MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in Computer Science & Business Systems
Scheme of Instruction and Examination
(Choice Based Credit System)
(Common to CSE, IT, CSE (AI&ML), CSE (Data Science))
Applicable from the Academic Year 2022-23

I SEMESTER

S.No	Course Code	Course Title	Instruction Hours Per Week			Examination Max. Marks		Duration of SEE in Hours	Credits
			L	T	P/D	CIE	SEE		
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 and Engineering	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			Examination Max. Marks		Duration of SEE in Hours	Credits
			L	T	P/D	CIE	SEE		
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

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. in COMPUTER SCIENCE & BUSINESS SYSTEMS
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III SEMESTER

S. No	Course Code	Course Title	Instruction Hours Per Week			Examination Max. Marks		Duration of SEE in Hours	Credits
			L	**T**	**P/D**	**CIE**	**SEE**		
1	EC331ES	Digital Electronics	3	0	0	40	60	3	3
2	CS301PC	Data Structures	3	0	0	40	60	3	3
3	CS302PC	Object Oriented Programming through Java	3	0	0	40	60	3	3
4	CS304PC	Discrete Mathematics	3	0	0	40	60	3	3
5	CS305PC	Computer Organization and Architecture	3	0	0	40	60	3	3
6	CS351PC	Data Structures Lab	0	0	3	40	60	3	1.5
7	CS353PC	Object Oriented Programming through Java Lab	0	0	3	40	60	3	1.5
8	CS356PC	Data visualization- R Programming / Power BI	0	0	2	40	60	3	1
9	CS357PC	Node JS/ React JS/ Django	0	0	2	40	60	3	1
10	MC351HS	Gender Sensitization Laboratory	0	0	2	50	50	3	0
		Total Hours / Marks / Credits	**15**	**0**	**12**	**410**	**590**	**-**	**20**

IV SEMESTER

S. No	Course Code	Course Title	Instruction Hours Per Week			Examination Max. Marks		Duration of SEE in Hours	Credits
			L	**T**	**P/D**	**CIE**	**SEE**		
1	MA402BS	Computer Oriented Statistical Methods	3	1	0	40	60	3	4
2	MS401HS	Business Economics and Financial Analysis	3	0	0	40	60	3	3
3	CS402PC	Operating Systems	3	0	0	40	60	3	3
4	CS404PC	Database Management Systems	3	0	0	40	60	3	3
5	CS405PC	Software Engineering	3	0	0	40	60	3	3
6	MC401HS	Constitution of India	3	0	0	40	60	3	0
7	CS451PC	Operating Systems Lab	0	0	2	40	60	3	1
8	CS452PC	Database Management Systems Lab	0	0	2	40	60	3	1
9	CS456PC	Real-time Research Project/ Societal Related Project / Field-Based Research Projects	0	0	4	50	-	-	2
		Total Hours / Marks / Credits	**18**	**1**	**8**	**370**	**480**	**-**	**20**

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

B.Tech. I Semester

MA101BS: Matrices and Calculus

L	T	P	C
3	1	0	4

(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, 9^{th}Edition, 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
(Common to CSE, IT, CSBS, CSE(AI&ML), CSE(DATA SCIENCE))

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

- Formulate algorithms and design flowcharts for simple problems and to know the usage of various operators and control statements in program development.
- Understand and analyze the concepts of arrays, strings, pointers and structures for real world problems.
- Implement various file handling techniques for better data management.
- Decompose a problem into functions and to develop modular reusable code.
- Applying C concepts to implements searching and sorting techniques.

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.

L	T	P	C
0	0	2	1

B.Tech. I - Semester

CS153ES: ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING
(Common to CSE, IT, CSBS, CSE(AI&ML), CSE(DATA SCIENCE))

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

L	T	P	C
0	0	2	1

CS151ES: PROGRAMMING FOR PROBLEM SOLVING LABORATORY
(Common to CSE, IT, CSBS, CSE(AI&ML), CSE(DATA SCIENCE))

[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:
- Identify various operators and control structures to solve simple mathematical expressions
- Demonstrate the concepts of arrays, strings, pointers and pointers to solve the problems.
- Solve various file handling techniques for better data management.
- Applying concept of user defined functions and recursion to support reusability.
- Experiment problems related to searching and soring techniques

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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:
     5 x 1 = 5
     5 x 2 = 10
     5 x 3 = 15
  e. 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.
$1-x/2 +x^2/4-x^3/6$

i. 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:
   I. Addition of Two Matrices
   II. Multiplication of Two Matrices
   III. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be the same.

d. Write C programs that use both recursive and non-recursive functions
   I. To find the factorial of a given integer.
   II. To find the GCD (greatest common divisor) of two given integers.
   III. To find x^n

e. Write a program for reading elements using a pointer into an array and display the values using the array.

f. Write a program for display values reverse order from an array using a pointer.

g. 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:

        I.   To insert a sub-string into a given main string from a given position.

       II.   To delete n Characters from a given position in a given string.

    d. 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.)

    e. Write a C program that displays the position of a character ch in the string S or − 1 if S doesn't contain ch.

    f. 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 list of integers using linear search method.

    b. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.

    c. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.

    d. Write a C program that sorts the given array of integers using selection sort in descending order

    e. Write a C program that sorts the given array of integers using insertion sort in ascending order

    f. 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

L	T	P	C
3	0	0	0

Course Objectives:

MC101BS: Environmental Science

- 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

MA201BS: Ordinary Differential Equations and Vector Calculus

L	T	P	C
3	1	0	4

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.

B.Tech II - Semester

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 M. N. Avadhanulu, P.G. Kshirsagar & T. V. S. Arun Murthy "A Text book of Engineering Physics"- S.

Chand Publications, 11th Edition 2019.

1. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019

Semiconductor Physics and Devices- 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:

2. Basic Principle – Donald A, Neamen, Mc Graw Hill, 4th Edition,2021.

3. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition,2022.

4. 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

L	T	P	C
2	0	0	2

EN201HS: ENGLISH FOR SKILL ENHANCEMENT
(Common to CSE, CSE (Data Science), CSE (AI&ML), IT, CSBS & EEE)

Course Objectives: This course will enable the students to:

1. Improve the language proficiency in English with an emphasis on Vocabulary and improve their functional grammar.
2. Enhance their Reading and Writing skills.
3. Develop study skills and communication skills in various professional situations.
4. Train in effective reading techniques for better comprehension of texts of various domains.
5. 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:

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

UNIT-I   *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   *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   *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 *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   *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 given under Unit-6 in the 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
(Common to All Branches)

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. i) 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.

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

   iii) 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.

   iv) 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. 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
(Common to CSE, CSE (DS), CSE (AI&ML), IT, CSBS & EEE)

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 will enable the students to:

1. Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. Sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. Bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4. Improve the fluency of students in spoken English and neutralize mother tongue interference
5. Train students to use language appropriately for public speaking, group discussions and interviews.

Course Outcomes: Students will be able to:

1. Understand the nuances of English language through audio- visual experience and group Activities.
2. Demonstrate their understanding of exact pronunciation of speech sounds.
3. Acquire fluency in their language and neutralize their accent for intelligibility without Mother Tongue Interference (MTI).
4. Speak with clarity and confidence which in turn enhances their employability skills.
5. Develop 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:

1. Cambridge Advanced Learners' English Dictionary with CD.
2. Grammar Made Easy by Darling Kindersley.
3. Punctuation Made Easy by Darling Kindersley.
4. Oxford Advanced Learner's Compass, 10th Edition.
5. English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
6. English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
7. English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
8. 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

L	T	P	C
0	0	2	1

IT251ES: IT WORKSHOP
(Common to CSE, IT, CSBS, CSE (AI&ML), CSE (DATA SCIENCE))

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.

MR-22 B.Tech. CSBS   **MGIT (Autonomous), Hyderabad**

B.Tech. II - Semester

	L	T	P	C
ME251ES: ENGINEERING WORKSHOP	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

L	T	P	C
3	0	0	3

III Semester Syllabus
EC331ES: DIGITAL ELECTRONICS
Common to CSE, IT, CSBS, & CSE(DATA SCIENCE)

Pre-requisite: Number Systems, Mathematics
Course Objectives:

1. To understand common forms of number representation in logic circuits
2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
3. To understand the concepts of combinational logic circuits and sequential circuits.
4. To understand the Realization of Logic Gates Using Diodes & Transistors.

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

1. Understand the numerical information in different forms and Boolean Algebra theorems
2. Postulates of Boolean algebra and to minimize combinational functions
3. Design and analyze combinational and sequential circuits
4. Known about the logic families and realization of logic gates.
5. To understand the concept of Asynchronous & Synchronous Logic Circuits.

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	2	1	-	-	-	-	-	2	1	1
CO2	3	2	2	1	2	1	-	-	-	-	-	2	1	1
CO3	2	3	3	2	2	1	-	-	-	-	-	1	1	2
CO4	3	2	1	1	1	-	-	-	-	-	-	-	2	2

UNIT - I
Boolean Algebra and Logic Gates: Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary logic.
Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, Digital logic gates.

UNIT - II
Gate – Level Minimization: The map method, Four-variable map, Five-Variable map, product of sums simplification Don't-care conditions, NAND and NOR implementation other Two-level implementations, Exclusive – Or function.

UNIT - III
Combinational Logic: Combinational Circuits, Analysis procedure Design procedure, Binary Adder-Subtractor Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers, HDL for combinational circuits.

UNIT - IV
Sequential Logic: Sequential circuits, latches, Flip-Flops Analysis of clocked sequential circuits, state Reduction and Assignment, Design Procedure. Registers, shift Registers, Ripple counters, synchronous counters, other counters.

UNIT - V
Memories and Asynchronous Sequential Logic: Introduction, Random-Access Memory, Memory Decoding, Error Detection and correction Read-only memory, Programmable logic Array programmable Array logic, Sequential Programmable Devices.
Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of state and Flow Tables, Race-Free state Assignment Hazards, Design Example.

Text Books:
1. Digital Design – Third Edition, M. Morris Mano, Pearson Education/PHI.
2. Digital Principles and Applications Albert Paul Malvino Donald P. Leach TATA McGraw Hill Edition.

Reference Books:
1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition.

L	T	P	C
3	0	0	3

III Semester Syllabus
CS301PC: DATA STRUCTURES
[Common to CSE, IT, CSBS, CSE(DATA SCIENCE) & CSE(AI&ML)]

Prerequisites:

1.	Programming for Problem Solving.

Course Objectives:

To Learn
- 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:

Student will be able to:
- 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 or combinations.
- 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 general tree 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 Anderson Freed, Universities Press.
2.   An Introduction to Data Structures with Application, 2nd edition by Jean-Paul Tremblay, Paul Sorenson, Mc Graw Hill publications..

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
CS302PC: OBJECT ORIENTED PROGRAMMING THROUGH JAVA
[Common to CSE, CSBS & CSE (DATA SCIENCE)]

Prerequisites:

1. A course on "Computer Programming and Data Structures".

2. A course on "Advanced Data Structures".

Course Objectives

To Learn
- To Understand the basic object-oriented programming concepts and apply them in problem solving.
- 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

Student will be able to:
- Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
- Demonstrate the implementation of inheritance (multilevel, hierarchical and multiple) by using extend and implement keywords
- Use multithreading concepts to develop inter process communication.
- Understand the process of graphical user interface design and implementation using AWT or swings.
- 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.
Swings – 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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III Semester Syllabus
CS304PC: DISCRETE MATHEMATICS
(Common to CSBS, CSE (DATASCIENCE)

Course Objectives:

- Introduceselementarydiscretemathematicsforcomputerscienceandengineering.
- 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, EnumerationofCombinationsandPermutations,EnumeratingCombinationsandPermutations   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 Sub graphs, 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.

TEXTBOOKS:
1. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1sted.
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joel. Mott, Abraham Kandel, Teodore P. Baker, Prentis Hall of India, 2nded.

REFERENCEBOOKS:
1. Discrete and Combinatorial Mathematics – an applied introduction: Ralph.P. Grimald, Pearson education, 5th edition.
2. Discrete Mathematical Structures: Thomas Kosy, Tata Mc Graw Hill publishing co.

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III Semester Syllabus
CS305PC: COMPUTER ORGANIZATION AND ARCHITECTURE
[Common to CSE, CSBS, CSE (DATA SCIENCE) & CSE (AI&ML)]

Prerequisites:
1. A Course on "Digital Electronics".

Course Objectives

To Learn
- The purpose of the course is to introduce principles of computer organization and the basic architectural 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

Student will be able to:
- 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 computer processor 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, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.
Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Inter processor 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 Architecture – William Stallings Sixth Edition, Pearson/PHI.
2. Structured Computer Organization – Andrew S. Tanenbaum, 4 th Edition, PHI/Pearson
3. Computer Organization and Design: The Hardware/Software Interface, by PATTERSON5th Ed. MIPS

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III Semester Syllabus
CS351PC: DATA STRUCTURES LAB
[Common to CSE, IT, CSBS & CSE (DATA SCIENCE)]

Prerequisites:

1.	Programming for Problem Solving.

Course Objectives

To Learn
- 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

Student will be able to:
- 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 linked list.:
i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.:
i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list.:
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 integers in 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) AVL trees 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
CS353PC: OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB
[Common to CSE, CSBS & CSE (DATA SCIENCE)]

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

Course Objectives

To Learn
- To write programs using abstract classes.
- To write programs for solving real world problems using the java collection framework.
- To write multithreaded programs.
- To write GUI programs using swing controls in Java.
- To introduce java compiler and eclipse platform.

Course Outcomes

Student will be able to:
- Able to illustrate OOP concepts in Java.
- Able to write programs using Abstract classes.
- Able to write multithreaded programs and Event handling.
- Able to write programs for solving real world problems using the java collection framework.
- Able to write GUI programs using swing controls in Java.

Note:
1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the use of the Eclipse platform.
2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

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 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.
3. A) Develop an applet in Java that displays a simple message.
B) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.
4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
5. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.
6. Write a Java program for the following:
Create a doubly linked list of elements.
Delete a given element from the above list.
Display the contents of the list after deletion
7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in the selected color. Initially, there is no message shown.

8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

9. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas.
Write a java program to display the table using Labels in Grid Layout.

10. 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).

11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

12. Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.

13. Write a Java program to list all the files in a directory including the files present in all its subdirectories.

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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III Semester Syllabus
CS356PC: DATA VISUALIZATION - R PROGRAMMING / POWER BI
[Common to CSE, IT, CSBS & CSE (DATA SCIENCE)]

Prerequisites:

Course Objectives

To Learn
- Effective use of Business Intelligence (BI) technology (Tableau) to apply data visualization
- To discern patterns and relationships in the data.
- To build Dashboard applications.
- To communicate the results clearly and concisely.
- To be able to work with different formats of data sets.

Course Outcomes

Student will be able to:
- Understand How to import data into Tableau.
- Understand Tableau concepts of Dimensions and Measures.
- Develop Programs and understand how to map Visual Layouts and Graphical Properties.
- Create a Dashboard that links multiple visualizations.
- Use graphical user interfaces to create Frames for providing solutions to real world problems.

Lab Problems:
1. Understanding Data, What is data, where to find data, Foundations for building Data Visualizations, Creating Your First visualization?
2. Getting started with Tableau Software using Data file formats, connecting your Data to Tableau, creating basic charts(line, bar charts, Tree maps),Using the Show me panel.
3. Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculations and fields.
4. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.
5. Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.
6. Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.
7. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colors.
8. Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.
9. Tableau file types, publishing to Tableau Online, Sharing your visualizations, printing, and Exporting.
10. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

Reference Books:
1. Microsoft Power BI cookbook, Brett Powell, 2nd edition.
2. R Programming for Data Science by Roger D. Peng (References)
3. The Art of R Programming by Norman Matloff Cengage Learning India.

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III Semester Syllabus

CS357PC: NODE JS/REACTJS/DJANGO

(Common to CSBS, CSE (AI&ML), CSE (DATASCIENCE)

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 Boot strap 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. MaketheabovewebapplicationresponsivewebapplicationusingBootstrapframework.
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 standalone application that connects with the database(Oracle/mySql) and perform the CRUD operation on the database tables.
6. Create an xml for the book store. 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. DevelopanexpresswebapplicationthatcaninteractwithRESTAPItoperform CRUD operations on student data. (Use Postman)

11. For the above application create authorized end points using JWT (JSON WebToken).
12. Create are act 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 open weather map.org and the display the current and historical weather information using graphical representation usingchart.js
14. Create a TODO application inreact with necessary components and deploy it into github.

REFERENCEBOOKS:

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, 2ndEdition, 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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B. Tech. III Semester Syllabus

MC351HS: GENDER SENSITIZATION LABORATORY

(EEE, CSE, IT, CSBS, CSE(DATA SCIENCE))

Course Objectives

> This course aims:
> - 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.

Course 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 labour 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 text book will empower students to understand and respond to gender violence.

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.

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 Woman hood. Growing up Male.

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:Genderand 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 DevelopmentIssues-Gender,GovernanceandSustainableDevelopment-GenderandHumanRights-GenderandMainstreaming

Unit–IV:Gender-BasedViolence

TheConceptofViolence-TypesofGender-basedViolence-Gender-basedViolencefromaHumanRightsPerspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment-FurtherReading: "Chupulu".

Domestic Violence: Speaking Out -Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinkingabout SexualViolenceBlamingtheVictim-"IFoughtformyLife…."

Unit–V:GenderandCulture

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature-GenderDevelopment 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.RosaParks-TheBraveHeart.

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 learningactivities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make useofanyauthenticmaterialsrelated to thetopics given inthesyllabuson"Gender".

SuggestedReadings:

- The Textbook, "Towards a World of Equals: A Bilingual Text Book on Gender" written by A. Suneetha, UmaBhrugubanda, DuggiralaVasanta, Rama Melkote, VasudhaNagaraj, AsmaRasheed, GoguShyamala, DeepaSreenivas andSusieTharupublishedbyTeluguAkademi,TelanganaGovernment in2015.

AssessmentandGrading:

- Discussion&ClassroomParticipation:20%
- Project/Assignment:30%
- EndTermExam:50%.

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Mahatma Gandhi Institute of Technology (A)
B.Tech. IV Semester
MA402BS: Computer Oriented Statistical Methods
(CSBS, CSE(DATA SCIENCE))

Course Objectives

- The ideas of random variables and various discrete and continuous probability distributions and their properties
- The concept of theoretical distributions
- The sampling theory and Estimation
- Testing of hypothesis and making inferences
- The basic ideas of statistics including measures of central tendency, curve fitting, correlation and regression

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

- Formulate and solve problems involving random variables. Apply the concepts of probability and distributions to case studies
- Understand the theoretical distributions
- Understand the concept of sampling and applyconceptofestimation
- Testingofhypothesisistocasestudies
- Apply statistical methods for analyzing experimental data

UNIT-I:RandomVariablesandProbability Distributions   **10 L**

Random variables - Discrete and Continuous random variables and their distribution functions, Expectation, Variance and standard deviation of random variables.

UNIT-II:Theoretical Distributions   **10 L**

Binomial, Poisson distributions and their properties -Poisson approximation to the Binomial distribution, Uniform distribution - Normal distributions and its properties - Normal approximation to Binomial distribution.

UNIT-III: Fundamental Sampling Distributions and Estimation   **10L**

Random Sampling, SamplingDistributions, Sampling Distribution ofMeans and the Central Limit Theorem, Theory of Estimation.Estimatingthemean,standarderrorofapointestimate,prediction/ confidence interval.

UNIT-IV:Testing of Hypothesis   **10 L**

Test of significance- Basics of testing of hypothesis, Null and Alternate hypothesis, types of errors, level of significance, Critical region, Large sample test - single mean, single proportion, difference of means, difference of proportions; Small sample tests: Student's t-distribution,single mean, difference of means.

UNIT-V: Applied Statistics   **8 L**

Curve fitting by the method of least squares, fitting of straight lines, second degree parabolas and more general curves – Correlation and regression, Rank correlation.

Suggested Readings:
1. RonaldE.Walpole,RaymondH.Myers,SharonL.Myers,KeyingYe,Probability&StatisticsFor Engineers&Scientists,9thEd.Pearson Publishers.
2. S CGuptaandVKKapoor,FundamentalsofMathematicalstatistics,Khannapublications.
   S.D.Sharma,OperationsResearch,KedarnathandRamnathPublishers, Meerut, Delhi

Reference Books:
1. T.T.Soong,FundamentalsofProbabilityandStatisticsForEngineers,JohnWiley&Sons,Ltd,2004.
2. SheldonMRoss,ProbabilityandstatisticsforEngineersandscientists, academicpress.
3. MillerandFreund's, ProbabilityandStatisticsforEngineers,8th Edition, PearsonEducations.

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MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (A)
B.Tech. IV Semester
MS401HS: Business Economics and Financial Analysis
(Common to CSE, IT, CSBS and CSE(DATA SCIENCE))

Course Objectives:

- To make the students understand various Forms of Business and the Impact of Economic variables on the Business, Concepts of Business Economics and its significance.
- To gain knowledge on various concepts related to market dynamics namely Demand and Supply: Elasticity of Demand, and Demand Forecasting, and Supply Analysis.
- To disseminate the knowledge on Production, Cost, Market Structures and Pricing - Production Function, Laws of Production, Market structures, the concepts of cost and breakeven analysis.
- To acquaint the students with books of accounts and final statements.
- To enable the students analyze a company's financial situation through ratio analysis.

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

- Select a suitable business organization with available resources.
- Analyze various Aspects of Demand and Supply -elasticity of demand, demand forecasting and supply analysis.
- Gain knowledge of different market structures, production theories, cost variables and pricing methods.
- Prepare Books of accounts and Financial Statements.
- Analyze financial well-being of a business using financial ratios.

UNIT – I: Introduction to Business and Economics:
Economics: Significance of Economics, Micro and Macro Economic Concepts, National Income - Concepts and Importance, Inflation, Business Cycle - Features and Phases.
Business: Structure of Business Firm, Types of Business Entities: Sole Proprietorship – Partnership – Cooperative Societies - Limited Liability Companies; Sources of Capital – Conventional sources and Non-Conventional Sources of Finance.
Business Economics: Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT – II:Demand and Supply Analysis:
Demand Analysis: Demand **-** Meaning, Determinants of Demand, Law of Demand, Exceptions to Law of Demand, Demand Function, Changes in Demand: Increase in Demand and decrease in Demand - Extension and Contraction in Demand.
Elasticity of Demand: Elasticity – Meaning, Types of Elasticity – Price Elasticity – Income Elasticity – Cross Elasticity– Advertising Elasticity of Demand, Factors affecting Elasticity of Demand, Measurement and Significance of Elasticity of Demand, Role of Elasticity of Demand in Decision Making.
Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting – Survey Methods and Statistical Methods.
Supply Analysis: Supply – Meaning, Determinants of Supply, Supply Function and Law of Supply.

Unit III: Production, Cost, Market Structures & Pricing:
Production Analysis: Production – Meaning, Factors of Production, Production Function, Production Function with one variable input and two variable inputs, Returns to Scale, Cobb-Douglas Production Function.
Cost analysis: Cost–Meaning, Types of Costs, Short run and Long run Cost Functions.
Market Structures: Nature of Competition. Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition.
Pricing: Pricing -Meaning, Objectives of Pricing, and Pricing Methods – Cost based Pricing Methods – Demand based pricing methods – Competition based Pricing Methods – Strategy based Pricing Methods - Product Life Cycle based Pricing, Break Even Analysis (simple problems)and Cost Volume Profit Analysis.

Unit IV: Financial Accounting:
Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for Maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts along with Adjustments– Trading Account and Profit & Loss account – Balance Sheet (simple problems).

UNIT – V: Financial Analysis through Ratios:
Concept of Ratio Analysis, Importance, Liquidity Ratios- Current Ratio – Quick Ratio – Absolute Liquid Ratio, Profitability Ratios – Gross Profit Ratio – Net Profit Ratio – Operating Ratio, Turnover Ratios – Stock Turnover Ratio – Debtors Turnover Ratio – Creditors Turnover Ratio, Leverage Ratios – Debt-to-Assets Ratio - Debt-Equity Ratio - Proprietary Ratios and Interpretation (simple problems).

TEXT BOOKS:

1. Geetika, Piyali Gosh, Purbaroy Choudhury, "Managerial Economics", 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.
2. Dhanesh K Khatri, "Financial Accounting", Tata McGraw Hill, 2011.
3. RamachandraAryasri. A, "Business Economics and Financial Analysis", McGraw Hill Education India Pvt. Ltd. 2020.

REFERENCE BOOKS:

1. P. L. Mehta, Managerial Economics, Analysis, Problems & Cases, 8th Edition, Sultan Chand & Sons, 2001.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.
3. D.D. Chaturvedi, S.L. Gupta, "Business Economics - Theory and Applications", International Book House Pvt. Ltd. 2013.

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IV Semester Syllabus
CS402PC: OPERATING SYSTEMS
[Common to CSE, IT, CSBS & CSE(DATA SCIENCE]

Prerequisites:

- A course on "Computer Programming and Data Structures".
- A course on "Computer Organization and Architecture".

Course Objectives:

To Learn

- 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, interprocess communication and I/O in Unix

Course Outcomes:

Student will be able to

- Understand and Analyze OS structure and services.
- Compare different CPU scheduling algorithms.
- Recognize and resolve synchronization problems.
- Understand the Memory management Concepts.
- Illustrate the concepts in File Management System.

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 and its types, system programs, OS Design and implementation, OS Structures.
Process – Process, Process states, PCB, Scheduling Queues, Schedulers, Operations on 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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IV Semester Syllabus
CS404PC: DATABASE MANAGEMENT SYSTEMS
[Common to CSE, IT, CSBS, CSE (DATA SCIENCE) & CSE(*AI&ML*)]

Prerequisites:
> 1. A course on "Data Structures."

Course Objectives

> To Learn
> * 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, transaction control, concurrency control, storage structures and access techniques.

Course Outcomes

> Student will be able to:
> * Gain knowledge of fundamentals of DBMS, database design and normal forms
> * Able to understand Integrity Constraints and Relational Algebra.
> * 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
CS405PC: SOFTWARE ENGINEERING
[Common to CSE, CSBS & CSE(DATA SCIENCE)]

Course Objectives

To Learn
- 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

Student will be able to:
- 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 design of 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 simple testing 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.

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IV Semester Syllabus

MC401HS: Constitution of India

(EEE, CSE, IT, CSBS, CSE (DATA SCIENCE))

Course Objectives

- To understand the history of making of Indian Constitution and the role of drafting committee.
- To list the salient features of the Preamble to the Constitution of India
- To identify the importance of fundamental rights as well as fundamental duties
- To understand the powers and functions of parliament, President, Council of Ministers, Governor Judges etc and their qualifications.
- To have a thorough understanding of Local self government and its associated agencies.
- To learn and realise the role and functioning of election commission and Institute and Bodies for thewelfare of SC/ST/OBC and women.

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

- Describe the history of making of Indian Constitution and the role of drafting committee
- Explain the purpose of Preamble to the Constitution of India
- Outline the Fundamental Rights and Fundamental Duties of a citizen.
- Acquire knowledge on functioning of Parliament, Executive and judiciary systems.
- Comprehend and evaluate the role of Local self government and its associated agencies.
- Assess and analyze the role and functioning of the Election Commission.

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.

Suggested Reading:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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IV Semester Syllabus
CS451PC: OPERATING SYSTEMS LAB
[Common to CSE, IT, CSBS & CSE (DATA SCIENCE)]

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

Course Objectives

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

Course Outcomes

Student will be able to:
- Write programs on various CPU scheduling algorithms
- Understand the usage of various Unix System calls
- Implement IPC mechanisms using system calls
- Implement Paging & segmentation of memory management
- Illustrate various page replacement algorithms

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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IV Semester Syllabus
CS452PC: DATABASE MANAGEMENT SYSTEMS LAB
[Common to CSE, IT, CSBS, CSE(DATA SCIENCE) & CSE(AI&ML)]

Course Objectives

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

Course Outcomes

Student will be able to:
- 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.