GLOBAL INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
COURSE CATALOGUE
REGULATIONS B.TECH – GR - 24
COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)
II SEMESTER

Course Code	Course Name	Subject Area	Category	Periods Per Week			Credits	Scheme of Examination Max Marks		
				L	T	P		CIA	SEE	Total
INDUCTION PROGRAM										
THEORY										
MA201BS	Differential Equations and Vector Calculus	BSC	Foundation	3	1	0	4	40	60	100
CH202BS	Engineering Chemistry	BSC	Foundation	3	0	0	3	40	60	100
EN203HS	English for Skill Enhancement	HSMC	Foundation	2	1	0	3	40	60	100
CS204ES	Data Structures	ESC	Foundation	3	0	0	3	40	60	100
PRACTICAL										
CE205ES	Computer Aided Engineering Graphics	ESC	Foundation	0	1	3	2	40	60	100
CH206BS	Engineering Chemistry Lab	BSC	Foundation	0	0	2	1	40	60	100
EN207HS	English Language and Communication Skills Lab	HSMC	Foundation	0	0	2	1	40	60	100
CS208ES	Data Structures Lab	ESC	Foundation	0	1	3	2	40	60	100
SKILL ENHANCEMENT PROJECT										
CS209ES	Essentials of Innovation	ExEEd	Skill	0	0	2	1	40	60	100
MANDATORY COURSE										
*MC210	Constitution of India	MC	MC - II	Ref: Academic Regulations B.Tech GR 24						
Total Credits				**20**						

COURSE CONTENT

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS								
II Semester: Common to All Branches								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
MA201BS	**Foundation**	**3**	**1**	**-**	**4**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: 16	Practical Classes: Nil				**Total Classes: 64**		
Prerequisite: Mathematical Knowledge at the pre-university level								

1. COURSE OVERVIEW

This course serves as a foundation course on differential equations and vector calculus. It includes techniques for solving ordinary differential equations, partial differential equations, vector differentiation and vector integration. It is designed to extract the mathematical developments, and skills, from basic concepts to advanced level of engineering problems to meet technological challenges.

2. COURSE OBJECTIVE

The students will try to Learn:

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

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Identify whether the given differential equation of first order is exact or not
CO 2	Solve higher differential equations and apply the concept of differential equations to real-world problems.
CO 3	Use the Laplace transforms techniques to solve ODEs.
CO 4	To find Gradient, Divergence, Curl and Vector identities
CO 5	Evaluate the line, surface and volume integrals and convert them from one to another

4. COURSE CONTENT

UNIT - I: First Order ODE **8 L**

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

UNIT - II: Ordinary Differential Equations of Higher Order **10 L**

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

UNIT - III: Laplace Transforms **10 L**

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, Change of Scale Property, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: Solving initial value problems by the Laplace Transform method.

UNIT - IV: Vector Differentiation **10 L**

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 **10 L**

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

5. Text books

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

6. Suggested Readings.

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

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**										**2**	**3**	**2**
CO 2	**2**	**3**										**2**	**2**	**3**
CO 3	**2**	**3**											**2**	**3**
CO 4	**3**	**-**	**1**		**2**							**2**	**3**	**-**
CO 5	**3**	**3**			**1**							**2**	**3**	**3**

COURSE CONTENT

ENGINEERING CHEMISTRY								
I Semester: CSE **II Semester: CE, ME, ECE, CSE(AI&ML), CSE(DS)**								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CH202BS	**FOUNDATION**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Basic principles of Chemistry								

1. COURSE OVER VIEW

This course focuses on the fundamental concepts of chemistry and then builds an interface with their industrial applications. The basic knowledge on chemical bonding and intermolecular forces which together are responsible for determining the properties of materials. The students will be able to analyze water purification processes to avoid industrial interruptions. The course concludes with an overview of involving electron transfer, including their applications in corrosion and energy storage for portable electronic devices. It should cultivate in students to identify chemistry in each piece of finely engineered products used in households and industry.

2. COURSE OBJECTIVE

The students will try to Learn:

i. The concepts of electrochemical principles and causes of corrosion in the new developments and breakthroughs efficiently in engineering and technology.
ii. The different parameters to remove causes of hardness of water and their reactions towards Complex ometric method.
iii. The properties, separation techniques of natural gas and crude oil along with potential applications in major chemical reactions.
iv. The different types of materials with respect to mechanisms and its significance in industrial applications.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Acquire the basic knowledge of electrochemical principles related to corrosion and its control
CO 2	Interpret the basic properties of water for its usage in industrial and domestic applications.
CO 3	Use complexometry for calculation of hardness of water to avoid industrial problems.
CO 4	Extend the applications of polymers based on their degradability and properties.
CO 5	Choose the appropriate fuel based on their calorific value for energy efficient processes.
CO 6	Predict the knowledge on viability of advanced materials for technological improvements in various

4. COURSE CONTENT

UNIT – I: Water and its treatment: [8]

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation - Determination of F- ion by ion- selective electrode method.

Boiler troubles: Sludges, Scales 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 [8]

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 to electrical vehicles. 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.

UNIT - III: Polymeric materials: [8]

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Teryle**ne**

Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP).

Rubbers: Natural rubber and its vulcanization.

Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

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 poly vinyl alcohol and their applications.

UNIT - IV: Energy Sources: [8]

Introduction, Calorific value of fuel – HCV, LCV- Dulongs 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: [8]

Cement: Portland cement, its composition, setting and hardening. Smart materials and their engineering applications Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl Amides Lubricants: Classification of lubricants with examples characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

5. TEXT BOOKS

i. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010.
ii. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016.
iii. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
iv. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications

6. REFERENCE BOOKS

i. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015).
ii. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011).

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**2**													**2**
CO 2	**1**		**3**				**2**							
CO 3	**1**				**3**									**2**
CO 4	**3**				**2**									
CO 5	**3**	**2**												

COURSE CONTENT

ENGLISH FOR SKILL ENHANCEMENT								
I Semester: CSE **II Semester: CSE(AI&ML), CSE(DS), ECE, CE, ME**								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EN203HS	**FOUNDATION**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		2	**1**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 32	Tutorial Classes: 16	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Oxford Advanced Learners Dictionary, Basic Word and Sentence formation								

1. COURSE OVER VIEW:

English: Language, Context and Culture is a skills-based English textbook for undergraduate students, prepared in alignment with the latest AICTE model curriculum. The book keeps in mind the need for comprehensive language learning, bridging the gap between the knowledge of English that students already possess and the competence required to become more proficient in using the language fluently, accurately, and in appropriate contexts. Such skills will lead them to become more self-reliant and self-confident.

Each unit of the book contains lessons on vocabulary, grammar, reading and writing, as well as a range of practice exercises linked to interesting reading texts. English: Language, Context and Culture will not only help students to improve their basic proficiency in English but also prepare them to boldly shape their own learning.

2. COURSE OBJECTIVE

The students will try to Learn:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

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

4. COURRSE CONTENT

UNIT-I:

Chapter entitled '**Toasted English' by R.K.Narayan** from **"English: Language, Context and Culture"** published by Orient Black Swan, 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, Structuresand Features of a Paragraph - Creating Coherence-Organizing Principles ofParagraphs in Documents.

UNIT-II:

Chapter entitled **'Appro JRD' by Sudha Murthy** from **"English: Language, Context and Culture" published** by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement andSubject-verb Agreement.

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice.

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places and Events– Classifying- Providing Examples or Evidence.

UNIT-III:

Chapter entitled **'Lessons from Online Learning' by F.Haider Alvi, Deborah Hurst et al** from**"English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter ofRequisition, Email Etiquette, Job Application with CV/Resume.

UNIT-IV:

Chapter entitled **'Art and Literature' by Abdul Kalam** from **"English: Language, Context and Culture"** published by Orient Black Swan, Hyderabad.

Vocabulary: Standard Abbreviations in English.

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice.

Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Precis Writing.

UNIT-V:

Chapter entitled **'Go, Kiss the World' by Subroto Bagchi** from ***"English: Language, Context and Culture"*** published by Orient Black Swan, Hyderabad.

Vocabulary: Technical Vocabulary and their Usage.

Grammar: Common Errors in English (Covering all the other aspects of grammar which were notcovered in the previous units).

Reading: Reading Comprehension-Exercises for Practice.

Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

5. TEXT BOOKS

i. English: Language, Context and Culture" by Orient Black Swan Pvt. Ltd, Hyderabad. 2022. Print.

6. REFERENCE BOOKS

i. Effective Academic Writing by Liss and Davis (OUP).
ii. Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge University Press Wood, F.T. (2007). Remedial English Grammar. Macmillan.
iii. Vishwa Mohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1									**3**	**3**		**3**		**2**
CO 2									**3**	**3**		**3**		**2**
CO 3									**3**	**3**		**3**		**2**
CO 4									**3**	**3**		**3**		**2**
CO 5									**3**	**3**		**3**		**2**

COURSE CONTENT

DATA STRUCTURES								
II Semester: CSE, CSE(AI&ML), CSE(DS)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CS204ES	**FOUNDATION**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Problem Solving through C Programming								

1. COURSE OVER VIEW

The **"Data Structures through C"** course provides a comprehensive understanding of data structures and their implementation using the C programming language. Students will explore foundational and advanced data structures, including linear lists, stacks, queues, search trees, hash tables, graphs, and tries. The course emphasizes designing and implementing efficient algorithms for operations such as searching, sorting, and pattern matching. By the end of the course, students will be equipped with the skills to solve real-world computational problems and optimize data management using appropriate data structures.

2. COURSE OBJECTIVE

The students will try to Learn:

i. To understand the fundamental concepts of data structures and their applications.
ii. To implement data structures such as arrays, linked lists, stacks, queues, trees, and graphs using C programming.
iii. To design and develop efficient algorithms for searching, sorting, and pattern matching.
iv. To explore advanced data structures like hash tables, tries, and balanced search trees for optimized data organization and retrieval.
v. To strengthen problem-solving and programming skills by applying data structures to real-world computational challenges.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Implement and manipulate fundamental data structures such as arrays, linked lists, stacks, and queues using C.
CO 2	Design and apply efficient algorithms for searching, sorting, and pattern matching.
CO 3	Implement and utilize advanced data structures like hash tables, tries, and balanced search trees to solve computational problems.
CO 4	Develop graph-based solutions using traversal techniques such as BFS and DFS.
CO 5	Apply data structures and algorithms to optimize problem-solving in real-world scenarios.

4. COURSE CONTENT

UNIT-I: **14L**

- 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: **12L**

- 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: **14L**

- 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: **12L**

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

UNIT - V: **12L**

- Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the
- Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

5. TEXT BOOKS

i. Fundamentals of Data Structures in C, 2 nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.

ii. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

6. REFERENCE BOOKS

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

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	3	0	0	0	0	0	0	0	0	0	0	3	0
CO 2	3	3	2	2	0	0	0	0	0	0	0	0	2	0
CO 3	3	3	3	2	0	0	0	0	0	0	0	0	2	0
CO 4	3	3	3	2	0	0	0	0	0	0	0	0	2	0
CO 5	3	3	0	3	3	0	0	0	0	0	0	2	2	0

COURSE CONTENT

COMPUTER AIDED ENGINEERING GRAPHICS								
II Semester: CSE(AI&ML), CSE(DS), ECE, CE, ME								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CE205ES	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**1**	**3**	**2**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: 16	Practical Classes: 48				**Total Classes: 64**		
Prerequisite:								

1. COURSE OVER VIEW

The aim of this course is to introduce students the basic concepts and the use of engineering drawing in the design and manufacturing field. The students acquaint with the basic knowledge and skills in engineering drawings and the capability to read and interpret blue prints for manufacturing. The students can also develop an understanding of 2D and 3D computer aided drafting with the requirements of good engineering drawings and be able to apply them to their work.

2. COURSE OBJECTIVE

The students will try to Learn:

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Apply computer aided drafting tools to create 2D and 3D objects
CO 2	Sketch conics and different types of solids
CO 3	Appreciate the need of Sectional views of solids and Development of surfaces of solids
CO 4	Read and interpret engineering drawings
CO 5	Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

4. COURRSE CONTENT

UNIT -I:

Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics.

UNIT - II:

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes.

UNIT - III:

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views.

UNIT - IV:

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting.

UNIT - V:

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

5. TEXT BOOKS

i. Engineering Drawing N.D. Bhatt / Charotar.
ii. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S. Chand and company Ltd.

6. REFERENCE BOOKS

i. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill.
ii. Engineering Graphics and Design, WILEY, Edition 2020.
iii. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
iv. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford.
v. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

Note: External examination is conducted using computer aided drafting and internal evaluation is to be done by both conventional as well as using computer aided drafting.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**3**		**3**					**3**		**1**	**3**	**1**
CO 2	**3**	**3**	**3**	**2**	**3**								**3**	**1**
CO 3	**3**	**3**	**3**		**3**					**1**			**2**	**3**
CO 4	**3**	**3**	**3**		**3**					**1**			**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**3**	**1**				**3**		**1**	**3**	**3**

COURSE CONTENT

ENGINEERING CHEMISTRY LABORATORY								
I Semester: CSE **II Semester: ECE, CE, ME, CSE(AI&ML), CSE(DS)**								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CH206BS	**FOUNDATION**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes:	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite:								

1. COURSE OVER VIEW

The course encourages introducing analytical tools in an Engineering perspective. The course efforts to provide the basic knowledge of analytical methodology, outlines the importance of volumetric analysis, comprehensive instrumental analysis for properties of polymers, colorimetric analysis and spectroscopic analysis. This practical approach gives the essence of analytical chemistry for skill development in determinations of materials properties and its viability in the industry.

2. COURSE OBJECTIVE

The students will try to Learn:

1. The quantitative analysis to know the strength of unknown solutions by instrumental methods.
2. The troubles of hard water and its estimation by analytical techniques.
3. The applications of appropriate lubricant for finely tuned machinery.
4. The basic knowledge on quantity of light absorbed by the materials.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Use conductivity meter and potentiometer for measurement of conductance and electromotive force of Solutions
CO 2	Use PH meter for measurement of Strength of Acidic Solutions.
CO 3	Make use of the principles of water analysis for domestic and industrial applications.
CO 4	Predict the Properties of polymeric materials by synthesizing the monomers.
CO 5	Use different types of lubricants to know its properties for the proper lubrication of machinery in industries.
CO 6	Interpret the absorption tendency of solids or liquids by using Colorimetry and spectroscopy techniques.

4. LIST OF EXPERIMENTS / DEMONSTRATIONS:

1. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometry method.
2. Conductometry: Estimation of the concentration of an acid by Conductometry.
3. Potentiometry: Estimation of the amount of Fe+2 by Potentiomentry.
4. pH Metry: Determination of an acid concentration using pH meter.
5. Preparations:
    a) Preparation of Bakelite.
    b) Preparation Nylon – 6.
6. Preparations:
    a) Estimation of acid value of given lubricant oil.
    b) Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

7. Corrosion: Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
8. Preparations:
    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.

5. REFERENCE BOOK

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).

6. MATERIALS ONLINE

a) Course template
b) Lab manual

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**2**													**2**
CO 2	**1**		**3**				**2**							
CO 3	**1**				**3**									**2**
CO 4	**3**				**2**									
CO 5	**3**	**2**												

COURSE CONTENT

ENGLISH LANGUAGE & COMMUNICATION SKILLS LABORATORY								
I Semester: CSE **II Semester: CSE(AI&ML), CSE(DS), ECE, CE, ME**								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EN207HS	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Computer with Headphones, OALD & Interactive Communication Skills Lab								

1. COURSE OVERVIEW:

The Professional Communication Skills (PCS) 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.

2. COURSE OBJECTIVES:

The students will try to Learn:

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.

3. COURSE OUTCOMES:

After successful completion of the course, students should be able to

CO 1	Understand the speech sounds, word accent, intonation and rhythm in day-to-day communication.
CO 2	Understand the nuances of English language through audio- visual experience and group activities.
CO 3	Neutralise their accent for intelligibility.
CO 4	Speak with clarity and confidence which in turn enhances their employability skills.
CO 5	Train students to use language appropriately for public speaking and group discussions.

4. COURRSE CONTENT

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.
Practice: Introduction to Phonetics – 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 AmericanPronunciation -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
Practice: Group Discussion

5. TEXT BOOKS:

1. (2022). English Language Communication Skills – Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.

6. REFERENCE BOOKS:

1. Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press.
2. Kumar, Sanjay & Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford University Press.
3. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient Black Swan Pvt. Ltd.
4. Vishwa Mohan, Aysha. (2013). English for Technical Communication for Engineering Students.Mc Graw-Hill Education India Pvt. Ltd.

7. SUGGESTED SOFTWARE

1. Cambridge Advanced Learners' English Dictionary with CD.
2. English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge UniversityPress.
3. English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
4. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1									**3**	**3**		**3**		**2**
CO 2									**3**	**3**		**3**		**2**
CO 3									**3**	**3**		**3**		**2**
CO 4									**3**	**3**		**3**		**2**
CO 5									**3**	**3**		**3**		**2**

COURSE CONTENT

DATA STRUCTURES LAB								
II Semester: CSE, CSE(AI&ML), CSE(DS)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CS208ES	**FOUNDATION**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**1**	**3**	**2**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: 16	Practical Classes: 48				**Total Classes: 64**		
Prerequisite:								

1. COURSE OVER VIEW

The "Data Structures Lab" course introduces students to the practical application of various data structures using the C programming language. It aims to enhance problem-solving skills by teaching students how to implement fundamental data structures like arrays, linked lists, stacks, queues, trees, graphs, and hash tables. The course also focuses on common sorting and searching algorithms, allowing students to efficiently solve real-world problems using C.

2. COURSE OBJECTIVE

The students will try to Learn:

- To write and execute C programs to implement data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables, and search trees.
- To understand and implement various searching and sorting algorithms using C.
- To provide hands-on experience in solving computing problems using appropriate data structures and algorithms.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to

CO 1	Implement data structures such as linked lists, stacks, queues, and trees.
CO 2	Apply searching algorithms like linear and binary search.
CO 3	Implement sorting algorithms like Insertion Sort, Quick Sort, and Radix Sort.
CO 4	Develop and manage binary search trees and hash tables.
CO 5	Use recursion and iteration for tree traversal and data manipulation.

4. COURSE CONTENT

Practice Sessions:

- Write a program that uses functions to perform the following operations on singly linked list.:

  i) Creation ii) Insertion iii) Deletion iv) Traversal

- Write a program that uses functions to perform the following operations on doubly linked list.:

  i) Creation ii) Insertion iii) Deletion iv) Traversal

- Write a program that uses functions to perform the following operations on circular linked list.:

  i) Creation ii) Insertion iii) Deletion iv) Traversal

- Write a program that implement stack (its operations) using

  i) Arrays ii) Pointers

- Write a program that implement Queue (its operations) using

  i) Arrays ii) Pointers

- 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

- Write a program to implement the tree traversal methods (Recursive and Non-Recursive).
- Write a program to implement

  i) Binary Search tree ii) B Trees iii) B+ Trees iv) AVL trees v) Red - Black trees

- Write a program to implement the graph traversal methods.
- Implement a Pattern matching algorithms using Boyer- Moore, Knuth-Morris-Pratt

5. TEXT BOOKS

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

6. REFERENCE BOOKS

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

7. ELECTRONIC RESOURCES

i. CodeLite: https://codelite.org/ Code:Blocks:
ii. http://www.codeblocks.org/ DevCpp
iii. http://www.bloodshed.net/devcpp
iv. html Eclipse: http://www.eclipse.org

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**2**	**3**			**2**								**3**	
CO 2		**3**	**2**										**3**	
CO 3			**3**										**3**	
CO 4				**2**						**1**	**1**		**3**	
CO 5					**3**							**1**	**3**	

COURSE CONTENT

ESSENTIALS OF INNOVATION								
II Semester: CSE(AI&ML), CSE(DS), ECE, CE, ME								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CS209ES	**SKILL**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite:								

1. COURSE OVER VIEW

Essentials of Innovation and Design thinking is a strategic approach towards creative problem-solving by placing users'/customers' needs above everything else. It is a process of questioning: questioning the problem, questioning assumptions, and questioning the implications. As a process, it is a great catalyst of change and evolution. A Design thinking approach helps develop and build a culture of innovation across the students.

2. COURSE OBJECTIVES:

The students will try to Learn:

1. The implications of disruption and the role of innovation.
2. The various frameworks, tools, and techniques of design thinking.
3. How to design, develop, and implement an innovation product or service or process.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Understand and articulate the history, philosophy, and principles of design thinking and its role in fostering innovation.
CO 2	Demonstrate knowledge of the design thinking process, including its stages and conceptual frameworks, and apply these to problem-solving.
CO 3	Conduct user research, map customer journeys, and use empathy and ideation techniques to generate innovative solutions.
CO 4	Apply design thinking principles to develop and evaluate products, services, and business models, addressing both tangible and intangible aspects.
CO 5	Implement innovation management strategies, pitch ideas effectively, and align design thinking with organizational goals and strategies.

4. COURRSE CONTENT

Unit I: Philosophy of Innovation and Design Thinking **7L**

- Introduction to Innovation and Design Thinking
- History and Philosophy of Design Thinking
- Design Thinking as a Problem-Solving Tool
- Design Thinking and its Benefits
- Design Thinking Mind-set

Unit II: Mechanics of Innovation and Design Thinking **6L**

- Integrative View of Design Thinking
- Design Thinking Process
- 5 Stages (Empathize, Define, Ideate, Prototype, and Test)
- Conceptual Frameworks Used in the Design Thinking Process
- Case Studies

Unit III: Design Thinking for Understanding Customers **7L**

- Understanding the User and Context
- Market Research
- Visualization and Customer Journey Mapping
- Empathy Mapping
- Redefining Problems, Brainstorming
- Reframing the Perspectives
- Ideation and Creativity
- Creative Ideation Methodologies
- Sketching & Visualization
- Storytelling

Unit IV: Implementing Design Thinking **6L**

- Innovating Products, Services, and Business Models
- Concept Evaluation and Concept Development
- Applications of Design Thinking
- Designing for Tangibles and Intangibles
- Ideas and Opportunities for Products

Unit V: Innovation Management **6L**

- Introduction to Innovation Management
- Business, Product & Process Innovation
- Organization Innovation
- Innovating Products, Services, and Business Models
- Crafting a Better World Using Design Thinking & Innovation
- Design Thinking, Innovation, and Organization Strategy
- Idea Pitching and Validation

5. TEXT BOOKS

i. Nigel Cross, "Design Thinking: Understanding How Designers Think and Work", Kindle Edition, 2011.
ii. Tim Brown, Harper Bollins, "Change by Design", 2009.
iii. Idris Mootee, "Design Thinking for Strategic Innovation", John Wiley & Sons, 2013.

6. REFERENCE BOOKS

i. Roger Martin, *The Design of Business: Why Design Thinking is the Next Competitive Advantage*, Harvard Business Review Press, 2009.
ii. David Kelley and Tom Kelley, *Creative Confidence: Unleashing the Creative Potential Within Us All*, Crown Business, 2013.
iii. Tim Brown, *Change by Design: How Design Thinking Creates New Alternatives for Business and Society*, Harper Business, 2009.
iv. Herbert Simon, *The Sciences of the Artificial*, MIT Press, 1996.
v. Peter G. Rowe, *Design Thinking*, MIT Press, 1987.
vi. Jeanne Liedtka, *Design Thinking for the Greater Good: Innovation in the Social Sector*, Columbia Business School Publishing, 2018.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**						**3**					**3**		
CO 2		**3**	**3**	**2**										
CO 3				**3**		**3**	**3**		**3**					**3**
CO 4			**3**		**3**						**3**			**3**
CO 5						**3**				**3**	**3**	**3**		**3**

COURSE CONTENT

CONSTITUTION OF INDIA								
II Semester: ME / CE / ECE / CSE (AI & ML) / CSE / CSE (DS)								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
MC210	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	-	-	-	-	-	-
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: Nil**		
Prerequisite:								

1. COURSE OBJECTIVES:

The students will try to Learn:

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

2. COURSE OUTCOMES

At the end of the course students should be able to:

CO 1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO 2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO 3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
CO 4	Discuss the passage of the Hindu Code Bill of 1956.

3. SYLLABUS:

UNIT–I:

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

UNIT-II:

Philosophy of the Indian Constitution- Preamble Salient Features.

UNIT-III:

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–IV:

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–V:

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 Zila Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT–VI:

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.

4. SUGGESTED READING:

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