                                       (9 periods)**

Introduction, types of water, Impurities in water and their consequences. Hardness of water, units of hardness, disadvantages of hardness, measurement of hardness by EDTA method, numerical problems on measurement of hardness of water, boiler troubles- priming & foaming, scales & sludge, caustic embrittlement, boiler corrosion, softening of water– Ion exchange process, zeolite process, desalination of brackish water by reverse osmosis, Drinking water treatment- Ozonisation & chlorination, specifications of potable water as per WHO and BIS standards. Fluoride in ground water: Effects on human health, defluoridation method – Nalgonda method; merits and demerits of various defluoridation methods.

**Unit III: Electrochemistry and Applications**                              **(10 periods)**

Electrode potential, Nernst equation, reference electrodes (Calomel electrode and glass electrode), electrochemical cell, cell potential calculations. Primary cells – dry cell, alkali metal sulphide batteries, Secondary cells – lead acid, lithium ion batteries, Fuel cells - Hydrogen-oxygen fuel cell, Methanol-oxygen fuel cell, Solid-oxide fuel cell.

**Corrosion:**   Introduction, Definition, types of corrosion- wet (galvanic corrosion, concentration cell corrosion) and dry corrosion, Factors influencing corrosion, control of corrosion- sacrificial anodic protection, Impressed current cathodic protection, electroplating method (Nickel).

**Unit IV: Instrumental Methods and Applications**                              **(9 periods)**

Introduction to spectroscopy–types of energy present in molecules, types of spectra, UV-Vis spectroscopy – principle, types of electronic transitions, chromophore, auxochrome, Bathochromic shift, Hypsochromic shift, Instrumentation of UV-Vis spectrophotometer, applications; Infrared spectroscopy – principle, types of vibrational modes, group frequencies, Instrumentation of IR spectrophotometer, applications. principle and applications of physicochemical methods (SEM, TEM, X-ray diffraction).

**Unit V: Fuel chemistry and Lubricants**                              **(8 Periods)**

**Fuel chemistry**: Types of fuels, calorific value, numerical problems based on calorific value; Liquid fuels, cracking of oils (Thermal and Fixed-bed catalytic cracking), knocking and anti-knock agents, Octane and Cetane values, Synthetic petrol: Fischer-Tropsch method and Bergius process.

**Lubricants**: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity and viscosity index , flash and fire points, cloud and pour points, Aniline points, neutralization number and mechanical strength.

                              **Total Periods: 45**

**TEXT BOOKS:**

1. P. C. Jain & Monika Jain, *Engineering Chemistry*, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 16th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy and C. Ramachandriah, *Engineering Chemistry,* Mc.Graw Hill Publishers, New Delhi.

**REFERENCE BOOKS:**

1.  J. D. Lee, *Concise Inorganic Chemistry*, Oxford University Press, 5$^{th}$ edition 2010.

2.  Skoog and West, *Principles of Instrumental Analysis*, Thomson, 6$^{th}$ edition, 2007.

3.  Peter Atkins, Julio de Paula and James Keelar, *Atkins' Physical Chemistry*, Oxford University Press, 10$^{th}$ edition, 2010.

**I-B. Tech - I/II Semester**
**(16BT1BS01): ENGINEERING CHEMISTRY**
(Common to All Branches of Engineering)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 30 | 70 | 100 | | 3 | 1 | - | 3 |

**PRE REQUISITE**: Intermediate/Senior Secondary Chemistry

**COURSE DESCRIPTION**: Water technology, Chemistry of Engineering materials, Nano Chemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.

**COURSE OBJECTIVES:**

1. To impart basic and applied knowledge in water technology, Chemistry of Engineering materials, Nano Chemistry, Green Chemistry, bio-diesel, electro chemical cells, sensors, corrosion and lubricants.

2. To develop skills in analysis of materials and design of systems for engineering applications.

3. To imbibe an attitude among students to practice Engineering in compliance with principles of Green Chemistry.

**COURSE OUTCOMES:** After completion of the course, a successful student is able to:

1. Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.
2. Develop analytical skills in:
   a. Determination of hardness of water.
   b. Determination of viscosity, flame and fire points, cloud and pour points.
3. Develop designing skills in:
   a. Synthesis of engineering plastics.
   b. Chemical methods for the synthesis of Nano materials.
4. Develop skills for providing solutions through:
   a. Mitigation of hardness of water.
   b. Newer Nanomaterials and engineering plastics for specific applications
5. Acquire awareness to practice engineering in compliance to modern techniques such as:
   a.  Nalgonda technique for defluoridation of water
   b.  Electroplating technique for control of corrosion.
6. Acquire awareness to societal issues on:
   a. Quality of water.
   b. Bio-diesel
   c. Chemical materials utility and their impact.

**DETAILED SYLLABUS:**

**UNIT–I:   WATER TECHNOLOGY                                    [9 periods]**
Introduction, types of water, impurities in water and their consequences, types of hardness of water, units of hardness of water, disadvantages of hardness of water, estimation of hardness of water by EDTA method, Boiler troubles: Scales and Sludges, Caustic embrittlement, Boiler corrosion and Priming and Foaming. Softening of water: Zeolite process and Ion exchange process, advantages and disadvantages. Desalination of brackish water by Reverse Osmosis, Numerical problems on estimation of hardness of water.
Fluorides in water: effects on human health, defluoridation method-Nalgonda method; comparison of merits and demerits of various defluoridation methods (Nalgonda, Bone Charcoal, Activated Alumina, Contact precipitation, Brick, Reverse osmosis).

**UNIT – II:  CHEMISTRY OF ENGINEERING MATERIALS          [9 periods]**
**Engineering Plastics:** Definition, general properties, synthesis, properties and applications of PC, PTFE, and PMMA.
**Conducting polymers**: Definition, types of conducting polymers: Intrinsic and extrinsic conducting polymers with examples, engineering applications of conducting polymers.
**Biodegradable polymers**: Definition, properties, classification, mechanism of degradation of biodegradable polymers and their applications.
**Composites** – Introduction, types of composites: fiber reinforced particulate and layered composites with examples, advantages of composites and applications.

**UNIT– III: NANO CHEMISTRY AND GREEN CHEMISTRY          [9 periods]**

**Nano Chemistry:** Introduction, classification, properties and applications of Nano materials (nano particles, nano tubes, nano wires, nano composites, dendrimers); synthesis of Nano materials – Sol-gel process.
**Green Chemistry:** Introduction, principles of green chemistry, Tools of Green Chemistry with Examples, Applications of Green Chemistry in science and technology.
**Biodiesel:** Introduction, Synthesis (Trans esterification method), advantages, disadvantages and applications.

**UNIT–IV: ELECTROCHEMICAL CELLS AND SENSORS          [9 periods]**

**Electrochemical cell**: Introduction, EMF of an electrochemical cell.
**Batteries:** Introduction, types of Batteries: primary and secondary batteries with examples, Ni-Cd batteries, Lithium-ion batteries, Lithium- Polymer batteries, Applications of batteries.
**Fuel Cells:** Definition, examples: $H_2$ – $O_2$ Fuel cell, solid oxide fuel cell, Bio-fuel cell and applications of fuel cells.
**Sensors** - Introduction, Types of Sensors, electrochemical sensor: construction and working principle of potentiometric sensor, and applications of electrochemical sensors.

**UNIT–V: CORROSION AND LUBRICANTS                          [9 periods]**

**Corrosion:**  Introduction, Definition, types of corrosion (dry and wet corrosion), galvanic corrosion, concentration cell corrosion, Factors influencing corrosion, Corrosion control: cathodic protection; sacrificial anodic protection and impressed current cathodic protection; protective coatings: Galvanizing and Electroplating (Nickel).

**Lubricants:** Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity, flash and fire points, cloud and pour points, Aniline points, neutralization number and mechanical strength.

**Total periods: 45**

**TEXT BOOKS:**

1. P.C.Jain & Monika Jain*, **Engineering Chemistry**, Dhanpat Rai Publishing Company (P)  Ltd, New Delhi, 16th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah **Engineering Chemistry***, Mc. Graw-Hill Higher Education, Hyderabad, 1st edition, 2015.

**REFERENCE BOOKS:**

1. A.K. Bandyopadhyay, **Nano Materials,** New Age international publishers, 2nd edition, 2014.
2. Paul T. Anastas, John C Warner, **Green Chemistry: Theory and practice,** Oxford University Press, 2000

## I B.Tech. - I/II Semester
## (19BT1BS32) ENGINEERING CHEMISTRY LABORATORY
(Common to All Branches of Engineering)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 50 | 50 | 100 | | - | - | 2 | 1 |

**PRE REQUISITE: -**

**COURSE OBJECTIVES:**
- To impart knowledge in basic principles of volumetric and instrumental methods of analysis.
- To develop practical skills encompassing quantitative analysis of materials by volumetric methods.
- To develop practical skills to analyze the materials by instrumental methods.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

A minimum of any **Ten** experiments are to be conducted among the following:

**LIST OF EXPERIMENTS :**

1. Estimation of Hardness of water by EDTA method

2. Determination of alkalinity of Water sample

3. Estimation of Dissolved Oxygen in water by Winkler's method.

4. Estimation Fe (II) by Dichrometry

5. Conductometric titration of strong acid Vs strong base

6. Estimation of Ferrous ion by Potentiometry

7. Determination of strength of acid by $P^H$ metric method

8. Determination of Strength of an acid in Pb-Acid battery

9. Determination of Viscosity by Ostwald's viscometer

10. Determination of percentage of Iron in Cement sample by colorimetry

11. Estimation of residual chlorine in drinking water.

12. Identification of simple organic compounds by UV-Vis and IR spectroscopy

**TEXT BOOKS:**

1. K. Mukkanti, *Practical Engineering Chemistry*, BS Publications, 2013.

2. K.N. Jayaveera, K.B. Chandra Sekhar, *Chemistry laboratory manual*, S.M. Enterprises Limited, 2013.

# I-B. Tech- I/II Semester

## (16BT1BS31): ENGINEERING CHEMISTRY LABORATORY

(Common to All Branches of Engineering)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 30 | 70 | 100 | | - | - | 3 | 2 |

**PRE REQUISITE:** Intermediate/Senior Secondary Chemistry

**COURSE DESCRIPTION:** Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of $P^H$ on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, $P^H$ meter and colorimeter; synthesis of Polymers and Nano materials.

**COURSE OBJECTIVES:** This course enables the students to:

1. Develop practical skills encompassing quantitative analysis of materials by volumetric methods, instrumental methods and acquire designing skills for the synthesis of Nano materials and Engineering plastics.

**COURSE OUTCOMES:** After completion of the course, a successful student is able to:

1. Acquire basic knowledge about the volumetric analysis and synthesis of materials used for engineering applications.
2. Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.
3. Develop designing skills for the synthesis of polymers and Nanomaterials.
4. Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, $P^H$ of a solution, determination of viscosity of lubricants and estimation of iron in cement.
5. Provide solutions for environmental issues through determination of quality of water.

A minimum of any **Ten** experiments are to be conducted among the following:

**LIST OF EXPERIMENTS:**

1. Estimation of Hardness of water by EDTA method.
2. Estimation of alkalinity of Water.
3. Estimation of Dissolved Oxygen in water.

4. Estimation of Ferrous Iron by Dichrometry.

5. Preparation of Novalac Resin.


6. Synthesis of Nano metal-oxide using sol– gel process.

7. Conductometric titration of strong acid Vs strong base

8. Estimation of Ferrous ion by Potentiometry.

9. Determination of amount of corrosion of metals in different medium

10. Measurement of viscosity of lubricants by Ostwald viscometer.
11. Determination of $P^H$ of a given solution by $P^H$ metry.

12. Estimation of Ferric iron in cement by Colorimetric method.


**Duration: 3 Periods for each experiment**

**Total periods: 36**

**TEXT BOOKS:**

1. K. Mukkanti, *Practical Engineering Chemistry*, BS Publications, 2013.

2. K.N. Jayaveera, K.B. Chandra Sekhar, *Chemistry laboratory manual*, S.M. Enterprises Limited, 2013.

**I B. Tech. - II semester**
**(19BT2BS01) TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
**(Common to All Branches)**

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 3 | 1 | -- | 4 |

**PRE-REQUISITE:** -

**COURSE OBJECTIVES:**

- To familiarize with Fourier series of a periodic function, the Fourier integral of a function and the Fourier transformation.

- To introduce Laplace transform techniques for solving differential equations.

- To acquaint the students with concepts of matrices and linear transformations useful in engineering contexts.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

CO1: Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.

CO2: Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

**DETAILED SYLLABUS:**

**UNIT- I: Fourier Series and Fourier Transforms                         (9 Periods)**

Fourier series: Determination of Fourier coefficients, Euler's formulae, convergence of Fourier series (Dirichlet's conditions), Fourier series in $(0,2l),(-l,l)$ ; Fourier series of even and odd functions; Half-range Fourier sine and cosine expansions in $(0,l)$ ; Fourier integral theorem (statement only), Fourier sine and cosine integrals; Fourier transforms, Fourier sine and cosine transforms, Inverse Fourier transforms.

**UNIT-II: Laplace Transforms                                          (9 Periods)**

Definition of Laplace transform, existence conditions, Laplace transform of standard functions, Properties of Laplace transforms, Laplace Transforms of derivatives, Laplace Transforms of integrals, multiplication by $t^n$, division by t, Laplace transform of periodic functions, Laplace transforms of unit step function and unit impulse function.

**UNIT- III: Inverse Laplace Transforms                                 (9 Periods)**

Inverse Laplace transform by different methods; Convolution theorem (without proof), inverse Laplace transforms by convolution theorem; Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

## UNIT- IV: Linear Algebra-I (Matrices)                    (9 Periods)

Rank of a matrix: echelon form; Linear systems of equations: solving system of Homogeneous and Non-Homogeneous equations; Eigen values and Eigen vectors of a matrix and properties (without proofs), Diagonalization of matrix by orthogonal transformation; Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation.

## UNIT- V: Linear Algebra-II (Vector Spaces)                 (9 Periods)

Vector spaces, Linear dependence and independence of vectors, basis, dimension, Linear transformations (maps), range and kernel of a linear map, rank and nullity, inverse of a linear transformation, rank-nullity theorem (without proof), matrix associated with a linear map.

**Total Periods: 45**

**TEXT BOOKS:**

1. T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, *Engineering Mathematics-II*, S. Chand & Company, 10th edition, 2016.

2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna publishers, 44th edition, 2017.

3. David Poole, *Linear Algebra: A Modern Introduction*, Brooks/Cole, 2nd edition, 2005.

**REFERENCE BOOKS**:

1. B.V. Ramana, *Higher Engineering Mathematics*, Tata McGraw hill, 1st edition, 2017.

2. V.Krishna Murthy, Mainra and Arora: *An Introduction to Linear Algebra*, Affiliated East-West Press, 1993.

# I B. Tech. – II Semester

## (16BT2BS01) TRANSFORMATION TECHNIQUES AND PARTIAL  DIFFERENTIAL EQUATIONS

### (Common to all Branches of Engineering)

| Int. Marks | Ext. Marks | Total Marks | L | T | P | C |
|---|---|---|---|---|---|---|
| 30 | 70 | 100 | 3 | 1 | -- | 3 |

**PRE REQUISITE**: Intermediate /Senior secondary mathematics

**COURSE DESCRIPTION**: Fourier series; Fourier integrals and transforms; Laplace transforms; z –transforms; partial differential equations.

**COURSE OBJECTIVES:**

CEO 1 :To impart basic knowledge on Fourier series, Fourier transforms,
Laplace  transforms, z-transforms and partial differential equations.

CEO 2 :To develop skills in analyzing the problems ,designing mathematical models,
Fourier series, Fourier transforms, Laplace transforms, z-transforms and
partial differential equations for the problems in engineering.

**COURSE OUTCOMES:** After completion of the course a successful student is able to

CO 1 :Acquire basic knowledge in
    (a) Fourier series and Fourier transforms
    (b) Fourier integrals
    (c) Laplace transforms and their applications
    (d) z- transforms and their applications
    (e) solving partial differential equations
    (f)  Heat transfer and wave motion

CO 2 : Develop skills in analyzing the
    (a) Properties of Fourier series for a given function
    (b) Partial differential equations through different evaluation methods
    (c) Difference equations through z – transforms
    (d) Engineering systems and processes involving wave forms and heat transfer

CO 3 :Develop skills in designing mathematical models for
    (a) Problems involving heat transfer and wave forms
    (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace
      transforms, z-transforms and difference equations

CO 4 :Develop analytical skills in solving the problems involving
    (a) Fourier series and Fourier transforms
    (b) Laplace transforms

    (c) Z-transforms and difference equations
    (d) Heat transfer and wave motion

CO 5 :  Use relevant transformation techniques for
    (a) Obtaining Fourier transforms for different types of functions
    (b)  Laplace transforms
    (c) Z- transforms
    (d) Partial differential equations

**DETAILED SYLLABUS**

**UNIT- I :  FOURIER SERIES**                                                   **(7 periods)**

**Fourier series:** Determination  of  Fourier  coefficients,convergence of Fourier series (Dirichlet'sconditions),Fourier series of even and odd functions,  Half-range  Fourier  sine and  cosine expansions.

**UNIT- II:  FOURIER INTEGRALSAND FOURIER TRANSFORMS**        **(8 periods)**

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

**UNIT-III:LAPLACE TRANSFORMS**                                     **(12 periods)**

Laplace transforms of standard functions. Properties of Laplace transforms. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem (without proof), inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

**UNIT-IV :   Z- TRANSFORMS**                                            **(9 periods)**

Z – transforms,  inverse Z– transforms,  damping  rule,  shifting  rule,  initial  and  final value theorems.   Convolution theorem(without proof),  solution of difference equations by Z– transforms.

**UNIT – V :  PARTIAL DIFFERENTIAL EQUATIONS**                  **(9 periods)**

Formation of Partial differential equations – Solutions of first order linear equations by method of grouping.  First and second order equations by method of separation of variables – Solutions of one dimensional Wave equation, Heat equation.

                                                    **Total no. of periods: 45**

**TEXT BOOK:**

1. T.K.V. Iyengar, B. Krishna Gandhi,S.Ranganatham and M.V.S.S.N. Prasad,***Engineering Mathematics, vol-1***, S. Chand & Company 13/e,2014.
2. T.K.V. Iyenger,  B.  Krishna Gandhi, S.Ranganadham  and M.V.S.S.N.Prasad,

***Mathematical Methods****,*S.Chand and Company, 8/e,2013

**REFERENCE BOOKS:**

1.  Grewal, B.S., ***Higher Engineering Mathematics***,Khanna publishers, Delhi, 42/e,2012

2.  Kreyszig, E., ***Advanced Engineering Mathematics***,John Wiley and Sons, Inc.,9/e,2013.

**II B. Tech. – II Semester (ECE, EEE and EIE)/**

**III B. Tech. – I Semester (CSE, CSE (AI), CSE (DS), CSBS, CSSE, IT, CE and ME)**

**(19BT4BS01)   MATERIAL SCIENCE**
(Open Elective-1)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|------------|------------|-------------|---|---|---|---|---|
| 40 | 60 | 100 | | 3 | - | - | 3 |

**PRE-REQUISITES: -**

**COURSE DESCRIPTION:** Introduction to Material Science and Engineering; Composite Materials; Smart Materials; Nano and Biomimetic Materials; Emerging Materials.

**COURSE OBJECTIVES:**

- To impart knowledge on processing, structure and properties of materials like composite materials, smart materials, biomimetric materials and nanomaterials.
- To develop awareness among the students about the impact of material science in engineering practices.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

**CO1.** Attain the basic knowledge on composites, smart materials, biomimetic materials and nano materials.

**CO2.** Demonstrate essential information about structure and properties of various composites used in various engineering applications.

**CO3.** Understand the basic properties of electro-rheostatic, magneto-rheostatic and shape memory alloys used in device applications.

**CO4.** Accomplish the basic knowledge in nanomaterials to familiarize various nano structured device applications.

**CO5.** Outline the processing and properties of functionally graded materials and identify its applications in various fields.

 **DETAILED SYLLABUS:**

**UNIT- I: INTRODUCTION TO MATERIAL SCIENCE AND ENGINEERING  (08 Periods)**

Introduction - historical perspective - material science and engineering, classification of materials (metals, ceramics, polymers and composites) and advanced materials and their

applications (biomaterials, smart materials and nanomaterials), modern materials needs. Processing, properties and applications of metals, polymers and ceramics (Qualitative).

### UNIT- II: COMPOSITE MATERIALS                                    (10 Periods)

Composite Materials - Classification, Laminated composites and Reinforced composite materials – Classification, structure and properties of sandwich composites – applications (commercial Aircraft, Marine Grade Sandwich, Automobile Grade Sandwich and Wind Turbine Blades), properties and applications of Nano composites - Advantages and Limitations of composites.

### UNIT- III: SMART MATERIALS                                    (07 Periods)

Classification of smart materials - Magneto-rheostatic (MR) and Electro-rheostatic (ER) materials - Shape Memory Alloys (SMA)- characteristics, Shape memory effect applications in different fields, advances in smart materials.

### UNIT – IV: NANO AND BIOMIMETIC MATERIALS                      (10 Periods)

**Nanomaterials:** Introduction, Low dimensional structures and energy quantization. Fabrication of nano materials - Lithographic technique using photons, metallic, semiconducting and magnetic properties of nano materials and applications (renewable energy and nano electro-mechanical systems (NEMS)).

**Biomimetic materials** – Introduction- classification and their applications (Lotus effect, Dolphin sound wave technology and viper as a model in defence)

### UNIT- V: EMERGING MATERIALS                                    (10 Periods)

Functionally graded materials (FGM) - Types, processing, properties and potential applications, functionally graded fibre cement – structural material, Functionally Graded Nanoelectronic, Optoelectronic and Thermoelectric Materials (Qualitative) and its applications.

**Total Periods: 45**

**TEXT BOOKS:**

1. William D Callister, David G Rethwisch, *Materials Science and Engineering*, Wiley,

    9th edition, 2014.

2. K M Gupta, *Engineering Materials – Research, Applications and Advances*, CRC press (Taylor & Francis group), 2015.

**REFERENCE BOOKS:**

1. Sulabha K Kulkarni*, Nanotechnology: Principles and practices*, Springer, 9$^{th}$ edition, 2014.

2. Charles P. Poole and Frank J. Owens, *Introduction to Nanotechnology*, Wiley-Interscience, May 2003.

1. Sulabha K Kulkarni, *Nanotechnology: Principles and Practices,* Springer, 3$^{rd}$ edition, 2014.

**II B. Tech. – II Semester (CSE, CSE (AI), CSE (DS), CSBS, CSSE, IT, CE and ME)/**
**III B. Tech. – I Semester (ECE, EEE and EIE)**

==**(19BT4HS05) GENDER AND ENVIRONMENT**==
==(Open Elective-2)==

| Int. Marks | Ext. Marks | Total Marks | L | T | P | C |
|---|---|---|---|---|---|---|
| 40 | 60 | 100 | 3 | - | - | 3 |

**PRE-REQUISITES: -**

**COURSE DESCRIPTION:** Gender and the environment relationship, Gendered Roles in the family & community, Gender and sustainable development, Gender in environmental justice, Gender &environmental security.

**COURSE OBJECTIVES:**

- To enhance understanding of environmental issues by considering the particular experiences of women and men in the face of environmental degradation and key areas in gender-environment relations and gender roles in thefamily, community and international levels.

- To trace how different feminisms, build on the core concepts of sustainability and justice to transform familiar debates in global environmental politics.

- To provide analysis of how gender relations affect the natural environment and how environmental issues have a differential impact on women and men.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

**CO1:**Apply the knowledge of gender & environment connections, key issues and topics within global environmental politics in environmental decision-making.

**CO2:**Comprehend the concepts of gender and sustainable development through debates, and policy documents.

**CO3:**Analyze the concept of environmental security and justice by identifying the sources of insecurity.

**DETAILED SYLLABUS**

==**UNIT I: GENDER ANDENVIRONMENT RELATIONSHIP** (9 Periods)==

Introduction–Gender and Environment–Development of gender roles–Society, gender & environment – Understanding environmental politics – Gender-environment connections– Eco-feminism - Cultural eco-feminism–Social eco-feminism - Feminist political ecology


## UNIT II: GENDERED ROLES IN THE FAMILY & COMMUNITY                    (9 Periods)

Organization of the household – Domestic division of labour - Food: growing, harvesting, shopping, preparing, and cooking
Gender & Power- Planning – Politics – NGO – Gendering of environmental protest – Environmental decision-making

## UNIT III: GENDER ANDSUSTAINABLE DEVELOPMENT                    (9 Periods)

Concept of sustainability & its achievement – Concept of sustainable development – Ecological Modernization – Gender & sustainability debates – Gender & sustainable development debates -  Gender in policy documents – Gender, poverty & equity in sustainable development

## UNIT IV: GENDER IN ENVIRONMENTAL JUSTICE                    (9 Periods)

Normative Concerns ( Fairness, Inequality & Justice) - Making sense of Environmental justice – Ecological debt, Transnational harm,& human rights – Ecological justice – Gender & Environmental Justice – Gender, Vulnerability & risk – Women in environmental justice movements – Knowledge & participation – Gender, sustainability& justice as guiding concepts

## UNITV: GENDER AND ENVIRONMENTAL SECURITY                    (9 Periods)

Connections between security & the environment – **Gender, environment & security:**Sustainability as security - poverty & insecurity – Insecurity as injustice – Competing ways of thinking security – Reflecting on sources of insecurity – **Case Study** – Food Security -**Case Study** – The impacts of natural disasters

**Total Periods: 45**


**TEXT BOOKS:**

1. Nicole Detraz. (2017)  "Gender and the Environment"Polity Press, Cambridge, UK.

2. Susan Buckingham- Hatfield. (2000) "Gender and Environment"Routledge, London.

**REFERENCE BOOKS:**

1. Promillakapur (ed). (2000). "Empowering Indian Women" Publication Division, Government of India, New Delhi.

2. Ronnie Vernooy, (Ed). (2006). "Social and gender Analysis Natural Resource Management:  Learnning studies and lessons from Aisa" Sage, New Delhi.

3.  Swarup, Hemlata and Rajput, Pam. (2000). Gender Dimensions of Environmental and Development Debate: The Indian Experience" In SturatS.Nagel, (ed). "India"s Development and Public Policy".Ashgate, Burlington.

**II B. Tech. – II Semester (CSE, CSE (AI), CSE (DS), CSBS, CSSE, IT, CE and ME)/ III B. Tech. – I Semester (ECE, EEE and EIE)**

## (19BT4HS09) LIFE SKILLS
### (Open Elective-2)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|:---:|:---:|:---:|---|:---:|:---:|:---:|:---:|
| 40 | 60 | 100 | | 3 | - | - | 3 |

**PRE-REQUISITES: -**

**COURSE DESCRIPTION:** Positive attitude; Self-discovery-Interpersonal relationships; Cross-cultural communication; Core thinking-Problem solving and Decision making; Business presentations and Public speaking.

**COURSE OBJECTIVES:**

- To inculcate skills for self-efficacy required to manage effective interpersonal relationships.
- To familiarize the strategies involved in problem solving, decision making and SWOT analysis.
- To develop presentation skills required in professional arena.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

**CO1.** Gain knowledge in strategies involved in developing positive attitude, process ofknowing oneself and managing effective interpersonal relationships.

**CO2.** Analyse problem solving strategies in Decision Making and SWOT analysis.

**CO3.** Communicate effectively with Engineering Community and Society by demonstrating presentation skills in professional arena.

**DETAILED SYLLABUS:**

**UNIT I: POSITIVE ATTITUDE**                                                    **(9 Periods)**

Introduction, Features of attitudes, Formation of attitudes, Ways of changing attitude in a person, Attitude in a work place, Developing positive attitude, Obstacles in developing positive attitude, Measuring attitude.

**UNIT II: SELF DISCOVERY AND INTERPERSONAL RELATIONSHIPS**      **(9 Periods)**

Importance of knowing yourself, Process of knowing yourself, SWOT Analysis, Elements of attitude in interpersonal relationships, Methods to deal with different types of interpersonal relationship skills.

**UNIT III: CROSS-CULTURAL COMMUNICATION                    (9 Periods)**

Different Communication Styles, Cultural variables, communication sensitivity and variables of national culture, Individual Cultural Variables, Cross-cultural Communication Strategies, Potential hot spots in cross-cultural communication, Cross-cultural communication – Basic Tips.

**UNIT IV: CORE THINKING, PROBLEM SOLVING AND DECISION MAKING**
**(9 Periods)**

Process of developing core thinking skills, Categories of thinking: Critical & Creative, Understanding problem solving, Cause of problems, Stages of problem solving, Methods of problem solving, Types of decision making.

**UNIT V: BUSINESS PRESENTATIONS AND PUBLIC SPEAKING        (9 Periods)**

Business presentations and speeches, structuring the material, Types of delivery, Guidelines for delivery, Effective sales presentation, Controlling nervousness and stage fright.

**Total Periods: 45**

**TEXT BOOKS:**

1. Dr. K. Alex (2018) Soft Skills, S. Chand and Company Limited, New Delhi.

2. Manmohan Joshi (2017) Soft Skills, bookboon.com, Bangalore.

**REFERENCE BOOKS:**

1. Meenakshi Raman and Prakash Singh (2013), Oxford University Press, New Delhi.

2. Jeff Butterfield (2011) Soft Skills for Everyone, Cengage Learning India Private Limited, Delhi.

**II B. Tech. – II Semester (CSE, CSE (AI), CSE (DS), CSBS, CSSE, IT, CE and ME)/**

**III B. Tech. – I Semester (ECE, EEE and EIE)**

==**(19BT4HS11) PROFESSIONAL ETHICS**==
==(Open Elective -2)==

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|:---:|:---:|:---:|---|:---:|:---:|:---:|:---:|
| 40 | 60 | 100 | | 3 | - | - | 3 |

**PRE-REQUISITES: -**

**COURSE DESCRIPTION:** Engineering Ethics; Professional Ideals and Virtues; Engineering as Social Experimentation; Responsibilities and Rights; Global Issues.

**COURSE OBJECTIVES:**

- To impart fundamental concepts of engineering ethics, professional values and social responsibility.
- To develop skills in discharging the professional responsibilities as managers, advisors and leaders
- To apply code of ethics in workplace.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in Engineering Ethics, Responsibilities and Rights.

CO2. Analyze the concepts of Engineering in Social Experimentation and Global Issues.

CO3**.** Apply the nuances of professional ideals at work place and in social context.

**DETAILED SYLLABUS:**

==**UNIT - I: ENGINEERING ETHICS**== ==**(9 periods)**==

==Scope and aim of engineering ethics, Senses of engineering ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy-Kohlberg's theory, Gilligan's theory, Consensus and controversy.==

==**UNIT - II: PROFESSIONAL IDEALS AND VIRTUES**== ==**(8 periods)**==

==Theories about virtues, Professions, Professionalism, Characteristics, Expectations, Professional responsibility, Integrity, Self-respect, Sense of responsibility, Self-interest, Customs and religion, Self-interest and ethical egoism, Customs and ethical relativism, Religion and divine command ethics, Use of ethical theories, Resolving moral dilemmas and moral leadership.==

**UNIT - III: ENGINEERING AS SOCIAL EXPERIMENTATION**                    **(10 periods)**

Engineering as experimentation, Similarities to standard experiments, Learning from the past and knowledge gained, Engineers as responsible experimenters, Conscientiousness, Moral autonomy and accountability, The challenger case, Codes of ethics and limitations, Industrial standards, Problems with the law of engineering.

**UNIT - IV: RESPONSIBILITIES AND RIGHTS**                    **(9 periods)**

Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Rights of engineers, Professional rights, Whistle-blowing, The BART case, Employee rights and discrimination.

**UNIT - V: GLOBAL ISSUES**                    **(9 periods)**

Multinational corporations, Professional ethics, Environmental ethics, Computer ethics, Engineers as consultants, Witnesses, Advisors and Leaders, Engineers as Managers, Managerial ethics applied to Engineering Profession, moral leadership.

**Total Periods: 45**

**TEXT BOOKS:**

1. Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw-Hill, 3rd edition, 2007.
2. Govindarajan, M., Nata Govindarajan, M., Natarajan, S. and Senthilkumar, V. S., *Engineering Ethics*, Prentice Hall of India, 2004.

**REFERENCE BOOKS:**

1. S. Kannan and K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, Oxford University Press, 2001.

## (19BT4HS12) WOMEN EMPOWERMENT   (Open Elective-1)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 3 | - | - | 3 |

**PRE-REQUISITES:**

**COURSE DESCRIPTION:** Concept & Framework, Status of Women, Women's Right to work, International Women's Decade, and Women Entrepreneurship.

**COURSE OBJECTIVES:**

- To provide knowledge on the concept and framework for women empowerment, socio-economic political status of the women and develop consciousness among themselves to fight for their rights,

- To witness unprecedented efforts from various sectors to reassess the roles of women, to enlarge the information base, to search for alternative strategies for women's equality and development and to develop policies and programs addressed to women's specific problems and needs.

- To create awareness on women entrepreneurship and schemes for the development of women  entrepreneurship and entrepreneurial challenges and opportunities

**COURSE OUTCOMES:** After successful completion of the course, the students will be able to:

**CO1:** Demonstrate the characteristics of empowered women, their achievements, and frame work for women empowerment, legal laws, and political status of women.

**CO2:** Apply the knowledge of women rights to address various societal issues and obstacles in different fields including science and technology.

**CO3:** Understand the significance of participation in policy debates, National conferences and common forums for women's' equality and development.

**CO4:** Analyze the concept of women entrepreneurship, government schemes and entrepreneurial challenges and opportunities.

**DETAILED SYLLABUS:**

## UNIT I:  CONCEPT & FRAMEWORK                                    (9 Periods)

Introduction- Empowered Women's Characteristics- Achievements of Women's Empowerment
**Concept of Empowerment:** Meaning& Concept- Generalizations about Empowerment - Empowerment Propositions - Choices women can make for empowerment - Women's

participation in decision making, development process & in Governance. **Framework for Women's Empowerment** - Five levels of equality- Tenets of Empowerment- Elements - Phases and aspects - Techniques - Categories and Models – Approaches.

## UNIT II: STATUS OF WOMEN                                                    (9 Periods)

**Legal Status:** Present Scenario- Call for Social change- Significant trends  - Legal & Schemes - Personal Law- Joint Family- Criminal Law- Shift towards Dowry  - Deterrent Punishment  - Criminal Law(II Amendment)  - Discrimination in Employment

**Political Status:**  Present Scenario - Political Participation & its Nature- Socio-economic Characteristics - Political Mobilization: Mass Media - Campaign Exposure - Group Orientation - Awareness of issues and participation - Progress & Future Thrust.

## UNIT III: WOMEN'S RIGHT TO WORK                                            (9 Periods)

Introduction- Present Scenario - Changes in Policy &Programme - National Plan of Action- Women's Cells and Bureau - Increase in work participation rate- Discrimination in labourmarket - Women in unorganized sector - Issues and Obstacles- Women in Education - Women in Science & Technology –

**Case Study:** Linking Education to Women's  Access to resources.

## UNIT IV:  WOMEN'S PARTICIPATORY DEVELOPMENT                               (9 Periods)

Dynamics of social change- conscious participation - Information Explosion - Organized Articulation  - National Conference - Common Forums -  Participatory Development  - New Issues Identified  - Role of other Institutions.

## UNIT V:  WOMEN ENTREPRENEURSHIP                                           (9 Periods)

Introduction–Definition-Concept-  Traits  of  women  Entrepreneurs-  Role  of  women Entrepreneurs in India -Reasons of Women Entrepreneurship- Government schemes & Financial Institutions to develop Women Entrepreneurs - Key policy recommendations - Project Planning-Suggestions and measures to strengthen women entrepreneurship - Growth & Future challenges - Training and Opportunities –

**Case Study:** Training Women as Hand-pump Mechanics

**Case  Study** : Literacy for Empowering Craftswomen

**Total Periods: 45**

**TEXT BOOKS:**

1. NayakSarojini, Nair Jeevan(2017), "Women's Empowerment in India". Pointer Publishers, Jaipur
2. SahaySushama (2013), "Women and Empowerment"  Discovery Publishing House, New Delhi.

# (19BT40107) SUSTAINABLE ENGINEERING

(Open Elective-2)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|:---:|:---:|:---:|---|:---:|:---:|:---:|:---:|
| 40 | 60 | 100 | | 3 | - | - | 3 |

**PRE-REQUISITES:** --

**COURSE DESCRIPTION:** Principles of sustainability; Sustainability metrics and assessment tools; Sustainable engineering practices; Sustainable engineering applications; Sustainable urbanization and industrialization.

**COURSE OUTCOMES:** *After successful completion of the course, students will be able to:*

CO1.  Analyze the principles of sustainability to solve complex environmental problems following relevant standards/protocols considering society, health, safety and environment.

CO2.  Analyze sustainability metrics and assessment tools to solve complex environmental problems following relevant standards and emerging trends considering society, health, safety, environment and economics besides communicating effectively in graphical form.

CO3.  Analyze sustainable engineering practices to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

CO4.  Design sustainable engineering applications to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

CO5.  Analyze sustainable urbanization and industrialization principles to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

## DETAILED SYLLABUS:

### UNIT I–PRINCIPLES OF SUSTAINABILITY (9 periods)

Emerging challenges, Sustainability and sustainable engineering; Environmental concerns; Social, economic and legal issues; Availability and depletion of natural resources, Disaster resiliency; Multilateral environmental agreements – Basel convention, Clean development mechanism (CDM), Montreal and Kyoto protocols.

### UNIT II–SUSTAINABILITY METRICS AND ASSESSMENT TOOLS (9 periods)

Sustainability indicators, metrics and assessment tools, Material flow analysis and material budget, Carbon footprint analysis, Life cycle assessment, Streamlined life-cycle assessment (SLCA), Economic input output-life cycle analysis, Environmental health risk assessment, Other emerging assessment tools.

## UNIT III–SUSTAINABLE ENGINEERING PRACTICES (9 periods)

Sustainable energy engineering, Sustainable waste management, Green and sustainable buildings and infrastructure, Sustainable civil infrastructure, Sustainable remediation of contaminated sites, Climate geoengineering.

## UNIT IV–SUSTAINABLE ENGINEERING APPLICATIONS (9 periods)

Environmental and chemical engineering projects, Materials engineering projects, Infrastructure engineering projects – Background, Methodology, Goal and Scope, Study area, Technical design, Environmental sustainability, Life cycle assessment, Economic sustainability, Social sustainability, Rating systems – ENVISION, LEED, GRIHA, IGBC; Conclusions.

## UNIT V–SUSTAINABLE URBANIZATION AND INDUSTRIALIZATION (9 periods)

Sustainable urbanization and industrialization, United Nations sustainable development goals – Right to education, Poverty eradication, Social and technological changes; Industrial Processes - Material selection, Energy efficiency, Pollution prevention and control techniques, Industrial Ecology, Industrial symbiosis.

**Total Periods: 45**

*Topics for self-study are provided in the lesson plan*

**TEXT BOOKS:**

1. Reddy, K.R., Cameselle, C., and Adams, J.A., *Sustainable Engineering: Drivers, Metrics, Tools, and Applications*, John Wiley &Sons, Inc., Hoboken, New Jersey, 2019, 544p (ISBN: 978-1-119-49393-8).

2. Allen, D. T. and Shonnard, D. R., *Sustainability Engineering: Concepts, Design and Case Studies*, Pearson Education, 1st Edition, 2012.

**REFERENCE BOOKS:**

1. Bradley. A.S; Adebayo,A.O., Maria, P.,*EngineeringApplications in Sustainable Design and Development*, Cengage Learning, 1st Edition, 2016.

2. Purohit, S. S., *Green Technology: An Approach for Sustainable Environment*, Agrobios Publication, 1st Edition, 2016.

3. *Energy Conservation Building Code (ECBC) 2007*, Bureau of Energy Efficiency, Govt. of India, New Delhi.

4. Twidell, J. W. and Weir, A. D., *Renewable Energy Resources*, Routledge, Taylor & Francis Group, 3$^{rd}$ Edition, 2015.

**ADDITIONAL LEARNING RESOURCES:**

1. Daniel A. Vallero and Chris Brasier, *Sustainable Design: The Science of Sustainability and Green Engineering*, Wiley-Blackwell, 1$^{st}$ Edition, 2008.

2. Jorge A. Vanegas, *Sustainable Engineering Practice: An Introduction*, Committee on Sustainability, American Society of Civil Engineers, https://doi.org/10.1061/9780784407509, 2004.

3. Mackenthun, K.M., *Basic Concepts in Environmental Management*, CRC Press, Taylor & Francis Group, 1$^{st}$ Edition, 1999.

4. *Environment Impact Assessment Guidelines*, Notification of Government of India, 2006.

## (19BT10501) PROGRAMMING FOR PROBLEM SOLVING

(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 3 | 1 | - | 4 |

**PRE-REQUISITES:** A course on Basic Mathematics

**COURSE DESCRIPTION:** Introduction to problem solving approach, Introduction to Python programming, control structures, sequences, sets, Dictionaries, Implementation of Data structures using Python, Modular programming, file handling, Data representation and Visualization.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Python constructs to solve basic problems.

CO2. Develop and use Python modules to provide solutions to problems.

**DETAILED SYLLABUS:**

### UNIT-I: INTRODUCTION TO PROBLEM SOLVING AND PYTHON PROGRAMMING

**(10 Periods)**

**Problem Solving Aspect**: top-down design, implementation of algorithms, building blocks of flow charts, program verification and efficiency of algorithms.

**Python Programming:** tokens, literals, identifiers, keywords, special symbols and operators; fundamental data types, expressions, type conversions, handling Input and output in Python.

### UNIT-II: CONTROL STRUCTURES                     (8 Periods)

**Selection Statements**: if statement, if-else statement, if-elif-else statement, nested-if statement.

**Iterative Statements**: while loop, for loop, break statement, continue statement, pass and else statements used with loops.

### UNIT-III: SEQUENCES, SETS, DICTIONARIES AND DATA STRUCTURES

**(9 Periods)**

**Sequences: Lists and operations** - creating, inserting elements, updating elements, deleting elements, searching and sorting, list comprehensions, nested lists; **tuples** - creating, searching and sorting, nested tuples; **strings** - Initializing a string and string operations, string handling methods, string formatting; **sets** - set creation and operations; **dictionaries** - operations on dictionaries, dictionary methods, sorting elements using lambdas.

**Data structures: Stacks** - push, pop, peek and display operations on stack, applications of stack; **Queues** – enqueue, dequeue and display operations on queue, applications of queues.

45

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## UNIT-IV: MODULAR PROGRAMMING AND FILE HANDLING (10 Periods)

**Modular Programming**: need for functions, function definition, function call, variable scope and lifetime, return statement, positional arguments, keyword arguments, default arguments and variable-length arguments, recursive functions; Modules - math, NumPy, date and time.

**File Handling:** types of files, opening and closing files, reading and writing data.

## UNIT-V: DATA REPRESENTATION AND VISUALIZATION (8 Periods)

Pandas: creating data frame, reading data from CSV files, indexing and selecting data, dealing with rows and columns; Visualization - bar plots, histogram, Scatter Plot.

**Total Periods: 45**

*Topics for self-study are provided in the lesson plan*

### TEXT BOOKS:

1. R. Nageswara Rao, *Core Python Programming,* 2nd edition, Dreamtech Press, 2018.
2. R. G. Dromey, *How to solve it by Computer,* Pearson, 2006.

### REFERENCE BOOKS:

1. Reema Thareja, *Python Programming using Problem Solving Approach*, 1st edition, Oxford University Press, 2017.
2. Charles Dierbach, *Introduction to Computer Science using Python: A Computational Problem-Solving Focus*, Wiley India, 2016.

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## II B. Tech. – I Semester
## (16BT30503) PYTHON PROGRAMMING

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 30 | 70 | 100 | | 3 | 1 | – | 3 |

**PRE-REQUISITES:**
A Course on "Object Oriented Programming through C++"

**COURSE DESCRIPTION:**
Data types and Expressions; Control Statements; Strings; Text Files; Lists; Dictionaries; Functions; Objects and their use; Exception Handling; Design with Classes; Graphical User Interface;

**COURSE OUTCOMES:**
*On successful completion of the course, students will be able to:*
CO1. Demonstrate knowledge in:
- Data Types, Variables, Expressions
- Control statements, Strings and Text files.
- Lists, Dictionaries and Functions.
- Objects and Design with classes
- Exception Handling and GUI
CO2. Analyze complex computational problems.
CO3. Design solutions for real life computational problems
CO4. Solve complex problems using python scripting constructs.
CO5. Implement python scripts using Integrated Development Environment.
CO6. Apply Python programming knowledge to solve problems related to societal applications like Medical and Weather Forecasting.

**DETAILED SYLLABUS:**
**UNIT- I: INTRODUCTION, DATA TYPES AND EXPRESSIONS**
(8 periods)
**Introduction:** Computer science, Computer algorithms, Computer software, The Python programming language, First program in Python.
**Data Types and Expressions:** Literals, Variables and Identifiers, Operators, Expressions and Data types.

**UNIT- II: CONTROL STRUCTURES, LISTS, DICTIONARIES AND SETS**
(8 periods)
**Control Structures:** Control structures, Boolean expressions, Selection control and Iterative control.
**Lists:** List structures, Lists in Python, Iterations over lists, Assigning and copying lists, List comprehensions.

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**Dictionaries, Tuples and Sets:** Dictionary types in Python, Implementation of Dictionary, Tuples, Set data type - the Set data type in Python, Implementation of sets.

## UNIT-III: DESIGN WITH FUNCTIONS, STRINGS AND TEXT FILES (9 periods)
Program routines, Functions, Recursion-Recursive functions, Recursive problem solving, Iteration Vs Recursion, A case study of Towers of Hanoi using recursion; Using text files, String processing, Exception handling, A Case study on cigarette Use/Lung cancer Correlation program.

## UNIT-IV: OBJECTS AND THEIR USE, OBJECT ORIENTED PROGRAMMING (9 periods)
**Objects and Their Use:** Software objects, Turtle graphics-Creating a turtle graphics window, The default turtle, Fundamental turtle attributes and behavior, Additional turtle attributes, Creating multiple turtles.
**Object Oriented Programming:** Encapsulation, Inheritance, and Polymorphism.

## UNIT-V: GUI PROGRAMMING (11 periods)
Tkinter Overview - tkinter pragmatics, Documentation, Extensions, structure; tkinter coding alternatives, adding buttons and callbacks-lambda, bound method, callable class object, Binding events; adding multiple widgets, Reusable GUI Components with classes, Dialogs, Entry, check buttons and Radio buttons, Scales, Menus.

**Total Periods: 45**

**TEXT BOOKS:**
1.  Charles Dierbach, *Introduction to Computer Science using Python: A Computational Problem-Solving Focus*, Wiley India Edition, 2016.
2.  Mark Lutz, "Programming Python," O'Reilly Publications, Fourth Edition, 2011.

**REFERENCE BOOK:**
1.  Kenneth Lambert and B.L. Juneja, *Fundamentals of Python*, Cengage Learning, Third Edition, 2012.

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## (19BT10531) PROGRAMMING FOR PROBLEM SOLVING LAB

(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|------------|------------|-------------|---|---|---|---|---|
| 50 | 50 | 100 | | - | - | 2 | 1 |

**PRE-REQUISITES:** A course on Basic Mathematics

**COURSE DESCRIPTION:** The course is designed to provide hands on practice on Scratch programming and python programming for problem solving.

**COURSE OUTCOMES:** After successful completion of the course, students will be able to:

CO1.   Develop scripts using Scratch tool to simulate simple problems.

CO2.   Apply Python Constructs and Modules to develop solutions for real-life problems.

CO3.   Function effectively as an individual and in team to foster knowledge and creativity.

CO4.   Write and present a substantial technical report/ document effectively.

**PRACTICAL EXERCISES:**

1)   a)   Design a script in Scratch to simulate Airplane for take-off and land.

    b)   Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result.

2)   a)   Design a script in Scratch to calculate factorial of a given number.

    b)   Design a script in Scratch to simulate Maze game. (Hint: To get Maze images refer http://inventwithScratch.com/downloads/)

3)   a)   Write a python script to read two integer numbers and perform arithmetic operations.

    b)   Write a python script to evaluate following expressions by considering necessary inputs.

      i) $ax^2 + bx + c$   ii) $ax^5 + bx^3 + c$    iii) $(ax + b) / (ax - b)$    iv) $x - a / b + c$

4)   a)   Write a python script to convert given decimal number into octal, hexa decimal and binary.

    b)   Write a python script to read four integer values separated with commas and display the sum of those four numbers.

    c)   Write a python script to print "SVEC" with prefix of ten spaces by using format().

5)   a)   Write a python script to calculate electricity bill based on following slab rates.

| Consumption units | Rate (in Rupees/Unit) |
|-------------------|------------------------|
| 0-100 | 4 |
| 101-150 | 4.6 |
| 151-200 | 5.2 |
| 201-300 | 6.3 |
| Above 300 | 8 |

52

89

(Hint: To get Consumption units take current Meter reading, old meter reading from the user as input)

b) Print the following pattern using python script.

```
                        1
                1   2   1
            1   2   3   2   1
        1   2   3   4   3   2   1
    1   2   3   4   5   4   3   2   1
```

6)  a)  Write a python script to read *N* student details like name, roll number, branch and age. Sort the student details based on their names and display.

   b)  Write a python script to delete duplicate strings from a list of strings. (Insertion order should maintain after deleting duplicate string).

   c)  Write a python script to read N number of student details into nested list and convert that as a nested dictionary.

7)  a)  Design a function that can perform sum of two or three or four numbers.

   b)  Write a python script to implement towers of Hanoi problem.

   c)  Write a Python function primesquare(l) that takes a nonempty list of integers and returns True if the elements of l alternate between perfect squares and prime numbers, and returns False otherwise. Note that the alternating sequence of squares and primes may begin with a square or with a prime. Here are some examples to show how your function should work.

   ```
   >>>primesquare([4])
       True
       >>>primesquare([4,5,16,101,64])
       True
       >>>primesquare([5,16,101,36,27])
       False
   ```

8)  a)  Write a python script to perform arithmetic operations on numpyarrays.

   b)  Write a python script to perform following matrix operations using numpy.
       i) Dot product ii) Matrix product    iii) Determinant     iv) Inverse

9)  a)  Write a python script to Create Pandas dataframe using list of lists.

   b)  Write a python script to load data from a CSV file into a Pandas DataFrame and perform basic operations on it.

10) a)  Draw a Scatter Plot by considering an appropriate data set.

   b)  Draw histograms by considering an appropriate data set.

11)     Mini Project-1

12)     Mini Project-2

**TEXT BOOK**:

1.  R. Nageswara Rao, *Core Python Programming*, 2$^{nd}$ edition, Dreamtech Press, 2018.

## II B. Tech. – I Semester
## (16BT30532) PYTHON PROGRAMMING LAB

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 50 | 50 | 100 | | – | – | 3 | 2 |

**PRE-REQUISITES:**
A Course on "Python Programming"

**COURSE DESCRIPTION:**
Hands on practice – Scripting using Python Programming constructs; Conditional statements; Loops; Text Files; Lists; Dictionaries; Strings; Functions; GUI.

**COURSE OUTCOMES:**
On successful completion of the course, students will be able to:

CO1. Demonstrate practical knowledge of using python scripting constructs:
- Selection and Repetition statements.
- Lists, Dictionaries, Strings and Functions.
- Text Files and GUI.

CO2. Analyze the complexity of computer hardware.

CO3. Design solutions for specified computational problems using Object Oriented Programming concepts

CO4. Use appropriate python scripts and functions for solving complex problems.

CO5. Create window based applications using tkinter package

CO6. Apply contextual knowledge to computational problems related to societal applications like Medical and Weather Forecasting.

CO7. Work effectively to contribute individually to solve real world problems.

CO8. Communicate effectively in both oral and written to develop Python scripts.

**LIST OF EXERCISES:**
1.
  a. Write a python script to display a simple message
  b. Write a python script to perform basic arithmetic operations on two values which are accepted from the user.
2.
  a. Write a python script to calculate the factorial of a given number.
  b. Write a python script to calculate sum of individual digits of a given number.
  c. Write a python script to display the prime number series up to the given N Value.

3.    a.    Write a python script to find the largest number among three numbers and display them in ascending order using if-else construct.

       b.    Write a python script to create a simple text file, write the contents into the created file and display the same on to the console screen.

4.    Write a python script to remove all the occurrences of a given character from a text file, copy the resultant text into another text file. Find the total occurrences of the eliminated characters and display the count along with the contents of the text file on to the console.

5.    a.    Write a python script to display Fibonacci sequence of numbers using while loop, for loop and do-while loop constructs.

       b.    Write a python script to demonstrate string methods.

6.    a.    Write a python script to create a list and add n number of user-defined values to the list and display the same on to the console screen.

       b.    Write a python script to perform the following operations on Lists:
           (i) Matrix Addition.
           (ii) Matrix Multiplication.

7.    a.    Write a python script to search a key element in the given list of elements.

       b.    Write a python script to arrange the given list of elements in ascending or descending order.

8.    a.    Write a python script to find GCD of two numbers using recursive and non recursive functions.

       b.    Write a python script to convert the following using functions:
           (i) Fahrenheit to Celsius temperature.
           (ii) Celsius to Fahrenheit temperature.

9.    a.    Write a python script to draw a square using setposition method in absolute positioning.

       b.    Write a python script to draw a triangle using left, right and Forward methods in relative positioning.

       c.    Write a python script using penup and pendown methods to draw "W" character using turtle graphics.

       d.    Write a python script to create your own polygon shape and create an interesting design with it.

10.    a.    Write a GUI Script for creating text label in a window.
       b.    Write a Python Script to create a command button. When the button is clicked the event should be handled and the message on the window should change from "Hello" to "Good Bye".
11.    a.    Write a python script to demonstrate the Exception Handling.
       b.    Write a Python script to demonstrate the Mouse and Key Event handling.
       c.    Write a python script to demonstrate menu-driven applications
12.    By forming a group of 3 to 4 members develop a mini-project for Horse Race Simulation with the help of GUI programming and tkinter package.

**REFERENCE BOOKS:**

1    Charles Dierbach, *Introduction to Computer Science using Python: A Computational Problem-Solving Focus,* Wiley India Edition, 2016.
2.    Mark Lutz, *Programming Python,* O'Reilly Publications, Fourth Edition, 2011.

**Greedy Method:** General method, Applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest paths.

### UNIT-IV: DYNAMIC PROGRAMMING AND BACK TRACKING
(10 Periods)

**Dynamic Programming**: General Method, Applications - Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem.

**Back Tracking:** General Method, Applications – N Queen problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

### UNIT-V: BRANCH AND BOUND TECHNIQUES    (8 Periods)

General method, Applications - Travelling sales person problem, 0/ 1 knapsack problem; LC Branch and Bound solution, FIFO Branch and Bound solution.

**Total Periods: 45**

**TEXT BOOK:**

1. Ellis Horowitz, Satraj Sahni and Rajasekharam, *Fundamentals of Computer Algorithms,* Galgotia Publications Pvt. Ltd, New Delhi, Second Edition, 2007.

**REFERENCE BOOKS:**

1. M. T. Goodrich and R. Tomassia, *Algorithm Design: Foundations, Analysis and Internet Examples,* John Wiley and Sons, 2002.
2. S. Sridhar, *Design and Analysis of Algorithms,* Oxford Press, 2015.
3. Harsh Bhasin, *Algorithms: Design and Analysis,* Oxford University Press, 2015.

## (19BT40532) DATABASE MANAGEMENT SYSTEMS LAB

(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 50 | 50 | 100 | | - | - | 2 | 1 |

**PRE-REQUISITES:** A course on "Database Management Systems"

**COURSE DESCRIPTION:**

Design of an ER Models; Hands-on experience on - DDL, DML commands, Query processing using operators, Joins, Views, Synonyms, Indexes, Single row functions, Group functions and Set functions; PL/SQL programming - Basic programs, Exception handling, Triggers, Functions, Cursors and Stored procedures.

**COURSE OUTCOMES:** *After successful completion of the course, students will be able to:*

CO1. Analyze the requirements of a given database problem and design viable ER-Models for implementation of database.

CO2. Create database schemas, select and apply suitable integrity constraints for querying databases using SQL interface.

CO3. Develop and interpret PL/SQL blocks to centralize database applications for maintainability and reusability.

CO4. Develop database applications for societal applications such as ticket reservation system, employee payroll system using modern tools.

CO5. Work independently and communicate effectively in oral and written forms.

**LIST OF EXERCISES:**

1. Design and analyze an ER Model for the following use case.

   Roadway Travels" is in business since 1977 with several buses connecting different places in India. Its main office is located in Hyderabad. The company wants to computerize its operations in the following areas:

   - o Reservations
   - o Ticketing
   - o Cancellations

   Reservations:

   Reservations are directly handled by booking office. Reservations can be made 60 days in advance in either cash or credit. In case the ticket is not available, await listed ticket is issued to the customer. This ticket is confirmed against the cancellation.

   Cancellation and Modification:

   Cancellations are also directly handed at the booking office. Cancellation charges will be charged. Waitlisted tickets that do not get confirmed are fully refunded.

2. a) Implement Data Definition Language commands -Create, Alter, Drop, Truncate, and Rename.

   b) Implement Data Manipulation Language commands - Insert, Select, Update,

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and Delete.

    c)  Implement Single Row functions - Character, Numeric and Date functions.

3.    Implement various types of integrity constraints - NOT NULL constraint, DEFAULT constraint, UNIQUE constraint, PRIMARY key, FOREIGN key, CHECK constraint.

4.    a)  Implement group functions with different operators such as aggregate operators, group by, having and order by.

    b)  Implement nested and correlated nested queries using set operators and set comparison operators.

5.    a)  Creation of views, synonyms, sequence, indexes and save point.

    b)  Implement various types of joins - outer join and inner join.

## Basic PL/SQL:

6.    Construct PL/SQL block for the following.

    a)  To determine whether a number is palindrome

    b)  To determine whether a number is an Armstrong number

    c)  To find greatest of three numbers

    d)  To display Fibonacci series

## Control Structures:

7.    a)  Write a program in PL/SQL to update the salary of a specific employee by 8% if the salary exceeds the mid-range of the salary against this job and update up to mid-range if the salary is less than the mid-range of the salary, and display a suitable message.

    b)  Write a PL/SQL program to display the description against a student's grade using CASE statement.

## Exception Handling:

8.    a)  Develop a PL/SQL program that displays the name and address of a student whose ID is given. If there is no student with the given student ID in the database, the program should raise a run-time exception NO_DATA_FOUND, which should be captured in the EXCEPTION block.

    b)  Construct the user-defined exceptions to get the salary of an employee and check it with the job's salary range. If the salary is below the range, raise an exception BELOW_SALARY_RANGE. If the salary is above the range, raise the exception ABOVE_SALARY_RANGE.

## Functions:

9.    a)  Write a function that accepts two numbers A and B and performs the following operations.

        ○  Addition

        ○  Subtraction

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- o Multiplication
- o Division

b) Write a PL/SQL block that updates salary of an employee in Employee table by using incr function which takes employee number as argument and calculates increment and returns increment based on the following criteria.

If salary <= 3000, increment = 30% of salary

If salary > 3000 and <= 6000, increment = 20% of salary

else increment = 10% of salary

## Procedures:

10. a) Write a procedure that accepts two numbers and displays their sum.

b) Write procedures to demonstrate IN, IN OUT and OUT parameters.

## Cursors:

11. a) Write a block in PL/SQL to create a Cursor that displays the employee name and number of jobs he or she has done in the past.

b) Write a program in PL/SQL to create a cursor to display the name and salary of each employee in the EMPLOYEES table whose salary is less than that specified by a passed-in parameter value.

## Triggers:

12. Develop a suitable student database application by considering appropriate attributes.

Couple of attributes to be maintained is the attendance of a student in each subject for which he/she has enrolled and internal assessment Using TRIGGERS for the following

a) Whenever the attendance is updated, check if the attendance is less than 85%; if so, notify the concerned head of the department.

b) Whenever, the marks in an internal assessment test are entered, check if the marks are less than 40%; if so, notify the concerned head of the department.

## REFERENCE BOOKS:

1. Satish Ansani, *Oracle Database 11g: Hands-on SQL and PL/SQL*, PHI, 2010.
2. Pranab Kumar Das Gupta, P. Radha Krishna, *Database Management System Oracle SQL and PL/SQL*, PHI, 2nd Edition, 2009.

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## II B. Tech. II Semester
## (16BT40531) DATABASE MANAGEMENT SYSTEMS LAB
(Common to CSE, IT and CSSE)

| Int. Marks | Ext. Marks | Total Marks | L | T | P | C |
|---|---|---|---|---|---|---|
| 50 | 50 | 100 | -- | -- | 3 | 2 |

**PRE-REQUISITES:**
A course on "Database Management Systems"

**COURSE DESCRIPTION:**
Hands on experience on - DDL, DML commands; Query processing using operators; Joins, Views, Single Row functions, Group Functions and SET functions; PL/SQL concepts - Basic Programs, Triggers, Functions, Cursors and Stored Procedures.

**COURSE OUTCOMES:**
*On successful completion of the course, students will be able to:*

CO1. Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data.

CO2. Analyze and evaluate the databases using SQL DML/DDL commands.

CO3. Design database schemas for the sales database, customer database and product database.

CO4. Develop solutions for database problems using stored procedures, stored functions, cursors and triggers.

CO5. Implement DDL and DML commands in SQL and PL/SQL, ORACLE to manage data in databases.

CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

CO7. Demonstrate communication skills, both oral and written for preparing and presenting reports on databases.

**DESCRIPTION OF SALES DATABASE:**
ABC is a company operating in the country with a chain of shopping centers in various cities. Everyday large numbers of items are sold in different shopping centers. The Sales database comprises of various tables like CUST, PROD, SALES_DETAIL, STATE_NAME with the following schemas.

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| CUSTOMERS Name | Type | Remark |
|---|---|---|
| CID | VARCHAR2(6) | PRIMARY KEY |
| CNAME | VARCHAR2(10) | |
| CCITY | VARCHAR2(8) | |
| **PRODUCTS** | | |
| **Name** | **Type** | **Remark** |
| PID | VARCHAR2(6) | PRIMARY KEY |
| PNAME | VARCHAR2(6) | |
| PCOST | NUMBER(5,2) | |
| PROFIT | NUMBER(3) | |
| **SALES DETAILS** | | |
| **Name** | **Type** | **Remark** |
| CID | VARCHAR2(6) | COMPOSITE PRIMARY KEY |
| PID | VARCHAR2(6) | COMPOSITE PRIMARY KEY |
| SALE | NUMBER(3) | |
| SALEDT | DATE | COMPOSITE PRIMARY KEY |
| **STATES** | | |
| **Name** | **Type** | **Remark** |
| CCITY | VARCHAR2(8) | PRIMARY KEY |
| STATE | VARCHAR2(15) | |

**LIST OF EXERCISES:**

1. **Execute: Data Definition Language (DDL) commands**
   I. Create the tables in sales database.
   II. View the structure of the each table.
   III. Change the structure of the table like add new column, change the width of a data type, change the data type of a column, delete column from the table, rename the column name and table names.
   IV. Delete all records stored in a table, but the structure of the table is retained.
   V. Remove a table from the database.

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## 2. Execute: Data Manipulation Language (DML) commands

### STATES PRODUCTS

| CCITY | STATE |
|-------|-------|
| Mysore | Karnataka |
| Kolkata | Westbengal |
| Pune | Maharashtra |
| Tirupathi | Andhra Pradesh |
| Chennai | Tamlnadu |

### CUSTOMERS SALES DETAILS

| PID | PNAME | PCOST | PROFIT |
|-----|-------|-------|--------|
| p1 | pen | 100 | 10 |
| p2 | pencil | 15.5 | 2 |
| p3 | pendrive | 950 | 50 |
| p4 | DVD | 35 | 5 |
| p5 | mouse | 500.5 | Null |

| CID | CNAME | CCITY |
|-----|-------|-------|
| c1 | gopal | mysore |
| c2 | haitvik | kolkata |
| c3 | rohan | pune |
| c4 | rajini | chennai |
| c5 | mohan | tirupathi |
| c6 | sanjay | mysore |
| c7 | samhita | Kolkata |

| CID | PID | SALE | SALEDT |
|-----|-----|------|--------|
| c1 | p1 | 10 | 1-Sep-16 |
| c2 | p3 | 20 | 18-Mar-17 |
| c5 | p5 | 30 | 20-Dec-16 |
| c3 | p2 | 45 | 1-Sep-16 |
| c4 | p4 | 15 | 1-Sep-16 |
| c7 | p3 | 22 | 18-Mar-17 |
| c1 | p2 | 23 | 1-Sep-16 |
| c2 | p1 | 33 | 14-Jul-17 |
| c3 | p5 | 14 | 18-Mar-17 |
| c6 | p4 | 10 | 14-Jul-17 |
| c1 | p2 | 5 | 18-Mar-17 |
| c4 | p2 | 50 | 18-Mar-17 |
| c5 | p1 | 20 | 14-Jul-17 |
| c3 | p3 | 9 | 1-Sep-16 |
| c6 | p5 | 10 | 18-Mar-17 |
| c3 | p4 | 8 | 20-Dec-16 |
| c7 | p3 | 6 | 1-Sep-16 |
| c1 | p5 | 9 | 14-Jul-17 |

I. Write a query to display all customers.
II. Write a query to display pname of all products.
III. Write a query to display cname and ccity of all customers.
IV. Write a query to display cname, ccity of all customers who lives in mysore.
V. Write a query to display cname and ccity of all customers who live in Kolkata or Chennai.
VI. Find the cost of pencil.
VII. Display CID as Customer_Id, CNAME as Name for all customers.
VIII. Change the name of the product p3 from 'pendrive' to 'modem'.
IX. Find the product ids in sales detail table (eliminating duplicates).
X. Remove the record from sales detail table whose sale value is 5.

3. Implement table level and Column level constraints like NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY, CHECK, DEFAULT.

## 4. Operators

I. Display the sum of pcost and profit of all products.
II. Display the column heading as "Selling Price" instead of PCOST+PROFIT.
III. Find out what percent of pcost is profit for all products.
IV. List the cids of customers who purchased products on '14-jul-2017'.
V. List only the products whose cost is more than 50.00.
VI. List all the customers who are not belongs to 'pune'.
VII. Write a query to display the pname and pcost of all the products where pcost lies between 5 and 25.
VIII. Write a query to display distinct customer id where product id is p3 or sale date is '18-mar-2017'.
IX. Write a query to display cname, ccity of those customers whose cid is in c1 or c2 or c4 or c5 (using IN operator).
X. List customers whose name starts with 'h'.
XI. Write a query to display all records of prod table in which first and third character of pname is any character and second character is 'e'.

XII. Write a query to display all cname which includes two 'a' in the name.
XIII. List the products with unknown profit.
XIV. Display the profit of products as zero if unknown.

## 5. Joins and Views

I. Write a query to display cname, pname, sale, saledt for all customers.
II. Write a query to display cname who have purchased Pen.
III. Write a query to display cname, pname, sale for all customers who sold after '01-sep-2016'.
IV. Write a query to display cname,ccity,state of all customers.
V. Write a query to display cname,ccity of all customers who belongs to Karnataka.
VI. Create a view on product table which includes pid, pname and pcost of products.
VII. Insert a row into the view.
VIII. Update the rows in a view.
IX. Delete the rows from view.

## 6. Order by, group by and having clauses.

I. Write a query to display pname of all records. Sort all records by pname. (use order by clause)
II. Write a query to display cname and ccity of all records. Sort by ccity in descending order.
III. Write a query to display saledt and total sale on the date.
IV. Write a query to display saledt and total sale on the date labeled as sale of all items.
V. Write a query to display saledt and total sale on the date sold after 01-sep-2016.
VI. Write a query to display saledt and total sale on the date labeled as sale of all items other than DVD.
VII. Write a query to display total number of customers who purchase pen.

## 7. Single Row Functions: Date Function, Numeric and Character Function

I. Write a query to display system date
II. Write a query to display the system date by rounding it to next month.
III. Write a query to display the system date by rounding it to next year.
IV. Write a query to display the last date of the system date.
V. Write a query to display the next date of system date which is Friday.

VI. Write a query to display sale date and date after 02 months from sale date.

VII. Write a query to display system date, sale date and months between two dates.

VIII. Write a query to display the greatest date between sale date and system date, name it as BIG, also display sale date and SYSDATE.

IX. Write a query to display the least date between sale date and system date name it as SMALL, also display sale date and SYSDATE.

X. Write a query to display the product name along with the rounded value of product cost for product name is "Pencil".

XI. Write a query to display product cost along with MOD value if divided by 5.

XII. Write a query to display cname in uppercase, lowercase, titlecase from cust table where customer name is "rohan".

XIII. Write a query to display all concatenated value of cname, ccity by converting cname into titlecase and ccity into uppercase.

XIV. Write a query to display the first 3 characters of cname.

XV. Write a query to display the position of 'm' in the cname of the customer whose name is "samhita".

XVI. Write a query to display the length of all customer names.

XVII. PAD # character in left of product cost to a total width of 5 character position.

## 8. Group Functions and Set Functions

I. Write a query to display the total count of customer.

II. Write a query to display the minimum cost of product.

III. Write a query to display average value of product cost rounded to 2nd decimal places.

IV. Write a query to display product name with total sale detail in descending order.

V. Write a query to display product name, sale date and total amount collected for the product.

VI Write a query to display sale date and total sale date wise which was sold after "14-jul-2016".

VII. Write a query to display the customer name who belongs to those places whose name is having 'i' or 'p'.

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VIII. Write a query to display customer name who belongs to a city whose name contains characters 'c' and whose name contains character 'a'.

IX. Write a query to display the customer name who does not belong to 'pune'.

## 9. PL/SQL basic programs

I. Write a PL/SQL program to find largest number among three. (Hint: Use Conditional Statement)

II. Write a PL/SQL program to display the sum of numbers from 1 to N using for loop, loop...end and while...loop.

## 10. SQL Cursor based programs

I. Write a PL/SQL program to display the costliest and cheapest product in PROD table.

II. Write a PL/SQL program which will accept PID and display PID and its total sale value i.e. sum.

## 11. Functions

I. Write a function that accepts two numbers A and B and performs the following operations.
   a.   Addition
   b.   Subtraction
   c.   Multiplication
   d.   Division

II. Write a function that accepts to find the maximum PCOST in PROD table.

## 12. Procedures

I. Write a procedure that accepts two numbers A and B, add them and print.

II. Write procedures to demonstrate IN, IN OUT and OUT parameter.

## 13. Triggers

I. Develop a PL/SQL program using BEFORE and AFTER triggers.

II. Create a row level trigger for the PROD table that would fire for INSERT or PDATE or DELETE operations performed on the PROD table. This trigger will display the profit difference between the old values and new values.

## REFERENCE BOOKS:

1. Satish Ansari, *Oracle Database 11g: Hands-on SQL and PL/SQL*, PHI Publishers, 2010.

2. Pranab Kumar Das Gupta, Data Base Management System; Oracle; SQL and DL/SQL, PHI Learhi, Private Limited, 2009.

## II B. Tech. – I Semester
## (19BT31202) SOFTWARE ENGINEERING

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 40 | 60 | 100 | | 3 | - | - | 3 |

**PRE-REQUISITES: -**

**COURSE DESCRIPTION:** Concepts of Software Engineering; Software Process Models; Conventional and Agile Process Models; Software Requirements Engineering Process; System Analysis; Architectural Design; User Interface Design and Re-engineering; Software Testing; Risk and Quality Management.

**COURSE OUTCOMES:** Aftersuccessful completion of the course, students will be able to:

CO1. Understand fundamental concepts of software engineering and analyze process models required to develop a software system.

CO2. Analyze software requirements and model requirements for the given scenario.

CO3. Apply design concepts and metrics for software development.

CO4. Apply testing strategies and techniques for quality software.

CO5. Analyze risks in software development life cycle and apply risk strategies to mitigate risks.

**DETAILED SYLLABUS:**

**UNIT I: SOFTWARE ENGINEERING AND SOFTWARE PROCESS      (11 periods)**

**A Generic view of process:** The Nature of Software, Software Engineering- Software Engineering Layers; The Software Process, Software Engineering Practice, Software myths.

**Process models:** A Generic Process Model, Prescriptive Process Models-The Waterfall Model, Incremental Process Models, Specialized Process Models; The Unified Process, Agile Development-Agility, Agile Process, Extreme Programming (XP), Scrum, Dynamic System Development Method,Agile Modeling (AM), Agile Unified Process (AUP).

**UNIT II: REQUIREMENTS ENGINEERING AND MODELING      (07 periods)**

**Requirements Engineering:** Functional and non-functional requirements, the software requirements document, Requirements specifications, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management.

**Requirements Modeling:** Requirements Analysis, Data Modeling Concepts, Flow-Oriented Modeling,Scenario based Modeling, UML Models that supplement the Use Case, Case study on Requirements modeling for Web and MobileApps.

**UNIT III: DESIGN ENGINEERING AND METRICS      (09 periods)**

**Design using UML:** Design concepts, Software Architecture, Architectural Styles, Class Diagram - Terms and concepts, Use case Diagram - Terms and concepts, Activity Diagrams - Terms and concepts, Interaction diagrams - Terms and concepts, Statemachine Diagram- Terms and concepts, Component Diagram- Terms and concepts, Deployment Diagram- Terms and concepts.

**Process and Project Metrics:** Metrics in the process and project domains, Software Measurement, Metrics for software quality.

## UNIT IV: SOFTWARE TESTING STRATEGIES AND APPLICATIONS     (08 periods)

**Testing strategies:** A strategic approach to software testing, Strategic issues, Test strategies for conventional software, Test strategies for object oriented software, Validation testing, System testing, The art of debugging.

**Testing Conventional Applications:** Software testing fundamentals, White box testing-Basis path testing, Control structure testing; Black box testing, Object oriented testing methods.

## UNIT V: RISK, QUALITY MANAGEMENT AND REENGINEERING     (10 periods)

**Risk and Quality Management:** Reactive and Proactive risk strategies, Software risks, Risk Mitigation Monitoring and Management (RMMM), RMMM plan, Formal Technical Reviews (FTR), Software Quality Assurance (SQA)-Tasks, Goals and Metrics; Software reliability.

**Reengineering:** Introduction, Business Process Reengineering (BPR), Software Reengineering, Restructuring, Reverse engineering, Forward engineering.

**Total Periods: 45**

*Topics for self-study shall be included in lesson plan.*

### TEXT BOOKS:

1. Roger S. Pressman, *Software Engineering - A Practitioner's Approach,* McGraw-Hill International Edition, Eigth Edition, 2015.
2. Ian Sommerville, *Software Engineering,* Pearson Education, Ninth Edition, 2011.

### REFERENCE BOOKS:

1. Grady Booch, James Rum Baugh and Ivar Jacobson, "The Unified Modeling Language User Guide," Second Edition, Pearson Education, 2009.
2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers, Third Edition, 2007.
3. ShelyCashman Rosenblatt, *Systems Analysis and Design,* Thomson Publications, Sixth Edition, 2006.

## II B.Tech. - II Semester
## (16BT41203) SOFTWARE ENGINEERING
(Common to CSE, IT and CSSE)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 30 | 70 | 100 | | 3 | 1 | - | 3 |

**PRE-REQUISITES:** --

**COURSE DESCRIPTION:** Concepts of Software Engineering; Software Process Models; Conventional and Agile Process Models; Software Requirements Engineering Process; System Analysis; Architectural Design; User Interface Design and Re-engineering; Software Testing; Risk and Quality Management.

**COURSE OUTCOMES:**

On successful completion of this course, students will be able to:

CO1.   Demonstrate knowledge on:
- Fundamental concepts of software engineering.
- Process models.
- Software development life cycle.

CO2.   Analyze software requirements and process models required to develop a software system.

CO3.   Design and develop a quality software product using design engineering     principles.

CO4.   Develop software product as per user and societal requirements.

CO5.   Follow standards for software development and quality management.

CO6.   Demonstrate skills in applying risk and quality management principles for     effective management of software projects.

**DETAILED SYLLABUS:**

**UNIT I: SOFTWARE ENGINEERING AND SOFTWARE PROCESS**
(11 Periods)

**A Generic View of Process:** The nature of software, Software engineering- Software engineering layers; The software process, Software engineering practice, Software myths.

**Process Models:** A Generic process model, Incremental process models, Evolutionary Process models; The unified process, Agile

Development-Agility, Agile process, Scrum, Agile modeling (AM), Agile Unified Process (AUP), The Cleanroom strategy.

## UNIT II: REQUIREMENTS ENGINEERING AND MODELING
### (7 Periods)

**Requirements Engineering:** Functional and non-functional requirements, The software requirements document, Requirements specifications, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management.

**Requirements Modeling:** Data modeling concepts, Flow-oriented modeling, Case study on requirements modeling for WebApps.

## UNIT III: DESIGN ENGINEERING AND METRICS (8 Periods)

**Design Engineering:** Design within the context of software engineering, The Design process, Design concepts, Software architecture, Architectural styles, Architectural design.

**Process and Project Metrics:** Metrics in the process and project domains, Software measurement, Metrics for software quality.

## UNIT IV: SOFTWARE TESTING STRATEGIES AND APPLICATIONS (9 Periods)

**Testing Strategies:** A strategic approach to software testing, Strategic issues, Test strategies for conventional software, Test strategies for object oriented software, Validation testing, System testing, The art of debugging.

**Testing Conventional Applications:** Software testing fundamentals, Basis path testing, White box and Black box testing, Object oriented testing methods.

## UNIT V: RISK, QUALITY MANAGEMENT AND REENGINEERING

### (10 Periods)

**Risk and Quality Management:** Reactive and proactive risk strategies, Software risks, Risk Mitigation Monitoring and Management (RMMM), RMMM plan, Software quality factors, Defect amplification Model, Formal Technical Reviews (FTR), Software Quality Assurance (SQA)-Tasks, Goals and metrics;

Software reliability.

**Reengineering:** Introduction, Business Process Reengineering (BPR), Software reengineering, Restructuring, Reverse engineering, Forward engineering.

**Total Periods: 45**

**TEXT BOOKS:**

1. Roger S. Pressman, *Software Engineering-A Practitioner's Approach,* McGraw-Hill International Edition, Seventh Edition, 2010.

2. Ian Sommerville, *Software Engineering,* Pearson Education, Ninth Edition, 2011.

**REFERENCE BOOKS:**

1. K. K. Aggarwal and Yogesh Singh, *Software Engineering, New Age International Publishers,* Third Edition, 2007.

2. Shely Cashman Rosenblatt, *Systems Analysis and Design, Thomson Publications,* Sixth Edition, 2006.

# II B. Tech. – I Semester
## (19BT31232) SOFTWARE ENGINEERING LAB

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 50 | 50 | 100 | | - | - | 2 | 1 |

**PRE-REQUISITES:** A Course on Software Engineering.

**COURSE DESCRIPTION:** Software Development Life Cycle activities-requirements specification, SRS preparation, Modeling case studies–Online Ticket Reservation system; Point of sales.

**COURSE OUTCOMES:** Aftersuccessful completion of the course, students will be able to:

CO1. Analyse user requirements and prepare software requirements specifications.

CO2. Apply design principles of UML for software design.

CO3. Apply tools for developing UML diagrams.

CO4. Use cost estimation models for project evaluation.

CO5. Work effectively as an individual to design UML models.

CO6. Write and present a substantial technical report/document effectively.

## LIST OF EXPERIMENTS:

1. Identify Functional and Non-Functional Requirements for:

    i) Online Ticket Reservation for Railways          ii) Online Auction Sales

2. a) Construct a flow graph for Insertion sort algorithm.

    b) Write a program to find Cyclomatic complexity for the above flow graph

    (**Hint:** McCabe's cyclomatic matrices V(G) of a graph G with n vertices , e edges and P connected components is $V(G)=e-n+2P$)

## CASE STUDIES:

Case studies given below should be Modeled using Visual Modeling tools in different views i.e. Use case view, logical view, component view, Deployment view.

### CASE STUDY 1: ONLINE TICKET RESERVATION FOR RAILWAYS

**Problem Statement:** Computer plays an integral part of the day in today's life. It makes the entire job easier and faster, every job is computerized so as the ticket reservation we can book over the online ticket reservation system. During the booking of the ticket reservation passenger has to select origin, date of journey, destination, class of train etc. The reservation counter keeps track of passenger's information. Thus the system will have all the details about the trains and facilities provided by them. There are various trains with the different level of convenience for the passengers. The whole database will be maintained by database administrator. There are varieties of trains where the passengers can select the train according to the convenience for their destination journey. The journey could be within the state or across the India. Each train has the three types of classes i.e. Sleeper class, First class and the AC compartment. Design the application for the above problem description.

### CASE STUDY 2: A POINT OF SALE (POS) SYSTEM

**Problem Statement:** A POS System is a computerized application used to record sales and handle payments; it is typically used in a retail store. It includes hardware

components such as a computer and bar code scanner, and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services and temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client – side terminals and interfaces such as browser, PDA's, touch – screens.

## CASE STUDY 3: RECRUITMENT PROCEDURE FOR SOFTWARE INDUSTRY

**Problem Statement:** In the software industry the recruitment procedure is the basic thing that goes in the hand with the requirement as specified by the technical management team. HR first gives an advertisement in leading Newspapers, Journals, Weeklies and Websites. The job seekers can apply for it through by Post or by e-mail to the company. The technical skill and the experience of the candidates are reviewed and the short listed candidates are called for the interview. There may be different rounds for interview like the written test, technical interview, and HR interview. After the successful completion of all rounds of interview, the selected candidates' names are displayed. Meanwhile HR gives all the details about the salary, working hours, terms and conditions and the retirement benefit to the candidate.

## CASE STUDY 4: ONLINE AUCTION SALES

**Problem Statement:** The online auction system is a design about a website where sellers collect and prepare a list of items they want to sell and place it on the website for visualizing. To accomplish this purpose the user has to access the site. Incase it's a new user he has to register. Purchaser's login and select items they want to buy and keep bidding for it. Interacting with the purchasers and sellers through messages does this. There is no need for customer to interact with the sellers because every time the purchasers bid, the details will be updated in the database. The purchaser making the highest bid for an item before the close of the auction is declared as the owner of the item. If the auctioneer or the purchaser doesn't want to bid for the product then there is fixed cutoff price mentioned for every product. He can pay that amount directly and own the product. The purchaser gets a confirmation of his purchase as an acknowledgement from the website. After the transition by going back to the main menu where he can view other items.

## CASE STUDY 5: TWO FLOOR ELEVATOR SIMULATOR

**Problem Statement:** The elevator has the basic function that all elevator systems have, such as moving up and down, open and close doors, and of course, pick up passengers. The elevator is supposed to be used in a building having floors numbered from 1 to MaxFloor, where the first floor is the lobby. There are car call buttons in the car corresponding to each floor. For every floor except for the top floor and the lobby, there are two hall call buttons for the passengers to call for going up and down. There is only one down hall call button at the top floor and one up hall call button in the lobby. When the car stops at a floor, the doors are opened and the car lantern indicating the current direction the car is going is illuminated so that the passengers can get to know the current moving direction of the car. The car moves fast between floors, but it should be able to slow down early enough to stop at a desired floor. When an elevator has no requests, it remains at its current floor with its doors closed.

In order to certificate system safety, emergency brake will be triggered and the car will be forced to stop under any unsafe conditions.

## CASE STUDY 6: HOME APPLIANCE CONTROL SYSTEM

**Problem Statement:** A home appliance control system (HACS) is a system which provides various services to remotely operate on home appliances, such as microwave

oven, TV, and garage door etc through remote devices such as mobile phone, desktop and palm-top. A home appliance control system (HACS) is a system which is controlled by a remote system such as a mobile phone or a palm-top, and at the same time controls, monitors and coordinates home appliances such as air conditioner, microwave oven, garage doors, TV set, VCR, audio controller, indoor/outdoor lights, water sprinkler, home security system, bath tub controller, etc. In order to activate home appliances and to allow for different ways of cooking, the HACS needs mechanisms for communication between the different devices in the system, and for coordination among the various processes running on such devices. The system administrator of the HACS system has the ability to add a new appliance or delete an existing one. The system administrator has the ability to add a new remote device and configure it with HACS or delete an existing one when it is not used. Also the system administrator can create an account for a new user or delete existing account if it is no longer used.

**REFERENCE BOOKS:**

1. Grady Booch, James Rum Baugh and Ivar Jacobson, "The Unified Modeling Language User Guide," Second Edition, Pearson Education, 2009.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons and David Fado, "UML 2 Toolkit," WILEY-Dreamtech India Pvt. Ltd., 2003.
3. Rajesh Naik and Swapna Kishore, "Software Requirements and Estimation," Tata McGraw Hill, New Delhi, 2001.

# I B. Tech. – I Semester

## (19BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to EEE, ECE, EIE, CSE (AI), CSE (DS) and CSBS)

| Int. Marks | Ext. Marks | Total Marks | | L | T | P | C |
|:---:|:---:|:---:|---|:---:|:---:|:---:|:---:|
| 40 | 60 | 100 | | 3 | - | - | 3 |

**PRE-REQUISITES:** --

**COURSE DESCRIPTION:** Principles of Electrical Systems; AC Machines; Semiconductor Devices and Op-Amps.

**COURSE OUTCOMES:**

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

CO1.  Analyze electrical circuits by applying the conceptual knowledge of circuit elements.

CO2.  Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.

CO3.  Demonstrate knowledge on characteristics and applications of transformers and AC machines.

CO4.  Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

**DETAILED SYLLABUS:**

**UNIT-I: Principles of Electrical Systems-I**                             **(9 Periods)**

Basic electrical sources: DC-Battery, AC sources–Single loop generator; Single phase and three phase supply; Electrical circuit elements (R, L and C), Ohm's law, Kirchhoff's laws, Representation of sinusoidal waveforms, peak and RMS values, phasor representation, reactive power, apparent power, real power, energy and power factor.

**UNIT-II: Principles of Electrical Systems-II**                         **(9 Periods)**

Significance of Power factor and power factor correction, most economical power factor. Typical layout of electrical grid; Typical layout and operation of Hydro, Thermal and Solar Power Plants; Fuse, circuit breaker (MCB, MCCB, RCCB, ELCB), relay (elementary treatment); Inverter and UPS (block diagram approach only). Earthing – importance of earthing, pipe earthing and plate earthing; Safety measures. Energy Efficiency (Star rating) standards by BEE.

**UNIT-III: Transformers and AC Machines**                           **(9 Periods)**

Construction and working of a single phase transformer, EMF Equation; Construction and working of three phase induction motor, torque equation, torque-slip characteristics, applications; construction and working of a resistor start &capacitor start and run single phase induction motor, applications; Construction and working of synchronous machine, applications.

**UNIT-IV: Semiconductor Devices**                                            **(10 Periods)**

PN Junction diode, Characteristics, applications - half wave and full wave rectifier.Zener diode, characteristics, application–Regulator.BJT- operation, configurations, characteristics, applications - switch and amplifier.

**UNIT-V: Op-Amps**                                                  **(8 Periods)**

Operational Amplifier: Block diagram of Op-Amp, equivalent circuit, Op-Amp AC and DC Characteristics, Inverting and Non-Inverting modes. Applications - Adder, Comparator, Integrator and Differentiator.

**Total Periods: 45**

*Topics for Self Study are provided in the Lesson Plan*

**TEXT BOOKS**:

1. AshfaqHussain*, Fundamentals of Electrical Engineering,* Dhanpatrai& Co. (P) Ltd., *3*rd edition, New Delhi, 2009.

2. R. L. Boylestad and Louis Nashelsky, *Electronics Devices and Circuits*, PHI, 11th edition, 2009.

**REFERENCE BOOKS**:

1. M.S. Naidu, S. Kamakshaiah, *Introduction to Electrical Engineering ,*Tata McGraw-Hill Education, New Delhi, 2007.

2. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International Pvt. Ltd., 4th edition, 2011.

# I B. Tech. – I Semester
## (19BT10231) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB
### (Common to EEE, ECE, EIE, CSE(AI), CSE(DS) and CSBS))

| Int. Marks | Ext. Marks | Total Marks |  | L | T | P | C |
|---|---|---|---|---|---|---|---|
| 50 | 50 | 100 |  | - | - | 2 | 1 |

**PRE-REQUISITES:** Physics at intermediate level.

**COURSE DESCRIPTION:** Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.

**COURSE OUTCOMES:**

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

CO1. Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.

CO2. Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.

CO3. Work independently and in teams to solve problems with effective communication.

**List of Experiments:**

Minimum **Ten** experiments are to be conducted.

1. Measurement of electrical quantities (AC & DC) using Voltmeter, Ammeter and Wattmeter.
2. Verification of Ohm's law and Kirchhoff's laws.
3. Circuit
   (a) with one lamp controlled by one switch and provision of 2-pin or 3-pin socket PVC surface conduit system.
   (b) With two lamps controlled by two switches with PVC surface conduit system.
   (c) for Stair case wiring and Godown wiring.
4. Measurement of Power factor and it's improvement.
5. Load test on 1-Phase Transformer.
6. Brake test on 3-Phase Induction Motor.
7. Brake test on 1- phase induction motor.
8. VI Characteristics of PN and Zener Diodes.
9. Ripple factor and load regulations of rectifier with and without filters.
10. Input and output characteristics of CE configuration.
11. Design of inverting and non-inverting amplifiers using op-amp.
12. Design of voltage summer and integrator using op-amp.
13. Soldering practice.

**REFERENCES BOOKS/ LAB MANUALS:**
1. P. S. Dhogal, *Basic Practicals in Electrical Engineering*, Standard Publishers, 2004.
2. YannisTsividis, *A First Lab in Circuits and Electronics*, Wiley, 1st edition., 2001

**ADDITIONAL LEARNING RESOURCES:**
1. www.vlab.co.in, Virtual Electric Circuits Lab, A initiative of MHRD under NMEICT.
2. www.vlab.co.in, Basic Electronics  Lab, A initiative of MHRD under NMEICT.
3. https://nptel.ac.in/courses/117106108/
4. https://ocw.mit.edu/high-school/physics/exam-prep/electric-circuits/
5. https://nptel.ac.in/courses/108105017/
6. https://nptel.ac.in/courses/108108112/
7. https://nptel.ac.in/courses/117107094/

## II B. Tech. - II Semester
## (19BT50409) **GREEN TECHNOLOGIES**
### (Open Elective-2)
### (Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

| Int. Marks | Ext. Marks | Total Marks | L | T | P | C |
|------------|------------|-------------|---|---|---|---|
| 40 | 60 | 100 | 3 | - | - | 3 |

**PRE-REQUISITES: --**

**COURSE DESCRIPTION:** Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

**COURSE OUTCOMES:** *After successful completion of the course, students will be able to:*

CO1. Analyze energy efficient communication systems such as Telecommunication systems, ICT, Wireless networks and cellular networks by understanding the principles of green communications.

CO2. Understand the impact of conventional energy sources on environment and realize the significance and principles of green energy sources for sustainability.

CO3. Understand the environmental impacts of IT and approaches for Green IT.

CO4. Analyze concepts of sustainable green construction using appropriate tools and techniques following latest developments and considering safety and environment besides communicating effectively in graphical form.

CO5. Demonstrate the environmental impact of traditional manufacturing and explore the need for green manufacturing process promoting sustainability.

**DETAILED SYLLABUS:**

**UNIT I–PRINCIPLES OF GREEN ENGINEERING AND GREEN COMMUNICATIONS**
**(9 periods)**

**Principles of Green Engineering:** Introduction, Definition of green engineering, Principles of green engineering

**Green Communications:** Introduction, Origin of Green Communications, Energy Efficiency in Telecommunication systems, Telecommunication system model and energy Efficiency, Energy saving concepts, Quantifying energy efficiency in ICT, Energy efficiency metrics of green wireless networks, Embodied energy of communication devices- Introduction, The extended energy model, Embodied/Operating Energy of a BS in Cellular network- A Case study; Energy efficient standards for wireline communications.

**UNIT II–GREEN ENERGY**
**(9 periods)**

Introduction, green energy systems - composition, adverse impacts,Green energy and sustainability, the target and solution.Diversification and localization of energy systems, green energy and sustainable development.Energy sources and their availability. Green

energy sources - solar energy, wind energy, geothermal energy, ocean energy, biomass and biogas.

## UNIT III–GREEN IT (9 periods)

Introduction, Awareness to Implementation: Green IT Trends, Green Engineering, Greening by IT: Using RFID for Environmental Sustainability, Smart Grids, Smart Buildings and Homes, Green Supply Chain and Logistics, Enterprise-Wide Environmental Sustainability, A Seven-Step Approach to Creating Green IT Strategy: Balancing the Costs and Benefits of Going Green, Research and Development Directions.

## UNIT IV–GREEN CONSTRUCTION (9 periods)

**Green Building:** Concept, Necessity, Characteristics, Benefits, Requisites for green building construction, Sustainability, Concept of REDUCE, REUSE, RECYCLE, RETHINK, REPLENISH AND REFUSE (6 R's), Sustainable construction focus point – Site selection, Planning, Water, Energy, Material, Indoor air quality, Construction procedures, case studies of residential and commercial green buildings.

**Vastu:** Concept, History, scientific approach, elements of vastu for selecting a plot.

**Indian Green Building Council:** Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, Procedure to get IGBC certification, GRIHA Rating.

## UNIT V – GREEN MANUFACTURING (9 periods)

Green Manufacturing - Introduction, Background and Definition; Impact of traditional manufacturing in environmental ecology, Need for green manufacturing, Motivation and barriers to green manufacturing, Advantages and Limitations of green manufacturing, Green manufacturing strategies,Green manufacturing and sustainability, Green manufacturing through clean energy supply, Green packaging and Supply chain.

**Total Periods: 45**

*Topics for self-study are provided in the lesson plan*

**TEXT BOOKS:**

1. KonstantinosSamdanis, Peter Rost, Andreas Maeder, MichelaMeo, Christos Verikoukis, *Green Communications: Principles, Concepts and Practice*, John Wiley & Sons, 2015.

2. G.D. Rai, *Non-conventional Energy Sources*, KhannaPublishers, Delhi, 5th Edition,2011.

3. San Murugesan, G.R. Gangadharan, *Harnessing Green IT – Principles and Practices*, John Wiley & Sons Ltd., 2008.

4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, *Green Building Handbook*, Volume 1, E & FN Spon, an imprint of Thomson Science & Professional.

5. J Paulo Davim, *Green Manufacturing: Processes and Systems*, Springer, 2012.

6. David A Dornfeld, *Green Manufacturing: Fundamentals and Applications*, Springer, 2013.

**REFERENCE BOOKS:**

1. Soli J. Arceivala, *Green Technologies for a better future,* McGraw Hill Education (India) Pvt. Ltd, 2014.
2. Marty Poniatowski, *Foundation of Green Information Technology, Prentice Hall, 2009.*
3. Athanasios V Alavanidis, ThomaisVlachogianni, *Green Chemistry and Green Engineering*, SynchronaThemata, 2012.

IV B.Tech. - I Semester
# (16BT70412)GREEN TECHNOLOGIES
(Open Elective)
(Common to EEE, ECE & EIE)

| Int. Marks | Ext. Marks | Total Marks | L | T | P | C |
|---|---|---|---|---|---|---|
| 30 | 70 | 100 | 3 | 1 | - | 3 |

**PREREQUISITES:** --

**COURSE DESCRIPTION:**
Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

**COURSE OUTCOMES:** On successful completion of the course, students will be able to
CO1. Deploy conceptual knowledge in green technologies pertaining toengineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

**DETAILED SYLLABUS:**

**UNIT-I: PRINCIPLES OF GREEN ENGINEERING AND GREEN COMMUNICATIONS**
                                                                                                        **(11 Periods)**
**Principles of Green Engineering:**
Introduction, Definition of green engineering, Principles of green engineering.
**Green Communications:**
Introduction, Origin of Green Communications, Energy Efficiency in Telecommunication systems, Telecommunication system model and energy Efficiency, Energy saving concepts, Quantifying energy efficiency in ICT, Energy efficiency metrics of green wireless networks, Embodied energy of communication devices- Introduction, The extended energy model, Embodied/Operating Energy of a BS in Cellular network- A Case study; Energy efficient standards for wireline communications.

**UNIT-II: GREEN ENERGY                                                                     (09 Periods)**
Introduction, adverse impacts of carbon emission, control of carbon emission– methods, greenhouse gas reduction – methods, Energy sources and their availability, Green energy for sustainable development. Green energy sources – Solar energy, Wind energy, Fuel cells, Biofuels, Wave and Geothermal energy (Principle of generation only).

**UNIT-III: GREEN IT                                                                           (09 Periods)**
The importance of Green Information technologies, Strategizing Green Initiatives, Implementation of Green IT, Information Assurance, Communication and Social Media, Regulating Green IT- Laws, Standards and Protocols; RoHS, REACh, WEEE, Legislating for

GHG Emissions and Energy Use of IT Equipment, Non-regulatory Government Initiatives, Industry Associations and Standard Bodies, Green Building Standards, Green Data Centres, Social Movements and Greenpeace, Conclusions.

**UNIT-IV: GREEN CONSTRUCTION                                    (09 Periods)**

**Green Building:** Definition, Typical features, Benefits, Requisites for green building construction, Sustainability, Concept of REDUCE, REUSE, RECYCLE, RETHINK, REPLENISH AND REFUSE (6 R's), Sustainable construction focus point – Site selection, Planning, Water, Energy, Material, Indoor air quality, Construction procedures.

**Indian Green Building Council:** Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, Procedure to get IGBC certification, GRIHA Rating.

**UNIT-V: GREEN MANUFACTURING                                    (09 Periods)**

Introduction, background, definition, motivation and barriers to green manufacturing, Impact of manufacturing in environmental ecology, Need for green manufacturing, Advantages and Limitations, green manufacturing strategies, Green manufacturing and sustainability, Sustainability tools; Waste stream mapping and application, Green manufacturing through clean energy supply, green lean manufacturing, green packaging and supply chain.

**Total Periods: 47**

**TEXT BOOKS:**

1. KonstantinosSamdanis, Peter Rost, Andreas Maeder, MichelaMeo, Christos Verikoukis, *Green Communications: Principles, Concepts and Practice,*John Wiley & Sons, 2015.
2. Soli J. Arceivala, *Green Technologies for a better future,* McGraw Hill Education (India) Pvt. Ltd, 2014.
3. San Murugesan, G.R. Gangadharan, *Harnessing Green IT – Principles and Practices,* John Wiley & Sons Ltd., 2008.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, *Green Building Handbook*, *Volume 1*, E & FN Spon, an imprint of Thomson Science & Professional.
5. *IGBC Green Homes Rating System Version 1.0* – A bridged reference guide.
6. J Paulo Davim, Green Manufacturing: Processes and Systems, Springer, 2012.
7. David A Dornfeld, Green Manufacturing: Fundamentals and Applications, Springer, 2013.

**REFERENCE BOOKS:**

1. Athanasios V Alavanidis, ThomaisVlachogianni, *Green Chemistry and Green Engineering*, SynchronaThemata, 2012.
2. G.D. Rai, *Non-conventional Energy Sources*, Khanna Publishers, Delhi, 5$^{th}$Edition,2011.
3. Marty Poniatowski, *Foundation of Green Information Technology, Prentice Hall, 2009.*
4. R. K. Gautham, *Green Homes*, BS publications, 2009.