MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Computer Science & Engineering (Artificial Intelligence and Machine Learning)
Scheme of Instruction and Examination
(Choice Based Credit System)
(Common to CSE, IT, CSBS & CSE (DS))
Applicable from the Academic Year 2022-23

I SEMESTER

S.No	Course Code	Course Title	Instruction Hours Per Week L	T	P/D	Examination Max. Marks CIE	SEE	Duration of SEE in Hours	Credits
1	MA101BS	Matrices and Calculus	3	1	0	40	60	3	4
2	CH101BS	Engineering Chemistry	3	1	0	40	60	3	4
3	CS101ES	Programming for Problem Solving	3	0	0	40	60	3	3
4	EE101ES	Basic Electrical Engineering	2	0	0	40	60	3	2
5	ME101ES	Engineering Graphics	1	0	4	40	60	3	3
6	CS153ES	Elements of Computer Science &	0	0	2	50	-	-	1
7	CH151BS	Engineering Chemistry Laboratory	0	0	2	40	60	3	1
8	CS151ES	Programming for Problem Solving Laboratory	0	0	2	40	60	3	1
9	EE151ES	Basic Electrical Engineering Laboratory	0	0	2	40	60	3	1
10	MC101BS	Environmental Science	3	0	0	40	60	3	0
11	-	Induction Programme	-	-	-	-	-	-	-
		Total	**15**	**2**	**12**	**410**	**540**	**-**	**20**

II SEMESTER

S.No	Course Code	Course Title	Instruction Hours Per Week L	T	P/D	Examination Max. Marks CIE	SEE	Duration of SEE in Hours	Credits
1	MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	40	60	3	4
2	PH201BS	Applied Physics	3	1	0	40	60	3	4
3	EN201HS	English for Skill Enhancement	2	0	0	40	60	3	2
4	EC201ES	Electronic Devices and Circuits	2	0	0	40	60	3	2
5	PH251BS	Applied Physics Laboratory	0	0	3	40	60	3	1.5
6	CS251ES	Python Programming Laboratory	0	1	2	40	60	3	2
7	EN251HS	English Language and Communication Skills Laboratory	0	0	2	40	60	3	1
8	IT251ES	IT Workshop	0	0	2	40	60	3	1
9	ME251ES	Engineering Workshop	0	1	3	40	60	3	2.5
		Total	**10**	**4**	**12**	**360**	**540**	**-**	**20**

L: Lecture   T: Tutorial   D: Drawing   P: Practical   CIE - Continuous Internal Evaluation   SEE - Semester End Examination

L	T	P	C
3	1	0	4

B.Tech. I Semester

MA101BS: Matrices and Calculus
(Common to all Branches)

Course Objectives

- Types of matrices and their properties, concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form.
- Geometrical approach to the mean value theorems and their application to the mathematical problems, evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative, finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications.

Course Outcomes

- Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations.
- Find the Eigen values and Eigen vectors, reduce the quadratic form to canonical form using orthogonal transformations.
- Solve the applications on the mean value theorems, evaluate the improper integrals using Beta and Gamma functions.
- Find the extreme values of functions of two variables with and without constraints.
- Evaluate the multiple integrals and apply the concept to find areas, volumes.

UNIT-I: Matrices
Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss- Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations, LU Decomposition method, Gauss elimination method and Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors
Linear Transformation and Orthogonal Transformation: Eigen values, Eigen vectors, properties of Symmetric, Skew Symmetric, Orthogonal, Unitary, Hermitian and Skew Hermitian matrices with reference to Eigen values and Eigen vectors Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III: Calculus
Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series. Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-IV: Multivariable Calculus (Partial Differentiation and applications)
Definitions of Limit and continuity, Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence and independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration)
Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

Suggested Readings:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Editon, 2016.

Reference Books:

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint,2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

B.Tech. I - Semester

L	T	P	C
3	1	0	4

CH101BS : Engineering Chemistry

Course Objectives:

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer:
- To understand water quality for industrial and domestic usage, softening methods and related problems.
- To acquire the knowledge of Battery technology, corrosion and corrosion controlling techniques which are essential for the Engineers and applications in industries.
- To understand the preparation, properties and applications of polymeric materials.
- To get exposed to qualitative and quantitative parameters of fuels and to develop understanding of the combustion process.
- To understand the application of smart materials, lubricants, refractories and cement.

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Course Outcomes:

After completing the course , the student will be able to acquire:
- Knowledge on the disadvantages of hard water for domestic and industrial purposes. The techniques of softening of hard water and treatment of potable water.
- Knowledge on storage of electrical energy in batteries, construction of batteries and fuel cells. Mechanism of corrosion of metals and alloys and corrosion control methods.
- Knowledge on the Preparation, properties and application of polymeric materials.
- Knowledge about the fuels, techniques of analysis for quality parameters of fuels, their combustion process and applications.
- Knowledge pertaining to the applications of smart materials, lubricants, refractories and cement.

UNIT - I: Water and its treatment:

Introduction to hardness of water – Expression of hardness, Units and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination.

Boiler troubles: Sludge, Scale, Boiler corrosion and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning. External treatment methods - Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

UNIT – II Battery Chemistry & Corrosion:

Introduction - Classification of batteries - primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of Zn-air and Lithium ion battery, Applications of Li-ion battery. Fuel Cells - Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

Corrosion: Causes and effects of corrosion – Theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion. Types of corrosion: Galvanic, Water-line and Pitting corrosion. Factors affecting rate of corrosion. Corrosion control methods: Cathodic protection – Sacrificial anode and impressed current methods. Application of Metallic coatings – Electroplating

UNIT - III: Polymeric materials:

Definition – Classification of polymers with examples – Types of polymerization – Addition and condensation polymerization with examples.
Plastics: Definition and characteristics - Thermoplastic and thermosetting plastics, Preparation, Properties and Engineering applications of PVC, Teflon and Bakelite.
Fibers: Preparation, Properties and Engineering applications of Nylon 6:6, and Terylene
Elastomers: Characteristics – Preparation – Properties and Applications of Buna-S, Butyl and Thiokolrubber.

Conducting polymers: Characteristics and Classification with examples - Mechanism of conduction in trans-polyacetylene and Applications of conducting polymers.
Biodegradable polymers: Concept and advantages - Polylactic acid and Polyvinyl alcohol and their applications.

UNIT - IV: Energy Sources:
Introduction, Calorific value of fuel – HCV, LCV- Dulong's formula. Classification - solid fuels: Coal – Analysis of coal – Proximate and ultimate analysis and their significance. Liquid fuels – Petroleum and its refining, Cracking types – Moving bed catalytic cracking. Knocking – Octane and Cetane rating. Synthetic petrol - Fischer-Tropsch's process. Gaseous fuels – Composition and uses of Natural gas, LPG and CNG. Biodiesel – Transesterification, advantages.

UNIT - V: Engineering Materials:
Smart materials and their engineering applications
Shape memory materials - Poly L- Lactic acid. Thermoresponse materials - Polyacryl amides, Poly vinylamides
Lubricants: Classification of lubricants with examples - Characteristics of a good lubricant.
Properties of lubricants: Viscosity, Cloud point, Pour point, Flash point and Fire point. **Refractories:** Definition, Classification, Characteristics of a good refractory. Application of refractories.
Cement: Portland cement - its composition, Setting and hardening

TEXT BOOKS:
1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning,2016
3. A textbook of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K.Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

REFERENCE BOOKS:
1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)

B.Tech. I - Semester

L	T	P	C
3	0	0	3

CS101ES: PROGRAMMING FOR PROBLEM SOLVING

Course Objectives:
- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of the C programming language.
- To learn the usage of structured programming approaches in solving problems.

Course Outcomes: The student will learn
- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in the C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- Searching and sorting problems.

UNIT - I: Introduction to Programming
Compilers, compiling and executing a program. Representation of Algorithm - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number Flowchart/Pseudocode with examples, Program design and structured programming

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr. Command line arguments

UNIT - II: Arrays, Strings, Structures and Pointers:
Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings Structures: Defining structures, initializing structures, unions, Array of structures Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self- referential structures, usage of self referential structures in linked list (no implementation) Enumeration data type

UNIT - III: Preprocessor and File handling in C:
Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

UNIT - IV: Function and Dynamic Memory Allocation:
Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT - V: Searching and Sorting:
Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

TEXT BOOKS:
1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:
1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

L	T	P	C
2	0	0	2

B.Tech. - I Semester

EE101ES: Basic Electrical Engineering

Prerequisites: Mathematics, Physics

Course Objectives

- To introduce the concepts of electrical circuits and its components
- To understand DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.

Course Outcomes

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

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basics of alternating current and polyphase systems
- To study the working principles of transformers
- To understand the basics of rotating machines
- To introduce components of Low Voltage Electrical Installations

UNIT- I: D.C. Circuits

Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with DC excitation, Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT- II: A.C. Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase AC circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit, Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT- III: Transformers

Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency, Auto-transformer-Theory and Copper saving in auto transformer.

UNIT- IV: Electrical Machines

Construction and working principle of DC machine, Performance characteristics of DC shunt machine, Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics, Construction and working of synchronous generator.

UNIT-V: Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthling, Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement.

Suggested Readings:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition,2008.

Reference Books:

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.

2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009

3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.

4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.

5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.

6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

B.Tech - I Semester

L	T	P	C
1	0	4	3

ME101ES: ENGINEERING GRAPHICS

Course Objectives:

- Recognize the standards of engineering graphics, learn to generate Geometric
- Constructions, Conic
- Sections and construct Engineering Scales.
- Understand the procedure to develop Orthographic projections of points, lines and planes.
- Learn the procedure to develop projection of solids and objects.
- Understand the procedure to generate the Sections and developments of Solids.
- Learn the procedure to develop Isometric projections, convert Orthographic views to Isometric views and vice versa using Graphics Instruments and AutoCAD.

Course Outcomes:

- Apply the fundamental principles of Engineering Graphics to create engineering drawings of various geometric constructions, conic sections and engineering scales adhering to BIS Standards.
- Generate Orthographic projections; Front View, top view and side views of points and lines.
- Draw the Orthographic projections of planes and solids
- Understand the Sections of solids and developments of surfaces.
- Develop Isometric projection convert Orthographic views to Isometric views and vice versa for practical engineering problems using AutoCAD.

UNIT – I:
Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections-ellipse, parabola, hyperbola and Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid. Introduction to Auto CAD software – Commands.

UNIT- II:
Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.

UNIT – III:
Projections of Regular Solids inclined to one plane, Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, and Cone

UNIT – IV:
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone. Intersection of solids – cylinder vs cylinder.

UNIT – V:
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Projection of solids. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions. Free hands Sketches of 2D, creation of 2D sketches. conversion of Isometric views to orthographic views using Auto CAD.

TEXT BOOKS:
1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
3. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S.Chand and company Ltd.

REFERENCE BOOKS:
1. Engineering Graphics and Design, WILEY, Edition 2020
2. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
3. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
4. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

Note: - Internal and External examinations are conducted in conventional mode.

B.Tech. I - Semester

L	T	P	C
0	0	2	1

CS153ES: ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING

Course Objective: To provide an overview of the subjects of computer science and engineering.

Course Outcomes:
- Know the working principles of functional units of a basic Computer
- Understand program development, the use of data structures and algorithms in problem solving.
- Know the need and types of operating system, database systems.
- Understand the significance of networks, internet, WWW and cyber security.
- Understand Autonomous systems, the application of artificial intelligence.

UNIT – I
Basics of a Computer – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, application software, packages, frameworks, IDEs.

UNIT – II
Software development – waterfall model, Agile, Types of computer languages – Programming, markup, scripting Program Development – steps in program development, flowcharts, algorithms, data structures – definition, types of data structures

UNIT – III
Operating systems: Functions of operating systems, types of operating systems, Device & Resource management
Database Management Systems: Data models, RDBMS, SQL, Database Transactions, data centers, cloud services

UNIT – IV
Computer Networks: Advantages of computer networks, LAN, WAN, MAN, internet, WiFi, sensor networks, vehicular networks, 5G communication. World Wide Web – Basics, role of HTML, CSS, XML, Tools for web designing, Social media, Online social networks. Security – information security, cyber security, cyber laws

UNIT – V
Autonomous Systems: IoT, Robotics, Drones, Artificial Intelligence – Learning, Game Development, natural language processing, image and video processing. Cloud Basics

TEXT BOOK:
1. Invitation to Computer Science, G. Michael Schneider, Macalester College, Judith L. Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

REFERENCE BOOKS:
1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4. Elements of computer science, Cengage

B.Tech. I - Semester

L	T	P	C
0	0	2	1

CH151BS : Engineering Chemistry Lab

Course Objectives:

The course consists of experiments related to the principles of chemistry required for an Engineering student and the student will learn the following:
- Estimation of hardness of water to check its suitability for industrial and drinking purpose and estimation procedures through volumetric analysis.
- Estimation procedures using conductometry and potentiometry.
- Preparation of polymers such as Bakelite and Polystyrene in the laboratory.
- Understand the lubricant properties such as saponification value and viscosity of oils.
- Understand the corrosion of metals in a corrosive medium.

Course Outcomes:

After completing the course, the student will gain practical knowledge on:
- Determination of parameters like hardness of water and estimations through volumetric analysis.
- Performance of experiments of conductometry and potentiometry and estimation procedures using them.
- Preparation of polymers like Bakelite and Polystyrene.
- Performing experiments related to estimation of saponification value and viscosity of lubricating oils.
- Performing experiments to know rate of corrosion of mild steel in various conditions.

 List of Experiments:
I.   **Volumetric Analysis:** Estimation of hardness of water by EDTA - Complexometry method.

II.   **Volumetric Analysis:** Estimation of Fe^{+2} by Dichrometry.

III.   **Conductometry:** Estimation of the concentration of an acid by Conductometry.

IV.   **Potentiometry:** Estimation of the amount of Fe^{+2} by Potentiometry.

V.   **Potentiometry:** Determination of an acid concentration using Potentiometer.

VI.   **Preparations:**
   1.   Preparation of Bakelite.
   2.   Preparation Polystyrene

VII.   **Lubricants:**
   1.   Estimation of acid value of given lubricating oil.
   2.   Estimation of viscosity of lubricating oil using Ostwald's Viscometer.

VIII.   **Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of Inhibitor

IX.   Virtual lab experiments

      a.   Construction of Fuel cell and its working.

      b.   Smart materials for Biomedical applications c.
           Batteries for Electrical vehicles.

      d.   Functioning of Solar cell and its applications.

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna - S Chand Publications,New Delhi (2022)

2. Vogel's text book of practical organic chemistry - 5th edition

3. Inorganic Quantitative analysis by A.I. Vogel - ELBS Publications.

4. College Practical Chemistry by V.K. Ahluwalia - Narosa Publications Ltd., New Delhi (2007).

B.Tech. I - Semester

CS151ES: PROGRAMMING FOR PROBLEM SOLVING LABORATORY

L	T	P	C
0	0	2	1

[Note:The programs may be executed using any available Open Source/ Freely available IDE
Some of the Tools available are:
CodeLite: https://codelite.org/ Code:Blocks:
http://www.codeblocks.org/ DevCpp :
http://www.bloodshed.net/devcpp.html Eclipse:
http://www.eclipse.org
This list is not exhaustive and is NOT in any order of preference]

Course Objectives: The students will learn the following:
- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:
- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- modularize the code with functions so that they can be reused

Practice sessions:
a. Write a simple program that prints the results of all the operators available in C (including pre/ post increment , bitwise and/or/not , etc.). Read required operand values from standard input.
b. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values from standard input.

Simple numeric problems:
a. Write a program for finding the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write a program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.
d. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
e. 5 x 1 = 5
f. 5 x 2 = 10
g. 5 x 3 = 15
h. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:
  a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula $s = ut+(1/2)at^2$ where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
  b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
  c. Write a program that finds if a given number is a prime number
  d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
  e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
  f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
  g. Write a C program to find the roots of a Quadratic equation.
  h. Write a C program to calculate the following, where x is a fractional value.
  i. 1-x/2 +x^2/4-x^3/6
  j. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3+ ....+x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays, Pointers and Functions:
  a. Write a C program to find the minimum, maximum and average in an array of integers.
  b. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array.
  c. Write a C program that uses functions to perform the following:
  d. Addition of Two Matrices
  e. Multiplication of Two Matrices
  f. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be the same.
  g. Write C programs that use both recursive and non-recursive functions
  h. To find the factorial of a given integer.
  i. To find the GCD (greatest common divisor) of two given integers.
  j. To find x^n
  k. Write a program for reading elements using a pointer into an array and display the values using the array.
  l. Write a program for display values reverse order from an array using a pointer.
  m. Write a program through a pointer variable to sum of n elements from an array.

Files:
  a. Write a C program to display the contents of a file to standard output device.
  b. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
  c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
  d. Write a C program that does the following:
      It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)
      Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function)
      The program should then read all 10 values and print them back.
  e. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Strings:
a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
c. Write a C program that uses functions to perform the following operations:
d. To insert a sub-string into a given main string from a given position.
e. To delete n Characters from a given position in a given string.
f. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
g. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
h. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:
a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.

b. Write a C program to construct a pyramid of numbers as follows:

```
1            *           1           1           *
1 2          * *         2 3         2 2         * *
1 2 3        * * *       4 5 6       3 3 3       * * *
                                     4 4 4 4     * *
                                                 *
```

Sorting and Searching:
a. Write a C program that uses non recursive function to search for a Key value in a given
b. list of integers using linear search method.
c. Write a C program that uses non recursive function to search for a Key value in a given
d. sorted list of integers using binary search method.
e. Write a C program that implements the Bubble sort method to sort a given list of
f. integers in ascending order.
g. Write a C program that sorts the given array of integers using selection sort in descending order
h. Write a C program that sorts the given array of integers using insertion sort in ascending order
i. Write a C program that sorts a given array of names

TEXT BOOKS:
1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:
1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

B.Tech. I - Semester

EE151ES: Basic Electrical Engineering Laboratory

L	T	P	C
0	0	2	1

Prerequisites: Basic Electrical Engineering

Course Objectives

- To analyze a given network by applying various electrical laws and network theorems
- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters.
- To analyze the performance characteristics of DC machines
- To analyze the performance characteristics of AC machines

Course Outcomes

After completion of this course, the student will be able to
- Get an exposure to basic electrical laws and theorems
- Understand the response of different types of electrical circuits to different excitations.
- Understand the measurement, calculation and relation between the basic electrical parameters
- Understand the basic characteristics of DC machines.
- Understand the basic characteristics of AC machines.

List of experiments/demonstrations:
PART- A (compulsory)

1. Verification of Ohm's Law

2. Verification of KVL and KCL

3. Verification of Thevenin's and Norton's theorem

4. Resonance in series RLC circuit

5. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)

6. Measurement of Active and Reactive Power in a balanced Three-phase circuit

7. Performance Characteristics of a DC Shunt Motor

8. Torque-Speed Characteristics of a Three-phase Induction Motor.

PART-B (any two experiments from the given list)
1. Verification of Superposition theorem.

2. Transient Response of Series RL and RC circuits for DC excitation

3. No-Load Characteristics of a Three-phase Alternator

4. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
5. Three Phase Transformer: Verification of Relationship between Voltages and Currents
   (Star-Delta, Delta-Delta, Delta-star, Star-Star)

Suggested Readings:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition,2008.

Reference Books:

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker,"Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

B.Tech. I - Semester

MC101BS: Environmental Science

L	T	P	C
3	0	0	0

Course Objectives:

- To understand the importance of ecosystem and ecological balance.
- To understand the natural resources and their conservation.
- To understand the importance of biodiversity and its values.
- To gain knowledge about environmental pollution, effects and controlling measures. To study about global environmental problems and global issues.
- To understand the environmental policies, regulations and sustainable development.

Course Outcomes:

After completing the course, the student will be able to:
- Get the information about ecosystem and their usage and conservation.
- Learn different types of natural resources and take up the measures to protect the resources.
- Get the information about biodiversity and their usage and conservation.
- Get the information about the types of pollution, understand their effects and controlling measures.
- Gain the knowledge about current global environmental issues and initiations to be taken to protect the environment.
- Gain the knowledge about environmental acts, EIA, sustainable development and follow the rules and regulations.

UNIT - I

Ecosystems: Definition, scope, and importance of ecosystem. Classification, structure, and function of an ecosystem, food chains, food webs, and ecological pyramids. Flow of energy, biogeochemical cycles, bioaccumulation, biomagnification, ecosystem value, services and carrying capacity. Field visits.

UNIT - II

Natural Resources: Classification of resources: Living and non-living resources. **Water resources:** Use and over utilization of surface and ground water, floods and droughts. Dams: Benefits and problems. **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources. **Land resources** and **Forest resources**. **Energy resources:** Growing energy needs, renewable and non-renewable energy resources, use of alternate energy resources. Case studies.

UNIT - III

Biodiversity and Biotic Resources: Introduction, definition, genetic, species and ecosystem diversity. Values of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, hot spots of biodiversity. Field visit. Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: In - Situ and Ex -situ conservation. National biodiversity act.

UNIT - IV

Environmental   Pollution
Classification of pollution. **Air pollution:** Primary and secondary pollutants, automobile and industrial pollution. Ambient air quality standards. **Soil pollution:** Sources and types, impacts of modern agriculture, degradation of soil. **Solid waste:** Municipal solid waste management, composition and characteristics of e-waste and its management.

Pollution control technologies: Wastewater treatment methods: Primary, secondary and tertiary. Overview of air pollution control technologies, concepts of bioremediation.

Global Environmental issues and Global efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions /Protocols: Earth summit, Kyoto protocol and Montréal protocol. NAPCC-GoI Initiatives.

UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection Act, legal aspects Air Act-1981, Water Act, biomedical waste management and handling rules, hazardous waste management and handling rules.

EIA: EIA structure, methods of baseline data acquisition. Concepts of environmental management plan (EMP).

Towards Sustainable Future: Concept of sustainable development goals, population and its explosion. Crazy consumerism, Environmental education, Human health, Environmental ethics. Concept of green building, Principles of green chemistry, Ecological footprint, Life cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:
1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:
1. Environmental Science: Towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008, PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New Age International publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS Publications.

B.Tech. II Semester

L	T	P	C
3	1	0	4

MA201BS: Ordinary Differential Equations and Vector Calculus

Course Objectives

- Methods of solving the differential equations of first order.
- Methods of solving the differential equations of higher order.
- Concept, properties of Laplace transforms, solving ordinary differential equations using Laplace transforms techniques.
- The physical quantities involved in engineering field related to vector valued functions.
- The basic properties of vector valued functions and their applications to line, surface and volume integrals.

Course Outcomes

- Identify whether the given differential equation of first order is exact or not.
- Solve higher differential equation and apply the concept of differential equation to real world problems.
- Use the Laplace transforms techniques for solving ordinary differential equations.
- To analyse the physical quantities involved in engineering field related to vector valued functions.
- Evaluate the line, surface and volume integrals and converting them from one to another.

UNIT-I: First Order Ordinary Differential Equations

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Ordinary Differential Equations of Higher Order

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x, $e^{ax}V(x)$ and $x\,V(x)$, method of variation of parameters, Equations reducible to linear ordinary differential equations with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits.

UNIT-III:
Laplace transforms

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, Convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV:
Vector Differentiation

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

UNIT-V:
Vector Integration

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Suggested Readings:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications,5th Edition, 2016.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

L	T	P	C
3	1	0	4

PH201BS : APPLIED PHYSICS

Course Objectives: The objectives of this course for the student are to:

- Understand the basic principles of quantum physics.
- Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
- Study the fundamental concepts related to the dielectric and magnetic materials.
- Identify the importance of nanoscale, quantum confinement and various fabrication techniques.
- Study the characteristics of lasers and optical fibres.

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

- Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor and an insulator by classification of solids.
- Identify the role of semiconductor devices in science and engineering Applications.
- Explore the fundamental properties of dielectric and magnetic materials for their applications.
- Appreciate the features and applications of Nano materials.
- Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

UNIT - I: QUANTUM PHYSICS

Blackbody radiation – Planck's radiation law - Wein's law, Rayleigh-Jean's law - Photoelectric effect – de Broglie's Hypothesis, Davisson and Germer's experiment – Heisenberg uncertainty principle with an illustration - Non-existence of electrons in nucleus - Time independent Schrodinger wave equation - Born interpretation of the wave function - Particle in one dimensional potential box.

UNIT - II: SEMICONDUCTORS AND DEVICES

Intrinsic and extrinsic semiconductors – Hall effect - Direct and indirect band gap semiconductors - Construction, principle of operation and characteristics of P-N Junction diode, Zener diode and Bipolar Junction Transistor (BJT) – LED, PIN diode, Avalanche Photo Diode (APD) and Solar cells: structure, materials, working principle and characteristics.

UNIT - III: DIELECTRIC AND MAGNETIC MATERIALS

Dielectric Materials: Types of polarizations – Electronic & Ionic polarizabilities - Internal field in Dielectrics and Clausius-Mossotti Relation – Ferroelectric - Piezoelectric and Pyroelectric materials – Applications: liquid crystal displays (LCD) and crystal oscillators.Magnetic Materials: Origin of magnetic moment - Classification of Magnetic materials - Weiss theory of ferromagnetism – Hysteresis curve – Soft and Hard magnetic materials – Applications: Bubble memory devices, magnetic field sensors.

UNIT - IV: NANOTECHNOLOGY

Nanoscale – Properties of Nanomaterials - Surface to volume ratio - Quantum confinement – Top-down fabrication: ball milling - Bottom-up fabrication: sol-gel, Physical Vapor Deposition (PVD) and Chemical Vapor Deposition (CVD) - Characterization techniques: XRD, SEM & TEM - Applications of nanomaterials.

UNIT - V: LASERS AND FIBER OPTICS

Lasers: Characteristics - Spontaneous and Stimulated emissions – Einstein coefficients - Population Inversion - Pumping mechanisms - Ruby laser, Nd:YAG laser, He-Ne laser, CO_2 laser, Semiconductor laser - Applications of lasers.

Fiber Optics: Introduction to optical fibers - Advantages of optical Fibers over conventional communications – Principle of light transmission through optical fiber - Structure of optical fiber - Acceptance angle and Numerical aperture - Classification of optical fibers: Step index and Graded index fibers – Attenuation mechanism in optical fibers – Block diagram of optical fiber communication system - applications.

TEXT BOOKS:

1. M. N. Avadhanulu, P.G. Kshirsagar & T. V. S. Arun Murthy "A Text book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4th Edition,2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition,2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.

REFERENCE BOOKS:

1. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons,11th Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhya – Nano Materials, New Age International, 1st Edition, 2007.

B. Tech. II Semester

EN201HS: English for Skill Enhancement

L	T	P	C
2	0	0	2

Course Objectives: This course will enable the students to:

- Improve the language proficiency in English with an emphasis on Vocabulary and improve their functional grammar.
- Enhance their Reading and Writing skills.
- Develop study skills and communication skills in various professional situations.
- Train in effective reading techniques for better comprehension of texts of various domains.
- Equip them to study Engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

Course Outcomes: Students will be able to:

- Choose appropriate vocabulary and sentence structures for their oral and written Communication.
- Demonstrate their understanding of the rules of functional grammar.
- Develop comprehension skills from the known and unknown passages.
- Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.
- Acquire basic proficiency in reading and writing modules of English.

UNIT - I
Chapter entitled „**Toasted English**" **by R. K. Narayan** from **"English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad. **Vocabulary**: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms **Grammar :** Identifying Common Errors in Writing with Reference to Articles and Prepositions. **Reading:** Reading and Its Importance- Techniques for Effective Reading.**Writing:** Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT - II
Chapter entitled „**Appro JRD**" **by Sudha Murthy** from **"English: Language, Context and Culture" published** by Orient BlackSwan, Hyderabad. **Vocabulary:** Words Often Misspelt - Homophones, Homonyms and Homographs **Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement. **Reading:** Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice **Writing:** Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT - III
Chapter entitled „**Lessons from Online Learning**" **by F. Haider Alvi, Deborah Hurst et al** from **"English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad. **Vocabulary**: Words Often Confused - Words from Foreign Languages and their Use in English. **Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses. **Reading:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice – Barriers to Effective Reading. **Writing:** Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT - IV
Chapter entitled „**Art and Literature**" **by Abdul Kalam** from **"English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad. **Vocabulary:** Standard Abbreviations in English – Idioms and Phrases **Grammar:** Redundancies and Clichés in Oral and Written Communication. **Reading:** Effective Steps to Reading - Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice **Writing:** Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

UNIT - V
Chapter entitled „**Go, Kiss the World**" **by Subroto Bagchi** from **"English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad. **Vocabulary**: Technical Vocabulary and their Usage **Grammar:** Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units) **Reading:** Reading Comprehension-Exercises for Practice **Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Note: Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- **Note: 1**. As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is **Open-ended**, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

- **Note: 2**. Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents .They are advised to teach 40 percent of each topic from the syllabus in blended mode.

Textbook:
1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

Reference Books:
1. Liss and Davis (2010) Effective Academic Writing, Oxford University Press.
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1, 2, 3. Cambridge University Press
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd.
5. Wiley (2019). Technical Communication. Wiley India Pvt. Ltd, Rupa Publications.
6. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition
8. Green, David (2015). Contemporary English Grammar Structure And Composition, Trinity Press (Imprint of Laxmi Publication Pvt Ltd)

L	T	P	C
2	0	0	2

B.Tech - II Semester

EC201ES: ELECTRONIC DEVICES AND CIRCUITS

Course Objectives:

- To introduce components such as diodes, BJTs and FETs.
- To know the applications of devices.
- To know the switching characteristics of devices.

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

- Acquire the knowledge of various electronic devices and their use on real life.
- Know the applications of various devices.
- Acquire the knowledge about the role of special purpose devices and their applications.

UNIT - I

Diodes: Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

UNIT - II

Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT - III

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor biasing and stabilization-fixed bias, self-bias and stability factors, Transistor as a switch, switching times,

UNIT - IV

Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

UNIT – V

Special Purpose Devices: Zener Diode **-** Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

TEXT BOOKS:

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education

2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson**.**

REFERENCE BOOKS:

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5thEdition, Oxford.

2. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications, Cambridge, 2018.

B.Tech II Semester

L	T	P	C
0	0	3	1.5

PH251BS: APPLIED PHYSICS LABORATORY

Course Objectives: The objectives of this course for the student to

- Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
- Understand the characteristics of various devices such as PN junction diode, Zener diode, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
- Able to measure the time constant of RC circuits.
- Study the variation of magnetic field along the axis of current carrying coil.
- Understanding the method of least squares fitting.

Course Outcomes: The students will be able to:

- Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
- Appreciate quantum physics in semiconductor devices and optoelectronics.
- Gain the knowledge of applications of RC circuits.
- Understand the effect of magnetic field in different current carrying coils.
- Carried out data analysis.

LIST OF EXPERIMENTS:

1. Determination of work function and Planck's constant using photoelectric effect.

2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.

3. Characteristics of series and parallel LCR circuits.

4. V-I characteristics of a p-n junction diode and Zener diode

5. V-I and P-I characteristics of light emitting diode (LED)

6. V-I Characteristics of solar cell

7. Determination of Energy gap of a semiconductor.

8. Determination of Acceptance Angle and Numerical Aperture of an optical fiber.

9. V-I characteristics of Laser diode.

10. Understanding the method of least squares – torsional pendulum as an example.

11. Determination of time constant using RC circuits

12. Determination of magnetic field of induction using Steewart-Gee's apparatus

Note: Any 8 experiments are to be performed.

REFERENCE BOOK:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

B.Tech. II - Semester

L	T	P	C
0	1	2	2

CS251ES: PYTHON PROGRAMMING LABORATORY

Course Objectives:
- To install and run the Python interpreter
- To learn control structures.
- To Understand Lists, Dictionaries in python
- To Handle Strings and Files in Python

Course Outcomes: After completion of the course, the student should be able to
- Develop the application specific codes using python.
- Understand Strings, Lists, Tuples and Dictionaries in Python
- Verify programs using modular approach, file I/O, Python standard library
- Implement Digital Systems using Python

Note: The lab experiments will be like the following experiment examples

Week -1:
1. i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
   ii) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3.
   i) Write a program to calculate compound interest when principal, rate and number of periods are given.
   ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points
4. Read name, address, email and phone number of a person through keyboard and print the details.

Week - 2:
1. Print the below triangle using for loop.
   5
   4 4
   3 3 3
   2 2 2 2
   1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in a given interval (use break)

Week - 3:
1. i) Write a program to convert a list and tuple into arrays.
   ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

Week - 4:
1. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.

   i).   Write a function called remove_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.

   ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.

   iii).   Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.

3.   i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'

   ii) Remove the given word in all the places in a string?

   iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

4.   Writes a recursive function that generates all binary strings of n-bit length

Week - 5:

1. i) Write a python program that defines a matrix and prints

   ii) Write a python program to perform addition of two square matrices

   iii) Write a python program to perform multiplication of two square matrices

2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.

3. Use the structure of exception handling all general purpose exceptions.

Week-6:

1.   a. Write a function called draw rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.

   b. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.

   c. Write a function called draw point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.

   d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw circle that draws circles on the canvas.

2.   Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.

3.   Write a python code to read a phone number and email-id from the user and validate it for Correctness.

Week- 7

1. Write a Python code to merge two given file contents into a third file.

2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.

3. Write a Python code to Read text from a text file, find the word with most number of occurrences

4. Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

Week - 8:

1. Import numpy, Plotpy and Scipy and explore their functionalities.

2. a) Install NumPy package with pip and explore it.

3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR

4. Write a program to implement Half Adder, Full Adder, and Parallel Adder

5. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

TEXT BOOKS:
1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS:
1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W. Chun, Pearson
6. Introduction to Python, Kenneth A. Lambert, Cengage

L	T	P	C
0	0	2	1

B. Tech. II Semester

EN251HS: English Language and Communication Skills Laboratory

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives: This course aims:

- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- To sensitize the students to the nuances of English speech sounds, word accent, intonation and Rhythm
- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize mother tongue interference
- To train students to use language appropriately for public speaking, group discussions and interviews.

Course Outcomes: Students will be able to:

- Understand the nuances of English language through audio- visual experience and group Activities.
- Demonstrate their understanding of exact pronunciation of speech sounds.
- Acquire fluency in their language and neutralize their accent for intelligibility without Mother Tongue Interference (MTI).
- Speak with clarity and confidence which in turn enhances their employability skills.
- Develops their ability in presenting, arguing, summarizing and leading various communicative activities.

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:
a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

Listening Skills:
Objectives
1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and
use the right intonation in sentences.
 • Listening for general content
 • Listening to fill up information
 • Intensive listening
 • Listening for specific information

Speaking Skills:
Objectives
1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional Contexts

 • Oral practice
 • Describing objects/situations/people
 • Role play – Individual/Group activities
 • Just A Minute (JAM) Sessions

The following course content is prescribed for the **English Language and Communication Skills Lab.**

Exercise – I

CALL Lab:
Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. Practice: Introduction to Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker- Testing Exercises.

ICS Lab:
Understand: Spoken vs. Written language- Formal and Informal English. Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave –Introducing Oneself and Others.

Exercise – II

CALL Lab:
Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation. Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - Testing Exercises.

ICS Lab:
Understand: Features of Good Conversation – Strategies for Effective Communication. Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III

CALL Lab:
Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI). Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation –Testing Exercises

ICS Lab:
Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV

CALL Lab:
Understand: Listening for General Details. Practice: Listening Comprehension Tests - Testing Exercises

ICS Lab:
Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication-Presentation Skills. Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V

CALL Lab:
Understand: Listening for Specific Details. Practice: Listening Comprehension Tests -Testing Exercises

ICS Lab:
Understand: Group Discussion – Introduction to Interview Skills Practice: Group Discussion – Mock Interviews

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):
Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

   i)   Computers with Suitable Configuration

   ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audiovisual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc. **Source of Material (Master Copy):**

- Exercises in Spoken English. Part 1, 2, 3. CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

REFERENCE BOOKS:

1. Kumar, Rajesh (2022). English Language Communication Skills – Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford University Press
4. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge University Press.
6. Central Institute of English (2005). Exercises in Spoken English Vol. 1, 2 & 3, Oxford India, Hyderabad

B.Tech. II - Semester

IT251ES: IT WORKSHOP

L	T	P	C
0	0	2	1

Course Objectives:

- The IT Workshop for engineers is a training lab course spread over 60 hours.
- The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, PowerPoint and Publisher.

Course Outcomes

- Perform Hardware troubleshooting
- Understand Hardware components and inter dependencies
- Safeguard computer systems from viruses/worms
- Document/ Presentation preparation
- Perform calculations using spreadsheets

LIST OF EXPERIMENTS:

PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions.
Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task 1: **Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP / VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Powerpoint

Task 1: Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech

2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech

3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

4. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)

5. LaTeX Companion – Leslie Lamport, PHI/Pearson.

6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.

7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, Pearson Education.

B.Tech. II - Semester

ME251ES: ENGINEERING WORKSHOP

L	T	P	C
0	1	3	2.5

Course Objectives: At the end of this course students are expected to

- Study of different hand operated power tools, uses and their demonstration.
- Gain a good basic working knowledge required for the production of various engineering products.
- Provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field.
- Study commonly used Engineering trades like carpentry, fitting, tin smithy, foundry, house wiring, plumbing & black smithy and practical exposure to these trades.
- Study of various machining operations.

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

- Practice on various workshop trades including plumbing, fitting, carpentry, foundry, house wiring, tin smithy, black smithy and welding by using different tools.
- Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring and chiseling.
- Apply basic electrical engineering knowledge for house wiring practice.
- Implement the knowledge of basic workshop processes under safety norms.
- Understand different metal joining techniques using arc welding process.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:
I.   Carpentry – (Bridle Joint, Half - Lap Joint, Mortise & Tenon Joint)

II.   Fitting – (L- fit, V-Fit & Dovetail Fit)

III.   Tin-Smithy – (Square Tin, Rectangular scoop & Rectangular tray)

IV.   Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)

V.   Welding Practice – (Arc Welding- Lap Joint, Butt Joint & T Joint)

VI.   House-wiring – (Parallel & Series, Two-way Switch and Tube Light)

VII. Black Smithy – (Oval shape, S – Hook & Fan Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools used in construction and Wood Working operations.

Text Books:
1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

Reference Books:
1. Work shop Manual - P. Kannaiah/ K. L. Narayana/ SciTech
2. Workshop Manual / Venkat Reddy/ BSP

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Computer Science & Engineering (AI&ML)
Scheme of Instruction and Examination
III Semester

S.No.	Course Code	Course Title	Instruction			Examination			Credits
			Hours Per Week			Max. Marks		Duration of SEE in Hours	
			L	T	P/D	CIE	SEE		
1	MA303BS	Mathematical and Statistical Foundations	3	1	0	40	60	3	4
2	CS301PC	Data Structures	3	0	0	40	60	3	3
3	CS303PC	Software Engineering	3	0	0	40	60	3	3
4	CS305PC	Computer Organization and Architecture	3	0	0	40	60	3	3
5	CS306PC	Operating Systems	3	0	0	40	60	3	3
6	CS352PC	Introduction to Data Structures Lab	0	0	2	40	60	3	1
7	CS354PC	Software Engineering Lab	0	0	2	40	60	3	1
8	CS355PC	Operating Systems Lab	0	0	2	40	60	3	1
9	CS357PC	Node JS/ React JS/ Django	0	0	2	40	60	3	1
10	MC301HS	Constitution of India	3	0	0	-	-	2	0
		Total Hours/Marks/Credits	18	1	8	360	540	29	20

L: Lecture　T: Tutorial　D: Drawing　P: Practical　CIE - Continuous Internal Evaluation　SEE - Semester End Examination

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Computer Science & Engineering (AI&ML)
Scheme of Instruction and Examination
IV Semester

S.No.	Course Code	Course Title	Instruction			Examination			Credits
			Hours Per Week			Max. Marks		Duration of SEE in Hours	
			L	T	P/D	CIE	SEE		
1	CS401PC	Discrete Mathematics	3	0	0	40	60	3	3
2	CS403PC	Automata Theory and Compiler Design	3	0	0	40	60	3	3
3	CS404PC	Database Management Systems	3	0	0	40	60	3	3
4	CS406PC	Introduction to Artificial Intelligence	3	0	0	40	60	3	3
5	CS407PC	Object Oriented Programming through Java	3	0	0	40	60	3	3
6	CS452PC	Database Management Systems Lab	0	0	2	40	60	3	1
7	CS453PC	Java Programming Lab	0	0	2	40	60	3	1
8	CS455PC	Prolog/ Lisp/ Pyswip	0	0	2	40	60	3	1
9	CS456PC	Real-time Research Project/Field-Based Research Project/Societal Related Project	0	0	4	50	-	3	2
10	MC451HSC	Gender Sensitization Lab	0	0	2	-	-	2	0
		Total Hours/Marks/Credits	15	0	12	370	480	29	20

L: Lecture　T: Tutorial　D: Drawing　P: Practical　CIE - Continuous Internal Evaluation　SEE - Semester End Examination

L	T	P	C
3	1	0	4

III Semester Syllabus
MA303BS: MATHEMATICAL AND STATISTICAL FOUNDATIONS

Prerequisites: Mathematics courses of first year of study.

Course Objectives:

- The Number Theory basic concepts useful for cryptography etc
- The theory of Probability, and probability distributions of single and multiple random variables
- The sampling theory and testing of hypothesis and making inferences
- Stochastic process and Markov chains.

Course Outcomes:

- After learning the contents of this course, the student must be able to
- Apply the number theory concepts to cryptography domain
- Apply the concepts of probability and distributions to some case studies
- Correlate the material of one unit to the material in other units
- Resolve the potential misconceptions and hazards in each topic of study.

UNIT - I
Greatest Common Divisors and Prime Factorization: Greatest common divisors, The Euclidean algorithm, The fundamental theorem of arithmetic, Factorization of integers and the Fermat numbers
Congruences: Introduction to congruences, Linear congruences, The Chinese remainder theorem, Systems of linear congruences

UNIT - II
Simple Linear Regression and Correlation: Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted Model, Properties of the Least Squares Estimators, Inferences Concerning the Regression Coefficients, Prediction, Simple Linear Regression Case Study
Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Statistical Independence.
Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT - III
Continuous Probability Distributions: Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial
Fundamental Sampling Distributions: Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S2, t-Distribution, F-Distribution.

UNIT - IV
Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation. Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean, Difference between Two Means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.

UNIT - V
Stochastic Processes and Markov Chains: Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, nstep transition probabilities, Markov chain, Steady state condition, Markov analysis.

Text Books:
1. Kenneth H. Rosen, Elementary number theory & its applications, sixth edition, Addison-Wesley, ISBN 978 0-321-50031-1
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.

Reference Books:
1. S. D. Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications
3. T.T. Soong, Fundamentals of Probability And Statistics For Engineers, John Wiley & Sons Ltd, 2004.

L	T	P	C
3	0	0	3

III Semester Syllabus
CS301PC: Data Structures

Prerequisites: Programming for Problem Solving
Course Objectives

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms

Course Outcomes

- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations orcombinations.
- Implement and know the application of algorithms for sorting and pattern matching.
- Design programs using a variety of data structures, including hash tables, binary and generaltree structures, search trees, tries, heaps, graphs, and AVL-trees.

UNIT - I
Introduction to Data Structures, abstract data types, Linear list - singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks- Operations, array and linked representations of stacks, stack applications, Queues- operations, array and linked representations.

UNIT - II
Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.
Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT - III
Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, B- Trees, B+ Trees, AVL Trees, Definition, Height of an AVL Tree, Operations - Insertion, Deletion and Searching, Red -Black, Splay Trees.

UNIT - IV
Graphs: Graph Implementation Methods. Graph Traversal Methods.
Sorting: Quick Sort, Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT - V
Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer -Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.
Text Books:
1. Fundamentals of Data Structures in C, 2 nd Edition, E. Horowitz, S. Sahni and Susan AndersonFreed, Universities Press.
2. Data Structures using C - A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.
Reference Books:
1. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan, Cengage Learning.
2. Data Structures using C - A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

L	T	P	C
3	0	0	3

III Semester Syllabus
CS303PC: SOFTWARE ENGINEERING

Course Objectives

- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

Course Outcomes

- Ability to translate end-user requirements into system and software requirements, using e.g.UML, and structure the requirements in a Software Requirements Document (SRD).
- Identify and apply appropriate software architectures and patterns to carry out high level designof a system and be able to critically compare alternative choices.
- Will have experience and/or awareness of testing problems and will be able to develop a simpletesting report

UNIT - I
Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. **A Generic view of process**: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI). **Process models**: The waterfall model, Spiral model and Agile methodology

UNIT - II
Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.
Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

UNIT - III
Design Engineering: Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT - IV
Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.
Metrics for Process and Products: Software measurement, metrics for software quality.

UNIT - V
Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM. **Quality Management:** Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

Text Books:
1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.

Reference Books:
1. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

L	T	P	C
3	0	0	3

III Semester Syllabus
CS305PC : COMPUTER ORGANIZATION AND ARCHITECTURE

Co-requisite: A Course on "Digital Electronics".
Course Objectives

- The purpose of the course is to introduce principles of computer organization and the basicarchitectural concepts.
- It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
- Topics include computer arithmetic, instruction set design, micro-programmed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

Course Outcomes

- Understand the basics of instruction sets and their impact on processor design.
- Demonstrate an understanding of the design of the functional units of a digital computer system.
- Evaluate cost performance and design trade-offs in designing and constructing a computerprocessor including memory.
- Design a pipeline for consistent execution of instructions with minimum hazards.
- Recognize and manipulate representations of numbers stored in digital computers

UNIT - I
Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT - II
Micro-programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT - III
Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating - point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT - IV
Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

UNIT - V
Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, InstructionPipeline, RISC Pipeline, Vector Processing, Array Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence.

Text Books:
1. Computer System Architecture – M. Morris Mano, Third Edition, Pearson/PHI.
2. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, V th Edition, McGraw Hill.

Reference Books:
1. Computer Organization and Design: The Hardware/Software Interface, by PATTERSON5th Ed. MIPS
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4 th Edition, PHI/Pearson

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III Semester Syllabus

CS306PC: OPERATING SYSTEMS

Prerequisites:
1. A course on "Computer Programming and Data Structures".
2. A course on "Computer Organization and Architecture".

Course Objectives:

- Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, interprocesscommunication and I/O in Unix

Course Outcomes:

- Will be able to control access to a computer and the files that may be shared
- Demonstrate the knowledge of the components of computers and their respective roles incomputing.
- Ability to recognize and resolve user problems with standard operating environments.
- Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively

UNIT - I
Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls
Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

UNIT - II
CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec
Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

UNIT - III
Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors
Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT - IV
Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT - V
File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

Text Books:
1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

Reference Books:
1. Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition-2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI

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III Semester Syllabus
CS352PC: INTRODUCTION TO DATA STRUCTURES LAB

Prerequisites: A Course on "Programming for problem solving".

Course Objectives:

- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues.

Course Outcomes:

- Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
- Ability to Implement searching and sorting algorithms

List of Experiments:
1. Write a program that uses functions to perform the following operations on singly linkedlist.:
   i) Creation   ii) Insertion   iii) Deletion   iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linkedlist.:
   i) Creation   ii) Insertion   iii) Deletion   iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linkedlist.:
   i)Creation   ii) Insertion   iii) Deletion   iv) Traversal
4. Write a program that implement stack (its operations) using
   i) Arrays   ii) Pointers
5. Write a program that implement Queue (its operations) using
   i) Arrays   ii) Pointers
6. Write a program that implements the following sorting methods to sort a given list of integersin ascending order
   i) Quick sort   ii) Heap sort   iii) Merge sort
7. Write a program to implement the tree traversal methods(Recursive and Non Recursive).
8. Write a program to implement
   i) Binary Search tree   ii) B Trees   iii) B+ Trees   iv) AVLtrees   v) Red - Black trees
9. Write a program to implement the graph traversal methods.
10. Implement a Pattern matching algorithms using Boyer- Moore, Knuth-Morris-Pratt.

Text Books:
1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/Pearson Education.

Reference Books:
1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning.

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III Semester Syllabus

CS354PC: SOFTWARE ENGINEERING LAB

Prerequisites
- A course on "Programming for Problem Solving".

Co-requisite
- A Course on "Software Engineering".

Course Objectives:

> - To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

Course Outcomes:

> - Ability to translate end-user requirements into system and software requirements
> - Ability to generate a high-level design of the system from the software requirements
> - Will have experience and/or awareness of testing problems and will be able to develop asimple testing report

List of Experiments

Do the following seven exercises for any two projects given in the list of sample projects or any other Projects:

1. Development of problem statements.
2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool
5. Performing the Design by using any Design phase CASE tools.
6. Develop test cases for unit testing and integration testing
7. Develop test cases for various white box and black box testing techniques.

Sample Projects:

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

Text Books:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.

Reference Books:

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

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III Semester Syllabus
CS355PC: OPERATING SYSTEMS LAB

Prerequisites: A course on "Programming for Problem Solving", A course on "Computer Organization and Architecture".

Co-requisite: A course on "Operating Systems".

Course Objectives:

- To provide an understanding of the design aspects of operating system concepts throughsimulation
- Introduce basic Unix commands, system call interface for process management, inter-process communication and I/O in Unix

Course Outcomes:

- Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
- Able to implement C programs using Unix system calls

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms a) FCFS b) SJF c) Round Robin d) priority

2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)

3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.

4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.

5. Write C programs to illustrate the following IPC mechanisms a) Pipes b) FIFOs c) Message Queues d) Shared Memory

6. Write C programs to simulate the following memory management techniques a) Paging b) Segmentation

7. Write C programs to simulate Page replacement policies a) FCFS b) LRU c) Optimal

Text Books:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

Reference Books:

1. Operating Systems - Internals and Design Principles, William Stallings, Fifth Edition-2005, Pearson Education/PHI
2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education

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III Semester Syllabus
CS357PC:NODE JS/ REACT JS/ DJANGO

Prerequisites: Object Oriented Programming through Java, HTML Basics

Course Objectives:

- To implement the static web pages using HTML and do client side validation using JavaScript.
- To design and work with databases using Java
- To develop an end to end application using java full stack.
- To introduce Node JS implementation for server side programming.
- To experiment with single page application development using React.

Course Outcomes:

- At the end of the course, the student will be able to,
- Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.
- Demonstrate Advanced features of JavaScript and learn about JDBC
- Develop Server – side implementation using Java technologies like
- Develop the server – side implementation using Node JS.
- Design a Single Page Application using React.

Exercises:

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
2. Make the above web application responsive web application using Bootstrap framework.
3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 and experiment 2.
4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.
5. Develop a java stand alone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.
6. Create an xml for the bookstore. Validate the same using both DTD and XSD.
7. Design a controller with servlet that provides the interaction with application developed in experiment 1 and the database created in experiment 5.
8. Maintaining the transactional history of any user is very important. Explore the various session tracking mechanism (Cookies, HTTP Session)
9. Create a custom server using http module and explore the other modules of Node JS like OS, path, event.
10. Develop an express web application that can interact with REST API to perform CRUD operations on student data. (Use Postman)
11. For the above application create authorized end points using JWT (JSON Web Token).
12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
13. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation using chart.js
14. Create a TODO application in react with necessary components and deploy it into github.

Reference Books:

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2nd Edition, 2008.
3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, A Press.

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III Semester Syllabus
MC301HS: CONSTITUTION OF INDIA

Course Objectives: Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rightsperspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutionalrole and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolutionin 1917 and its impact on the initial drafting of the Indian Constitution

Course Outcomes: Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before thearrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP]under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
- Discuss the passage of the Hindu Code Bill of 1956

Unit - 1 History of Making of the Indian Constitution- History of Drafting Committee.

Unit - 2 Philosophy of the Indian Constitution- Preamble Salient Features

Unit - 3 Contours of Constitutional Rights & Duties - Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Unit - 4 Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit - 5 Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit - 6 Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

Reference Books:
1. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
2. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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IV Semester Syllabus
CS401PC: DISCRETE MATHEMATICS

Course Objectives:

- Introduces elementary discrete mathematics for computer science and engineering.
- Topics include formal logic notation, methods of proof, induction, sets, relations, algebraic structures, elementary graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

Course Outcomes:

- Understand and construct precise mathematical proofs
- Apply logic and set theory to formulate precise statements
- Analyze and solve counting problems on finite and discrete structures
- Describe and manipulate sequences
- Apply graph theory in solving computing problems

UNIT - I
Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

UNIT - II
Set theory: Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions.

UNIT - III
Algebraic Structures: Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as Partially Ordered Sets, Boolean Algebra.

UNIT - IV
Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Exclusion.

UNIT - V
Graph Theory: Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

Text Books:
1. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1st ed.
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe l. Mott, Abraham Kandel, Teodore P. Baker, Prentis Hall of India, 2nd ed.

Reference Books:
1. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, Pearson education, 5th edition.
2. Discrete Mathematical Structures: Thomas Kosy, Tata McGraw Hill publishing co
3. Graph Theory With Appln To Engg & Comp, Narsingh Deo, Prentice Hall India

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IV Semester Syllabus

CS403PC: AUTOMATA THEORY AND COMPILER DESIGN

Prerequisite: Nil

Course Objectives: Students will be able to:

- To introduce the fundamental concepts of formal languages, grammars and automata theory.
- To understand deterministic and non-deterministic machines and the differences betweendecidability and undecidability.
- Introduce the major concepts of language translation and compiler design and impart theknowledge of practical skills necessary for constructing a compiler.
- Topics include phases of compiler, parsing, syntax directed translation, type checking use ofsymbol tables, intermediate code generation

Course Outcomes: Students will be able to:

- Able to employ finite state machines for modeling and solving computing problems.
- Able to design context free grammars for formal languages.
- Able to distinguish between decidability and undecidability.
- Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
- Acquire skills in using lex tool and design LR parsers

UNIT - I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.

Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.

Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA

UNIT - II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.

Pumping Lemma for Regular Languages: Statement of the pumping lemma, Applications of the Pumping Lemma.

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Parse Trees, Ambiguity in Grammars and Languages.

UNIT - III

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA and CFG's, Acceptance by final state

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines

UNIT - IV

Introduction: The structure of a compiler,

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex,

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom- Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers

UNIT - V
Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.
Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code
Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management

Text Books:
1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, 2nd Edition, Pearson.

Reference Books:
1. Theory of Computer Science - Automata languages and computation, Mishra and Chandrashekaran, 2nd Edition, PHI.
2. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
3. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly .

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IV Semester Syllabus
CS404PC: DATABASE MANAGEMENT SYSTEMS

Prerequisites: A course on "Data Structures".

Course Objectives:

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transactioncontrol, concurrency control, storage structures and access techniques.

Course Outcomes:

- Gain knowledge of fundamentals of DBMS, database design and normal forms
- Master the basics of SQL for retrieval and management of data.
- Be acquainted with the basics of transaction processing and concurrency control.
- Familiarity with database storage structures and access techniques

UNIT - I
Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS
Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT - II
Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/altering tables and views.
Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III
SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active databases.
Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, First, Second, Third normal forms, BCNF, lossless join decomposition, multivalued dependencies, Fourth normal form, Fifth normal form.

UNIT - IV
Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log-Based Recovery, Recovery with Concurrent Transactions.

UNIT - V
Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree based Indexing, Comparison of File Organizations, Indexes- Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM),
B+ Trees: A Dynamic Index Structure.

Text Books:
1. Database System Concepts, Silberschatz, Korth, McGraw hill, V edition.3rd Edition
2. Introduction to Database Systems, C. J. Date, Pearson Education

Reference Books:
1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill.

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IV Semester Syllabus
CS406PC: INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Prerequisite: Knowledge on Data Structures.

Course Objectives:

- To learn the distinction between optimal reasoning Vs. human like reasoning.
- To understand the concepts of state space representation, exhaustive search, heuristic
- search together with the time and space complexities.
- To learn different knowledge representation techniques.
- To understand the applications of AI, namely game playing, theorem proving, and machinelearning.

Course Outcomes:

- Learn the distinction between optimal reasoning Vs human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.
- Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.
- Learn different knowledge representation techniques.
- Understand the concepts of state space representation, exhaustive search, heuristic searchtogether with the time and space complexities.
- Comprehend the applications of Probabilistic Reasoning and Bayesian Networks.
- Analyze Supervised Learning Vs. Learning Decision Trees

UNIT - I
Introduction to AI - Intelligent Agents, Problem-Solving Agents,
Searching for Solutions - Breadth-first search, Depth-first search, Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces.

UNIT-II
Games - Optimal Decisions in Games, Alpha-Beta Pruning, Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Knowledge-Based Agents, **Logic-** Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses.

UNIT-III
First-Order Logic - Syntax and Semantics of First-Order Logic, Using First Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification, Forward Chaining, Backward Chaining, Resolution.
Knowledge Representation: Ontological Engineering, Categories and Objects, Events.

UNIT-IV
Planning - Definition of Classical Planning, Algorithms for Planning with State Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches. Hierarchical Planning.

UNIT-V
Probabilistic Reasoning:
Acting under Uncertainty, Basic Probability Notation Bayes' Rule and Its Use, Probabilistic Reasoning, Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient

Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First- Order Probability.

Text Books:
1. Artificial Intelligence: A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.
2. Artificial Intelligence, 3rd Edn., E. Rich and K. Knight (TMH)

Reference Books:
1. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
2. Artificial Intelligence, Shivani Goel, Pearson Education.
3. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

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IV Semester Syllabus

CS407PC: OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Objectives

- To understand the basic object-oriented programming concepts and apply them in problemsolving.
- To illustrate inheritance concepts for reusing the program.
- To Demonstrate multitasking by using multiple threads and event handling
- To develop data-centric applications using JDBC.
- To Understand the basics of java console and GUI based programming

Course Outcomes

- Demonstrate the behavior of programs involving the basic programming constructs like controlstructures, constructors, string handling and garbage collection.
- Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by usingextend and implement keywords
- Use multithreading concepts to develop inter process communication.
- Understand the process of graphical user interface design and implementation using AWT orswings.
- Develop applets that interact abundantly with the client environment and deploy on the server.

UNIT - I
Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. A way of viewing world - Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT - II
Inheritance, Packages and Interfaces - Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring java.io.

UNIT - III
Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception subclasses. String handling, Exploring java.util. Differences between multithreading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads. Enumerations, autoboxing, annotations, generics.

UNIT - IV
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices,

lists panels - scrollpane, dialogs, menubar, graphics, layout manager - layout manager types - border, grid, flow, card and grid bag.

UNIT - V
Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

Text Books:
1. Java the complete reference, 7th edition, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson education.

Reference Books:
1. Core Java 2, Vol 1, Fundamentals, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education.
2. Core Java 2, Vol 2, Advanced Features, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education
3. Object Oriented Programming with Java, R.Buyya, S.T.Selvi, X.Chu, TMH.

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IV Semester Syllabus
CS452PC: DATABASE MANAGEMENT SYSTEMS LAB

Co-requisites: "Database Management Systems"

Course Objectives:

- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

Course Outcomes:

- Design database schema for a given application and apply normalization
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers

List of Experiments:

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. A. Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.)
   B. Nested, Correlated subqueries
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

Text Books:
1. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
2. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.

Reference Books:
1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

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IV Semester Syllabus

CS453PC: JAVA PROGRAMMING LAB

(Common to IT & CSM)

Course Objectives:

- To understand OOP principles.
- To understand the Exception Handling mechanism.
- To understand Java collection framework.
- To understand multithreaded programming.
- To understand swing controls in Java.

Course Outcomes:

- Able to write the programs for solving real world problems using Java OOP principles.
- Able to write programs using Exceptional Handling approach.
- Able to write multithreaded applications.
- Able to write GUI programs using swing controls in Java.

List of Experiments:

1. Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
2. Write a Java program to demonstrate the OOP principles. [i.e., Encapsulation, Inheritance, Polymorphism and Abstraction]
3. Write a Java program to handle checked and unchecked exceptions. Also, demonstrate the usage of custom exceptions in real time scenario.
4. Write a Java program on Random Access File class to perform different read and write operations.
5. Write a Java program to demonstrate the working of different collection classes. [Use package structure to store multiple classes].
6. Write a program to synchronize the threads acting on the same object. [Consider the example of any reservations like railway, bus, movie ticket booking, etc.]
7. Write a program to perform CRUD operations on the student table in a database using JDBC.
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. Handle any possible exceptions like divided by zero.
9. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. [Use Adapter classes]

Text Books:

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.

Reference Books:

1. Thinking in Java, Bruce Eckel, Pearson Education.
2. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson..

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IV Semester Syllabus
CS455PC: PROLOG/ LISP/ PYSWIP

List of Programs:

1. Write simple fact for following:
    A.   Ram likes mango.
    B.   Seema is a girl.
    C.   Bill likes Cindy.
    D.   Rose is red.
    E.   John owns gold

2. Write predicates one converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing.

3. Write a program to solve the Monkey Banana problem

4. WAP in turbo prolog for medical diagnosis and show the advantages and disadvantages of green and red cuts.

5. Write a program to solve the 4-Queen problem.

6. Write a program to solve traveling salesman problems.

7. Write a program to solve water jug problems using Prolog.

8. Write simple Prolog functions such as the following. Take into account lists which are too short. -- remove the Nth item from the list. -- insert as the Nth item.

9. Assume the prolog predicate gt(A, B) is true when A is greater than B. Use this predicate to define the predicate addLeaf(Tree, X, NewTree) which is true if NewTree is the Tree produced by adding the item X in a leaf node. Tree and NewTree are binary search trees. The empty tree is represented by the atom nil.

10. Write a Prolog predicate, countLists(Alist, Ne, Nl), using accumulators, that is true when Nl is the number of items that are listed at the top level of Alist and Ne is the number of empty lists. Suggestion: First try to count the lists, or empty lists, then modify by adding the other counter.

11. Define a predicate memCount(AList,Blist,Count) that is true if Alist occurs Count times within Blist. Define without using an accumulator. Use "not" as defined in utilities.pro, to make similar cases are unique, or else you may get more than one count as an answer.

    Examples:
    memCount(a,[b,a],N).
    N = 1 ;
    no
    memCount(a,[b,[a,a,[a],c],a],N).
    N = 4 ;
    no
    memCount([a],[b,[a,a,[a],c],a],N).
    N = 1 ;
    No

Text Books:

1. PROLOG: Programming for Artificial Intelligence, 3e, by BRATKO, WILEY
2. Programming in Prolog, William F. Clocksin, Christopher S. Mellish.
3. Practical Common Lisp, Peter Seibel.

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IV Semester Syllabus
MC451HS: GENDER SENSITIZATION LAB

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines - such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course
- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Learning Outcomes
➢ Students will have developed a better understanding of important issues related to gender in contemporary India.
➢ Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
➢ Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
➢ Students will acquire insight into the gendered division of labor and its relation to politics and economics.
➢ Men and women students and professionals will be better equipped to work and live together as equals.
➢ Students will develop a sense of appreciation of women in all walks of life.
➢ Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit-I: UNDERSTANDING GENDER
Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men
- Preparing for Womanhood. Growing up Male. First lessons in Caste.
Unit – II: GENDER ROLES AND RELATIONS
Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu"*.

Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Unit – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

➢ Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".

Text Book:

1. "*Towards a World of Equals: A Bilingual Textbook on Gender"* written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu **published by Telugu Akademi, Telangana Government in 2015.**