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B.Tech. CSE LNCT University
II Semester Syllabus

Engineering Chemistry& Life Sciences (CS-101)

COURSE OUTCOMES:
After Completing the course student should be able to:

CO1	Solve analytical problem of hard water
CO2	Assess quality of fuel.
CO3	Use lubricants in relevant fields
CO4	convey that all forms of life have the same building blocks and yet the manifestations are diverse
CO5	understanding molecular basis of DNA as a genetic material for information transfer

COURSE CONTENTS:

UNIT I WATER – ANALYSIS, TREATMENTS AND DISINFECTION METHODS:

Sources, Impurities, Hardness and its units, Determination of hardness by EDTA method, Alkalinity and its determination and related numerical problems. Boiler troubles- Sludge and Scale, Priming and foaming, Boiler Corrosion, Caustic embrittlement,
Softening methods - Lime- Soda process, Zeolite process, Ion Exchange process and related numerical problems.

UNIT II LUBRICANTS AND LUBRICATION:
Introduction, Mechanism of lubrication, Classification of lubricants, Significance and determination of Viscosity & Viscosity Index, Flash and Fire point, Cloud and Pour point, Carbon residue, Aniline point, Acid number, Saponification number, SEN.

UNIT III FUELS AND COMBUSTION:
Fossil fuels and classification, Calorific Value and its types, Determination of calorific value by Bomb Calorimeter, Calculation of calorific value by Dulong's formula, Proximate and Ultimate analysis of coal & their significance, Knocking, Relationship between knocking & structure of hydrocarbon, Octane number, Cetane number, Combustion and its related numerical problems.

UNIT IV BIOMOLECULES:
Molecules of life,Monomeric units and Polymeric structures: Sugars, Starch and Cellulose, Amino acids and Proteins, Nucleotides, DNA and RNA, Two carbon units : lipids.

UNIT V GENETIC ENGINEERING:

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Mendel's law of inheritance, Genes, Gene mapping, DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Recombinant DNA Technology, Genetic disorders in humans.

Reference Books: –

1. Chemistry for Environmental Engineering &Science,Sawyer, McCarty and ParkinMcGraw Hill, Education Pvt. Ltd., New Delhi.

2. Engineering Chemistry.B.K. Sharma.KrishnaPrakashan Media (P.) Ltd., Meerut.

3. Basics Engineering Chemistry.S.S Dara& A.K Singh.S.Chand& Company Ltd. Delhi.

4. Applied Chemistry.Theory and Practice, O.P. Viramani, A.K. Narula.New Age International Pvt. Ltd. Publishers, New Delhi.

5. Polymer Science.Ghosh.Tata McGraw Hill

6. Engineering Chemistry.ShashiChawla,Dhanpat Rai& Company Pvt. Ltd. New Delhi.

7. Engineering Chemistry. Jain&Jain,DhanpatRai& Company Pvt. Ltd. New Delhi.

8. A text book of Engineering Chemistry, Agrawal, C.V. Murthy, C.P. Naidu, ABS publication, Hyderabad.

9. Biology: A global approach, 10th edition, Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.;Jackson, R. B., Pearson Education Ltd. 2014.

10. Principles of Biochemistry,Nelson, D. L.; Lehninger, A. L.; and Cox, M. M., 8th edition, W.H. Freeman, 2020.

List of suggestive core experiments: –

1. **Water Testing**
   i. Determination of total hardness by complexometric titration.
   ii. Determination of mixed alkalinity : OH^-& CO_3^{2-} and CO_3^{2-}& HCO_3^-
   iii. Chloride ion estimation by Argentometric titration.
2. Fuels and Lubricant Testing
   i. Flash and Fire Point determination by-
      Abel's Apparatus, Cleveland Apparatus,Pensky Marten's Apparatus
   ii. Viscosity& Viscosity index determination by –
      Redwood viscometer-I&Redwood viscometer-II
   iii. Determination of Cloud and Pour point of the given lubricating oil.
   iv. Determination of Aniline point of the given lubricating oil.
3. Determination of percentage of moisture in the given sample of coal/solid lubricant by proximate analysis.
4. Determination of Calorific Value by Bomb Calorimeter.
5. Determination of protein concentration by ultraviolet spectroscopy
6. Determination of Gluten in different wheat samples.
7. Determination of Casein in different milk samples

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Linear Algebra and Optimization (CS-202)

COURSE OUTCOMES:
After Completing the course student should be able to:

CO1	Solve analytical problems of algebra
CO2	Use the concept of matrices decomposition in relevant fields.
CO3	Analyse statistical techniques to handle problems.
CO4	Develop the logics that is useful in engineering.
CO5	Investigate the tools to optimize problems.

Course Contents

UNIT I Vector Spaces: Vector Space, Vector Sub Space, Linear Combination of Vectors, Linearly Dependent, Linearly Independent, Basis of a Vector Space, Linear Transformations.

UNIT II Matrix Decomposition: Determinant and Trace, Cramer's rule, LU- decomposition, Cholesky Decomposition, Eigen decomposition, Singular Value decomposition(SVD),Gram-Schmidt orthogonalization.

UNIT III Concept of Probability: Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.

UNIT IV Applied Statistics: Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standarddeviations.

UNIT V Small samples: Test for single mean, difference of means and correlation coefficients, test for ratio of variances, Chi-square test for goodness of fit and independence of attributes.

Reference Books: –
1. K. Hoffman and R. Kunze: Linear Algebra, 2nd Edition, Prentice Hall of India, 2005
2. S. Axler: Linear Algebra Done Right, 2nd Edition, Springer UTM, 1997.
3. Dr. Hari Arora" Probability and Statistics" S.K.Kataria &Sons.
4. C.L.Liu, "Elements of Discrete Mathematics" Tata Mc Graw-Hill Edition.
5. Trembley, J.P & Manohar; "Discrete Mathematical Structure with Application CS", McGraw Hill.
6. Kenneth H. Rosen, "Discrete Mathematics and its applications", McGraw Hill.
7. Bisht, "Discrete Mathematics",Oxford University Press N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
8. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
9. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill,New Delhi, 2010Basic Computer Engineering (CS-203)

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Mechanical Engineering(CS-204)

COURSE OUTCOMES:
After Completing the course student should be able to:

CO1	An ability to analyze basic properties of material its applications in industry, design and conduct experiments, as well as to analyze and interpret data.
CO2	Prepare simple composite components and joining different materials.
CO3	Student will be able to apply concept of thermodynamics in modern engineering.
CO4	An ability to formulate, analyze properties of fluids, applying principles of fluid mechanics.
CO5	Examine the different characteristics of instruments like accuracy, precision etc

Course Contents:

Unit I: **Engineering Materials**: Classification of engineering materials, Composition of Cast iron and Carbon steels, Iron Carbon diagram. Alloy steels their applications. Mechanical properties like strength, hardness, toughness, ductility, brittleness, malleability etc. of materials, tensile & compressive test, Stress-strain diagram of ductile and brittle materials, Hooks law and modulus of elasticity.

Unit II: **Introduction to Manufacturing**: Introduction to manufacturing processes, casting, forming, machining and joining process. Casting process, Types of casting process, different types of forming process and their application, machine tools, working principle of lathe and drilling machine. Principle of working of arc and gas welding.

Unit III: **Thermodynamics**: Thermodynamic system, properties, state, process, Zeroth, First and second law of thermodynamics, thermodynamic processes at constant pressure, volume, enthalpy & entropy for closed system. Steam formation, Steam properties, calculation of heat value, and use of steam tables.

Unit IV: **Fluids**: Fluid properties, pressure, density and viscosity etc. Types of fluids, Newton's law of viscosity, Pascal's law, Bernoulli's equation.

Unit V: **Measurement:** Concept of measurements, errors in measurement, Temperature, Pressure, Velocity, Flow strain, Force and torque measurement, Vernier caliper, Micrometer, Dial gauge, Slip gauge, Sine-bar.

Reference Books:

1- Agrawal C M, Basic Mechanical Engineering, Wiley Publication.
2- Production Technology – Hajara & Choudhary
3- Manufacturing Process - Bagman
4- Nag P.K, Engineering Thermodynamics,TMH .
5- AchuthanM , , Engineering Thermodynamics ,PHI.
6- Kothandaraman &Rudramoorthy, Fluid Mechanics & Machinery, New Age.
7- Nakra &Chaudhary , Instrumentation and Measurements, TMH

List of Suggestive Core Experiments:

Theory related Eight to Ten experiments including core experiments as follows:

1- Study of Universal Testing machines.
2- Linear and Angular measurement using, Micrometer, Slip Gauges, Dial Gauge and Sine-bar.
3- Study of Lathe Machine.
4- Study of Drilling Machines.
5- Verification of Bernoulli's Theorem.
6- Study of various types of Boilers.
7- Study of different IC Engines.
8- Study of different types of Boilers Mountings and accessories.
9- Computer Aided Drafting (CAD),software's basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders
10- Case study of E vehicle

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Electrical and Electronic Engineering(CS-106)

COURSE OUTCOMES:
After Completing the course student should be able to:

CO1	Remember laws of electrical circuits, theorems and transformation in various DC electrical circuits.
CO2	Describe single and three phase elementary AC electrical circuits.
CO3	Execute the concept related to magnetic circuits and single phase transformer for its functionality.
CO4	Analyze the concepts related to DC and AC machines.
CO5	Assess the elementary digital system and semiconductor components for its operation and findings.

Course Contents:
UNIT-1 D.C. CIRCUITS:
Voltage and current sources, type of independent sources, Source Transformation, Kirchhoff's Law, Superposition theorem, Thevenin's theorem and its numerical using series and parallel resistive circuits excited by independent sources only, Power & Energy in such circuits. Mesh & nodal analysis.

UNIT – II: 1- PHASE AND 3 PHASE AC CIRCUITS:
Generation of sinusoidal AC voltage, definition of average value, R.M.S. value, form factor and peak factor of AC quantity , Concept of phasor, Concept of Power factor, Concept of impedance and admittance, Active, reactive and apparent power, analysis of R-L, R-C, R-L-C series circuit. Necessity and advantages of three phase systems, Meaning of Phase sequence, balanced and unbalanced supply and loads. Relationship between line and phase values for balanced star and delta connections.

UNIT – III: MAGNETIC CIRCUITS &BASIC OF 1 PHASE TRANSFORMER:
Basic definitions related to magnetic circuit, similarity and dissimilarity between electric and magnetic circuit. magnetic field produced by current carrying conductor, AC excitation in magnetic circuits, Concept of self and mutual inducted voltage in brief, Concept of B-H loop of magnetic materials, explain hysteresis and eddy current loss in brief,laws of electromagnetic Induction, direction of induced E.M.F. **Single phase transformer**- Explain different parts of transformer with diagram, working principle for ideal transformer, e.m.f. equation, transformation ratio with numerical.

UNIT IV: ROTATING ELECTRICAL MACHINES:
Working Principle, classification and different parts of DC machines. Working Principle and parts of single phase and three phase Induction motor.Concept of slip and Torque slip characteristics of three phase Induction motor.Applications of DC and AC machines.

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Data Structures (CS205)

COURSE OUTCOMES:
After Completing the course student should be able to

CO1	Explain stack and queue data structures along with their merits and demerits
CO2	Use primitive operations on arrays, structures, stack and queue data structures.
CO3	Develop programs to perform primitive operations on linked lists.
CO4	Utilize dijkstra's algorithm to find spanning tree for a given graph.
CO5	Apply quick and merge sorting methods in problem solving.

Course contents

UNIT-I: **Arrays and List**

Array: Definition, Representation, Address Calculation; Searching: Linear search, Binary search; Sorting: Bubble sort, Insertion sort, Selection sort, Radix sort, Shell sort;List: Introduction,ImplementationasLinkedlist,CircularlinkedList,Doublylinkedlist,Applications oflinkedlist.

Unit-II: **Stacks**

Definition,Representations:static and dynamic, Implementation of stack,Applications of stack:Polish notation representation and conversion, Tower of Honoi problem, Implementation of recursion, Quick sort andMerge sort.

Unit-III: **Queues and Hashing**

Definition, Representations, Static and dynamic, Circular Queue, Doubleended Queue, PriorityQueue, Implementation of Priority Queue using Heap data structure, HeapSort, applications of queues.Hash Structures: Representation, Search and Implementation and other issues.

Unit-IV: **Trees**

Definition, Basic terminology, Binary tree, Complete Binary Tree, representations: Static and dynamic, Traversal techniques in binary tree, Heap tree, Binary Search tree, AVL tree, M way search trees,B-tree&its variations.

Unit-V: **Graphs**

Definition, Basic terminology, Graph Types, Representations: static, dynamic; Implementations, Searching in graphs, Shortest path in graphs, Applications.

Books Suggested:

- E.Horowitz&Sahni,Fundamental Data Structure,GalgotiaBookSource,1983.
- Tannenbaum,Data Structure Using C,PearsonEducation,2003.
- Kruz,Data Structure and Programming Design,1987.
- N.Wirth,Algorithms+DataStructure=Program,PrenticeHallofIndia,1979.
- Goodrich&Tamassia,DataStructuresandAlgorithmsinC++,2ndEdition,John

Suggested List of Experiments

Array , Linked List-I , Linked List-II, Stack, Queue, Tree-I, Tree-II ,Graph , Searching and Sorting , Hashing

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Data Analysis using Python (AL206)

COURSE OUTCOMES:
After Completing the course student should be able to:

CO1	Analyse basic features of python and compare it with other programming language.
CO2	Implement primitive and derived data structures with python.
CO3	Implement structural and functional programming concept with python.
CO4	Implement object oriented programming concept with python.
CO5	Illustrate concurrent programming with python.

Course Contents

UNIT – I
Python programming Basic: Python interpreter, IPython Basics, Tab completion, Introspection, %run command, magic commands, matplotlib integration, python programming, language semantics, scalar types. Control flow
UNIT – II
Data Structure, functions, files: tuple, list, built-in sequence function, dict, set, functions, namescape, scope, local function, returning multiple values, functions are objects, lambda functions, error and exception handling, file and operation systems
UNIT – III
NumPy: Array and vectorized computation: Multidimensional array object. Creating ndarrays, arithmetic with numpy array, basic indexing and slicing, Boolean indexing, transposing array and swapping axes, universal functions, array-oriented programming with arrays, conditional logic as arrays operations, file input and output with array
UNIT – IV
Pandas: Pandas data structure, series, DataFrame, Index Object, Reindexing, dropping entities from an axis, indexing, selection and filtering, integer indexes, arithmetic and data alignment, function application and mapping, soring and ranking, correlation and covariance, unique values, values controls and membership, reading and writing data in text format
UNIT – V
Visualization with Matplotlib: Figures and subplots, colors, markers, line style, ticks, labels, legends, annotation and drawing on sublots, matplotlib configuration
Plotting with pandas and seaborn: line plots, bar plots, histogram, density plots, scatter and point plots, facet grids and categorical data

Reference Books:

1. Timothy A. Budd: Exploring python, McGraw-Hill Education.

2. R.Nageshwar Rao ,"Python Programming" ,Wiley India

3. Allen B. Downey; Think Python, O'Reilly Media, Inc.

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Suggested List of Experience

1. To write a Python program to find GCD of two numbers.

2. To write a Python Program to find the square root of a number by Newton's Method.

3. To write a Python program to find the exponentiation of a number.

4. To write a Python Program to find the maximum from a list of numbers.

5. To write a Python Program to perform Linear Search

6. To write a Python Program to perform binary search.

7. To write a Python Program to perform selection sort.

8. To write a Python Program to perform insertion sort.

9. To write a Python Program to perform Merge sort.

10. To write a Python program to find first n prime numbers.

11. To write a Python program to multiply matrices.

12. To write a Python program for command line arguments.

13. To write a Python program to find the most frequent words in a text read from a file.

14. To write a Python program to simulate elliptical orbits in Pygame.

15. To write a Python program to bouncing ball in Pygame.

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Mini Project(CS-107)P ,Micro Project with C++(CS-207)(P)

Student has to take up some project work , prototype development and report writing with fundamental computing techniques such as C prog, MS Office etc for mini project and with C++ as micro project

Communication Skills & Seminar(CS-108)(P)

COURSE OUTCOMES:
After Completing the course student should be able to:

CO1	Able to understand the role of effective communication for success in professional world and develop effective communication to be employable.
CO2	Able to read actively and write and speak with grammatical correctness.
CO3	Enhance all four basic skills of language learning specially listening and understanding any kind of spoken material adored with different accent, voice modulation, tone variation and stress pattern.
CO4	Inculcate the art of effective presentation with proper body language and voice modulation.
CO5	Hone writing business correspondence like business letters and reports properly.

Course Contents

Unit-I ESSENTIALS OF LANGUAGE LEARNING:

Fundamentals Of Grammar : Parts Of Speech, Tense, Subject-Verb Concord, Determiners, Punctuation, Narration, Voice, Figures of Speech, Introduction To Sentence.
Vocabulary Building : Affixes, Antonyms, Synonyms, One-Word Substitution, Idioms, Proverbs, Homonyms, Homophones, Homographs and Heteronyms, Abbreviations, Acronyms, Verbal Analogy
Unit-II READING
Vocabulary building and Comprehension:Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, synonyms, antonyms, Reading comprehension.
Reading Comprehension : Introduction, Types and Techniques.Ways to be a effective reader.
Unit-III INTRODUCTION TO COMMUNICATION
Communication: Introduction, Meaning and Significance, Process of Communication, Oral and Written Communication, 7c's of Communication, Barriers to Communication and Ways to overcome them, Importance ofCommunication for Technical students, nonverbal communication.
Unit-IV WRITING AND LISTENING
Developing Writing Skills:Planning, Drafting and Editing, Precise Writing, Précis, Technical definition and Technical description.Listening Comprehension : Introduction, Types, Techniques for effective listening, Listening Vs. Hearing, Barriers to effective Listening and it's remedy.

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Unit-V BUSINESS COMMUNICATION
Business Correspondence:Importance of Business Letters, Parts and Layout; Application, Contents of good Resume, E-Mail, Review Writing, Notice Of Meeting, Circular, Agenda, Minutes and Memorandum.

Topics to be covered in the Language laboratory sessions:
1. Introducing oneself, family, social roles.
2. Public Speaking and oral skills with emphasis on conversational practice, extempore speech, JAM(Just a minute sessions), describing objects and situations, giving directions, debate,telephonic etiquette.
3. Reading Comprehension: Intensive reading skills, rapid reading, and reading aloud (Reading material to be selected by the teacher).
4. To write a book review. Standard text must be selected by the teacher.
5. Role plays: preparation and delivery topic to be selected by teacher/faculty.

Reference Books:-

1. Meenakshi Raman and SangeetaSharma,'Technical Communication : Principles and practice',2017.Oxford University Press

2. Dr Neeta Sharma,   English,2017.Satya Prakashan New Delhi

3. Krizan and Merrier,Effective Business Communication,2007.Cengage learning

4. Sanjay Kumar and Pusplata, Communication Skill,2011.Oxford University Press

5. F.T. Wood, Remedial English Grammar2007.Macmillan.

6. Kul Bhushan Kumar& R S Salaria,Effective Communication Skills'2016.Khanna Publishing House, Delhi

7. CIEFL-Exercises in spoken English Parts I-III.1997.Oxford University Press.

List of Suggestive Core Experiments:

Practice work and activities are based on the contents included in course.

1. Introduction To Phonetics ; Pronunciation, Intonation, Stress and Rhythm.

2. Conversations and Dialougues

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Mini Project(CS-107)P ,Micro Project with C++(CS-207)(P)

Student has to take up some project work , prototype development and report writing with fundamental computing techniques such as C prog, MS Office etc for mini project and with C++ as micro project

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