VIGNAN INSTITUTE OF TECHNOLOGY AND SCIENCE
Near Ramoji Film City, Deshmukhi Village, Pochampally Mandal, Yadadri Bhuvanagiri Dist.
(Approved by AICTE, New Delhi, Affiliated to JNTUH, Hyderabad)
AN AUTONOMOUS INSTITUTION
Eamcet Code VGNT Dist Code : YBG

DEPARTMENT OF MECHANICAL ENGINEERING
B.Tech. in MECHANICAL ENGINEERING
COURSE STRUCTURE (VR23 Regulations)
Applicable from 2023-24 Batch

I YEAR I SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1.	23MA101BS	Matrices and Calculus	3	1	0	4
2.	23PH102BS	Applied Physics	3	1	0	4
3.	23ME103ES	Elements of Mechanical Engineering	0	0	2	1
4.	23ME104ES	Engineering Workshop	0	1	3	2.5
5.	23EN105HS	English for Skill Enhancement	2	0	0	2
6.	23CS106ES	C Programming and Data Structures	3	0	0	3
7.	23PH107BS	Applied Physics Laboratory	0	0	3	1.5
8.	23CS108ES	C Programming and Data Structures Laboratory	0	0	2	1
9.	23EN109HS	English Language and Communication Skills Laboratory	0	0	2	1
10.	23CH110MC	Environmental Science	3	0	0	0
		Induction Programme				
		Total	**14**	**3**	**12**	**20**

I YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1.	23MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	23CH202BS	Engineering Chemistry	3	1	0	4
3.	23ME203ES	Computer Aided Engineering Graphics	1	0	4	3
4.	23ME204ES	Engineering Mechanics	3	0	0	3
5.	23ME205PC	Engineering Materials	2	0	0	2
6.	23CS206ES	Python Programming Laboratory	0	1	2	2
7.	23CH207BS	Engineering Chemistry Laboratory	0	0	2	1
8.	23ME208PC	Fuels & Lubricants Laboratory	0	0	2	1
		Total	**12**	**3**	**10**	**20**

MATRICES AND CALCULUS
(Course Code: 23MA101BS)

B.Tech. I Year I Sem.

L	T	P/D	C
3	1	0	4

Course Objectives:

1. To learn the types of matrices, Concept of Rank of a matrix and applying the concept of rank to know the consistency of linear equations and to find all possible solutions, if exist.
2. To learn the concept of Eigen values and Eigen vectors of a matrix, Diagonalization of a matrix, Cayley Hamilton theorem and Reduce a quadratic form into a canonical form through an orthogonal transformation.
3. To learn the concept of the Mean value theorems, Evaluation of Improper integrals using Beta and Gamma Functions.
4. To learn the Partial differentiation, Jacobian, maxima and minima and Taylor series expansion of functions of two variables.
5. To learn The Evaluation of multiple integrals and their applications in the allied fields.

Course Outcomes: After completing this course

1. Student will be able to find the Rank of a matrix and analyze solutions of system of linear equations.
2. Student will be able to find the Eigen values and Eigen vectors of a matrix, Diagonalization of a matrix, verification of Cayley Hamilton theorem and reduce a quadratic form into a canonical form through orthogonal transformation.
3. Student will be able to verify mean value theorems and Evaluate Improper Integrals using Beta and Gamma Functions.
4. Student will be able to find the maxima and minima of function of two variables, Jacobian and Taylor series expansion of functions of two variables.
5. Student will be able to Evaluate Multiple Integrals

UNIT-I: Matrices [10 Periods]

Matrices: Types of Matrices, Symmetric, Skew-symmetric, Hermitian, Skew- Hermitian, orthogonal and Unitary Matrices; Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; Solving system of Homogeneous and Non-Homogeneous linear equations, LU – Decomposition Method.

UNIT- II: Eigen Values and Eigen Vectors [8 Periods]

Linear Transformation, Orthogonal Transformation. Eigen values, Eigen vectors, properties of eigen values and Eigen vectors with reference to different matrices; Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); Finding inverse and power of a matrix by Cayley-Hamilton Theorem.

Quadratic Forms: Nature, rank, index and signature of the Quadratic Form, Reduction of Quadratic form to canonical forms by Orthogonal Transformation Method.

UNIT- III: Calculus [10 Periods]

Mean value theorems: Rolle's Theorem and Lagrange's Mean value theorem with their Geometrical Interpretation and its applications, Cauchy's mean value Theorem. Taylor's Series. (All the theorems without proof). Beta and Gamma Functions: Introduction to Improper Integrals, Definition of Beta and Gamma functions, properties, and other forms. Relation between Beta and Gamma functions. Evaluation of Improper integrals using Beta and Gamma functions.

UNIT- IV: **Multivariable Calculus (Partial differentiation and applications) [10 Periods]**

Definitions of Limit and Continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence and Independence. Taylor's Series for functions of two variables,

Applications: Maxima and Minima of function two variables and three variables using Method of Lagrange Multipliers.

UNIT - V: Multivariable Calculus (Integration) [8 Periods]

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) for triple integrals. Finding areas using double integrals and Volumes using double and triple integrals.

TEXT BOOKS:

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.

REFERENCES:

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. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,
   Reprint, 2008.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.

APPLIED PHYSICS

(Course Code: 23PH102BS)

B.Tech. I Year I Sem.

L	T	P/D	C
3	1	0	4

Course Objectives:

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric and magnetic materials.
4. Identify t h e importance of Nano scale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibers.

Course Outcomes:

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

1. 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.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric and magnetic materials for their applications.
4. Appreciate the features and applications of Nanomaterial.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

UNIT - I: QUANTUM PHYSICS AND SOLIDS (20 hrs)

Quantum Mechanics: Introduction to quantum physics, blackbody radiation – Stefan-Boltzmann's law, Wein's and Rayleigh-Jean's law, Planck's radiation law - photoelectric effect de-Broglie hypothesis, Expression for de-Broglie wavelength of electron- Davisson and Germer experiment –Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.

Solids: Free electron theory (Qualitative)- Bloch's theorem -Kronig-Penney model–E-K diagram- effective mass of electron-origin of energy bands- classification of solids.

UNIT - II: SEMICONDUCTORS AND DEVICES (15 hrs)

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, their structure, materials, working principle and characteristics.

UNIT-III: DIELECTRIC, MAGNETIC AND ENERGY MATERIALS (16 hrs)

Dielectric Materials: Basic definitions- Types of polarizations (Qualitative) - Ferroelectric, Piezoelectric, and Pyroelectric materials, Local filed (Qualitative), Clausius-Mossotti equation.

Magnetic Materials: Domain Theory, Hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance, applications of magnetic materials.

Energy Materials: Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors.

UNIT - IV: NANOTECHNOLOGY (12 hrs)

Nanoscale, quantum confinement, surface to volume ratio, Properties of Nano partilces,bottom-up fabrication: sol-gel, precipitation, combustion methods – top-down fabrication: ball milling - physical vapor deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM&TEM - applications of nanomaterials.

UNIT - V: LASER AND FIBER OPTICS (15 hrs)

Lasers: Laser beam characteristics-three quantum proce sses -Einstein coefficients and their relations- lasing action - pumping methods- ruby laser, He-Ne laser, CO2 laser, semiconductor laser-applications of laser.

Fiber Optics: Introduction to optical fiber- advantages of optical Fibers - total internal reflection- construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons,11th Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhya - Nano Materials, New Age International, 1stEdition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1st Edition, 2022.

ELEMENTS OF MECHANICAL ENGINEERING

(Course Code: 23ME103ES)

B.Tech. I Year I Sem.

L	T	P/D	C
0	0	2	1

Course Objectives: The objectives of this course are to

- Make the student to experimentally measure the common geometric properties like length, diameter, flatness, curvature, volume and moment of inertia etc.
- Give a practical knowledge to evaluate the friction between surfaces and also to evaluate the natural frequency of the system.
- Correlate between theory and experimental results, directly observe the proof of principles and theories through practical knowledge
- Introduce students to the basic concepts of manufacturing through the demonstration of various processes.
- Understand the commonly used mechanical components like gear box, working of boilers and IC engine etc.

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

- CO 1: Understand the operation, usage and applications of different measuring instruments and tools.
- CO 2: Examine the different characteristics of instruments like accuracy, precision, etc.
- CO 3: Prepare simple composite components and joining different materials using soldering process.
- CO 4: Identify tools & learn practically the process of turning, milling, grinding on mild steel pieces.
- CO 5: Understand the basic components of the IC engine, gear box and boiler.

List of Experiments to be performed:

1. Measurement of length, height, diameter by vernier calipers.
2. To measure diameter of a given wire and sphere, thickness of a given sheet and volume of an irregular lamina using micrometer screw gauge.
3. Use of straight edge and sprit level in finding the flatness of surface plate.
4. Determination of time period and natural frequency of simple pendulum.
5. Determination of time period and natural frequency of compound pendulum.
6. To measure the coefficients of static and kinetic friction between a block and a plane using various combination of materials.
7. To determine the radius of curvature of a given spherical surface.

8. The experimental determination of the Moment of Inertia of regular and irregular solids.
9. Metal joining process–soldering of metal alloys to any PCB board
10. A simple composite geometry preparation by hand layup method.
11. Grouping of Dry cells for a specified voltage and current and its measurement using ammeters and voltmeters etc.
12. Demonstration of lathe, milling, drilling, grinding machine operations.
13. Study of transmission system –gear box
14. Assembly /disassembly of Engines
15. Study of Boilers

Note: Perform any 10 out of the 15 Exercises.

ENGINEERING WORKSHOP

(Course Code: 23ME104ES)

B.Tech. I Year I Sem.

L	T	P/D	C
0	1	3	2.5

Course Objectives:

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

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

- CO 1: Practice the manufacturing of components using workshop trades that include fitting,carpentry, foundry, welding, tin-smithy and black-smithy.
- CO 2: Identify and apply suitable tools for different trades of engineering processes including drilling, material removal, measuring, and chiselling.
- CO 3: Apply basic electrical engineering knowledge for house wiring practice.
- CO 4: Study and practice on machine tools and their operations
- CO 5: Get a demonstration on the basic principles of the 3D printing process and exposure to plumbing activities & modern power tools.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
V. Welding Practice – (Arc Welding & Gas Welding)
VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:

3D printing, Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working.

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

English for Skill Enhancement

(Course Code: 23EN105HS)

B.Tech. I Year I Sem.

L	T	P/D	C
2	0	0	2

Course Objectives: This course will enable the students to:

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 theoreticaland practical components of the syllabus.

Course Outcomes: Students will be able to:

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

UNIT - I

Chapter entitled '***Toasted English*' by R.K.Narayan** from ***"English: Language, Context and Culture"*** published by Orient BlackSwan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT - II

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

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

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

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

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

UNIT - III

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

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

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

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

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

UNIT - IV

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

Vocabulary: Standard Abbreviations in English

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 -Précis Writing.

UNIT - V

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

Vocabulary: Technical Vocabulary and their Usage

Grammar: Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

TEXT BOOK:

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

REFERENCE BOOKS:

1. Effective Academic Writing by Liss and Davis (OUP)

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. (2019). Technical Communication. Wiley India Pvt. Ltd.

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

C PROGRAMMING AND DATA STRUCTURES

(Course Code: 23CS106ES)

B.Tech. I Year I Sem.

L	T	P/D	C
3	0	0	3

Course Objectives: Introduce the importance of programming, C language constructs, program development, data structures, searching and sorting.

Course Outcomes:

1. Understand the various steps in Program development.
2. Explore the basic concepts in C Programming Language.
3. Develop modular and readable C Programs
4. Understand the basic concepts such as Abstract Data Types, Linear and Non-Linear Datastructures.
5. Apply data structures such as stacks, queues in problem solving
6. To understand and analyze various searching and sorting algorithms.

UNIT - I

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development

Introduction to C Language – Background, Simple C programs, Identifiers, Basic data types,Variables, Constants, Input / Output

Structure of a C Program – Operators, Bit-wise operators, Expressions, Precedence andAssociatively, Expression Evaluation, Type conversions, Statements.

UNIT - II

Statements – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Recursion.

Designing Structured Programs- Functions, basics, user defined functions, inter function communication, standard functions.

Arrays – Concepts, using arrays in C, inter function communication, array applications, two –dimensional arrays, multidimensional arrays.

UNIT - III

Pointers – Introduction, Pointers for inter function communication, pointers to pointers, compatibility,

Pointer Applications – Passing an array to a function, Memory allocation functions, array of pointers

Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion.

UNIT - IV

Derived types – The Typedef, enumerated types, Structures – Declaration, definition and initializationof structures, accessing structures, operations on structures, complex structures. Unions – Referencing unions, initializers, unions and structures.

Input and Output – Text vs Binary streams, standard library functions for files, converting file types, File programs – copy, merge files.

UNIT – V

Sorting- selection sort, bubble sort, insertion sort,
Searching-linear and binary search methods.

Data Structures – 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.

TEXT BOOKS:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie,PHI/Pearson Education

REFERENCE BOOKS:

1. C & Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3 Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
4. C for Engineers and Scientists, H. Cheng, McGraw-Hill International Edition
5. Data Structures using C – A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, Pearson Education / PHI
6. C Programming & Data Structures, E. Balagurusamy, TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures – E V Prasad and N B Venkateswarlu, S. Chand & Co.

APPLIED PHYSICS LAB

(Course Code: 23PH107BS)

B.Tech. I Year I Sem.

L	T	P/D	C
0	0	3	1.5

Course Objectives:

The objectives of this course for the student to

1. Capable of handling instruments related to the Hall Effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and time constant of RC circuit.
3. Able to measure the characteristics of dielectric constant of a given material.
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Understanding the method of least squares fitting.

Course Outcomes:

The students will be able to:

1. 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.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Gain the knowledge of applications of dielectric constant.
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Carried out data analysis.

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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. Input and output characteristics of BJT (CE, CB & CC configurations)
6. a) V-I and L-I characteristics of light emitting diode (LED)
   b) V-I Characteristics of solar cell
7. Determination of Energy gap of a semiconductor.
8. Determination of the time constant of RC circuit.
9. Study B-H curve of a magnetic material.
10. Determination of dielectric constant of a given material
11. a) Determination of the Wavelength of LASER beam by using diffraction grating method.
    b) Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
12. Understanding the method of least squares – torsional pendulum as an example.

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

C PROGRAMMING AND DATA STRUCTURES LABORATORY

(Course Code: 23CS108ES)

B.Tech. I Year I Sem.

L	T	P/D	C
0	0	2	1

Course Objectives: Introduce the importance of programming, C language constructs, program development, data structures, searching and sorting.

Course Outcomes:

1. Develop modular and readable C Programs
2. Solve problems using strings, functions
3. Handle data in files
4. Implement stacks, queues using arrays, linked lists.
5. To understand and analyze various searching and sorting algorithms

List of Experiments:

1. Write a C program to find the sum of individual digits of a positive integer.
2. 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.
3. Write a C program to generate all the prime numbers between 1 and n, where n is a valuesupplied by the user.
4. Write a C program to find the roots of a quadratic equation.
5. Write a C program to find the factorial of a given integer.
6. Write a C program to find the GCD (greatest common divisor) of two given integers.
7. Write a C program to solve Towers of Hanoi problem.
8. 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)
9. Write a C program to find both the largest and smallest number in a list of integers.
10. Write a C program that uses functions to perform the following:
    i) Addition of Two Matrices
    ii) Multiplication of Two Matrices
11. Write a C program that uses functions to perform the following operations:
    i) To insert a sub-string in to a given main string from a given position.
    ii) To delete n Characters from a given position in a given string.
12. Write a C program to determine if the given string is a palindrome or not
13. Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.
14. Write a C program to count the lines, words and characters in a given text.
15. Write a C program to generate Pascal's triangle.
16. Write a C program to construct a pyramid of numbers.

17. Write a C program that uses functions to perform the following operations:
    i) Reading a complex number
    ii) Writing a complex number
    iii) Addition of two complex numbers
    iv) Multiplication of two complex numbers
    (Note: represent complex number using a structure.)
18.
    i. Write a C program which copies one file to another.
    ii. Write a C program to reverse the first n characters in a file.(Note: The file name and n are specified on the command line.)
19.
    i. Write a C program to display the contents of a file.
    ii. Write a C program to merge two files into a third file (i.e., the contents of the first filefollowed by those of the second are put in the third file)

20. Write a C program that uses functions to perform the following operations on singly linkedlist.:
    i) Creation ii) Insertion iii) Deletion iv) Traversal

21. Write C programs that implement stack (its operations) using
    i) Arrays ii) Pointers

22. Write C programs that implement Queue (its operations) using
    i) Arrays ii) Pointers

23. Write a C program that implements the following sorting methods to sort a given list ofintegers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort

24. Write C programs that use both recursive and non recursive functions to perform the followingsearching operations for a Key value in a given list of integers:
    i) Linear search ii) Binary search

TEXT BOOKS:

1. C Programming & Data Structures, B.A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning.
2. Let us C, Yeswanth Kanitkar
3. C Programming, Balaguruswamy.

English Language Communication Skills Lab

(Course Code: 23EN109HS)

L	T	P	C
0	0	2	1

B.Tech. I Year I Sem.

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:

To facilitate computer-assisted multi-media instruction enabling individualized andindependent language learning

To sensitize the students to the nuances of English speech sounds, word accent,intonation and rhythm

To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking

To improve the fluency of students in spoken English and neutralize the impact ofdialects.

To train students to use language appropriately for public speaking, group discussionsand interviews

Course Outcomes: Students will be able to:

Understand the nuances of English language through audio- visual experience and groupactivities

Neutralize their accent for intelligibility

Speak with clarity and confidence which in turn enhances their employability skills

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 LSRWskills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speechof 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 professionalcontexts

- 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 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 IICALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern insentences – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern insentences – 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 andSeeking Permissions - Telephone Etiquette.

Exercise - IIICALL 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 andResponding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise IVCALL 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 – VCALL Lab:
Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests -*Testing Exercises*

ICS Lab:
Understand: Group Discussion

Practice: Group Discussion

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 followingspecifications:

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 audio- visual 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 contentsof the syllabus.

Suggested Software:

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

REFERENCE BOOKS:

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook.* CengageLearning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook.* CambridgeUniversity Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook.* Oxford UniversityPress
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.* CambridgeUniversity Press.

Environmental Science
(Course Code: 23CH110MC)

B.Tech. I Year I Sem.

L	T	P/D	C
3	0	0	0

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

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 usingmineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source (hydroelectric energy, solar energy, geothermal energy, wind energy, nuclear energy, and biomass energy) and case studies.

UNIT - III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity.Value 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-situconservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **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. Carbon trading.

UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan.(EMP).

Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA),Carbon Capture technology and CO_2 Sequestration technology.

TEXT BOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha forUniversity 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 LearningPrivate Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearning 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.

ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Course Code: 23MA201BS)

B.Tech. I Year II Sem.

L	T	P/D	C
3	1	0	4

Course Objectives: To Learn

1. Methods of Solving First order Ordinary Differential Equations and its applications.
2. Methods of Solving Higher order Ordinary Differential Equations and its applications.
3. Laplace Transforms and its applications.
4. Gradient, Divergence, curl and Scalar potential function.
5. Line, Surface and volume integrals, Vector integral theorems.

Course Outcomes: After learning the contents of this course the student must be able to

1. Solve First order Ordinary Differential Equations and its applications.
2. Solve Higher order Ordinary Differential Equationsand its applications.
3. Find Laplace transform of given functions and solution of ordinary differential equations.
4. Find Gradient, Divergence, curl and Scalar potential function.
5. Find Line, Surface and volume integrals and verify Vector integral theorems.

UNIT- I: First Order ODE [8 Periods]

Exact Differential Equations, Non-Exact Differential Equations, Linear Differential Equations, Bernoulli's Differential Equations. Orthogonal trajectories, Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT- II:Ordinary Differential Equations of Higher Order [10 Periods]

Introduction-Homogenous, Non-homogeneous differential equations. Complementary function and Particular integral, Non-Homogeneous terms of the type e^{ax} , sin(ax), cos (ax), polynomial in x, e^{ax} V(x), x^k V(x), Method of variation of parameters. Applications: Electrical Circuits

UNIT-III : Laplace Transforms [10 Periods]

Laplace Transforms: Laplace transform of standard functions, First shifting theorem, Unit step function, Dirac delta function, second shifting theorem, Laplace transform of functions when multiplied and divided by t. Laplace transforms of derivatives and integrals of functions, Evaluation of integrals using Laplace transforms, Laplace transform of Periodic functions.

Inverse Laplace transform by different methods, Convolution Theorem, Applications: Solving differential equations with constants coefficients with Initial conditions by Laplace transform method. (All the theorems without proof).

UNIT-IV: Vector Differentiation [10 Periods]

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Vector Identities, Solenoidal and Irrotational vectors, Scalar potential function.

UNIT-V: Vector Integration [10 Periods]

Line, Surface and Volume Integrals. Green's Theorem, Gauss Divergence Theorem and Stokes Theorem (without proofs) and their applications. Discussion of these theorems with reference to solenoidal and irrotational vector fields.

TEXT BOOKS:

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.

REFERENCES:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, Jogn Wiley & Sons,2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Ed, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. Alan Jeffrey, Mathematics for Engineers and Scientists, 6th Edition, 2013, Chapman & Hall.
5. Kanti B.Datta, Mathematical Methods of Science and Engineering, Cengage Learning.

ENGINEERING CHEMISTRY
(CourseCode:23CH202BS)

B.Tech. I Year II Sem.

L	T	P/D	C
3	1	0	4

Course Objectives:

1. TobringadaptabilitytonewdevelopmentsinEngineeringChemistryandtoacquiretheskillsrequiredtobecomeaperfectengineer.
2. Toincludetheimportanceofwaterinindustrialusage,fundamentalaspectsofbatterychemistry,significanceofcorrosionit'scontroltoprotectthe structures.
3. Toimbibethebasicconceptsofpetroleumanditsproducts.
4. ToacquirerequiredknowledgeaboutengineeringmaterialslikeCement,lubricantsandrefractories.

Course Outcomes:

1. Studentswillacquirethebasicknowledgeofelectrochemicalproceduresrelatedtocorrosionanditscontrol.
2. Thestudentsareabletounderstandthebasicpropertiesofwateranditsusageindomesticandindustrialpurposes.
3. They can learn the fundamentals and general properties of polymers and otherengineeringmaterials.
4. Theycanpredictpotentialapplicationsofchemistryandpracticalutilityinordertobecomegood engineersandentrepreneurs.

UNIT-I:Waterand itstreatment:[8]

Introduction to hardness of water – Estimation of hardness of water by complexometric methodand related numerical problems. Potable water andits specifications-Steps involved in thetreatment of potable water-Disinfection of potable water by chlorination and break point ofchlorination.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feedwater - Calgon conditioning-Phosphate conditioning-Colloidal conditioning, External treatmentmethods - Softening of water by ion- exchange processes and Zeolite processes. Desalination ofwater –Reverseosmosis.

UNIT–IIBatteryChemistry &Corrosion[8]

Introductionof**Electrochemistry**-
Electrochemicalcells,Electrodepotential,standardelectrodepotential,Nernstequation,Numericalproblems.

Batteries: Classificationofbatteries-Basicrequirementsforcommercialbatteries.Primarybattery-Licell,Secondarybattery-Construction,workingandapplicationsofLithiumionbatteryand Lead-acid battery. Fuel Cells-Differences between battery and a fuel cell, Construction andapplicationsofMethanolOxygenfuelcell.

Corrosion: Causesandeffectsofcorrosion–theoriesofchemicalandelectrochemicalcorrosion–mechanism of electrochemical corrosion. Types of corrosion: Galvanic, water-lineandpittingcorrosion.Factorsaffectingrateofcorrosion,Corrosioncontrolmethods-Cathodicprotection–Sacrificial anode and impressed current methods. Electro plating-copper plating,Electroless plating-Niplating.

UNIT-III:Polymericmaterials:[8]

Definition–Classificationofpolymerswithexamples–Typesofpolymerization–addition(freeradicaladdition)andcondensationpolymerizationwithexamples.

Fibers:Nylon6:6andTerylene

Plastics: Definitionandcharacteristics-thermoplasticandthermosettingplastics,Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiberreinforcedplastics(FRP).

Rubbers: Natural rubber and its vulcanization. **Elastomers:** Characteristics, preparation,propertiesandapplicationsofBuna-S,ButylandThiokolrubber.

Conductingpolymers: CharacteristicsandClassificationwithexamples-mechanismofconductioninTrans-polyacetyleneandapplicationsofconductingpolymers.

Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcoholandtheirapplications.

UNIT-IV:EnergySources: [8]

Introduction,Calorificvalueoffuel–HCV,LCV-Dulongsformula,Calorificvaluenumericalproblems.

Classificationoffuels.**Solid fuels**:analysisofcoal–proximateandultimateanalysisandtheirsignificance. **Liquid fuels**: petroleum and its refining, cracking types–moving bed catalyticcracking. Knocking–octane and cetane rating, synthetic petrol-Fischer-Tropsch's process;**Gaseousfuels**: Compositionand uses ofnaturalgas,LPGand CNG.

UNIT-V:**EngineeringMaterials:[8]**

Cement: Portlandcement,itscomposition,classificationofcements,settingandhardeningofcement.

Lubricants: Classification of lubricants with examples-characteristics of a good lubricants,propertiesoflubricants:viscosity,cloudpoint,pourpoint,flashpointandfirepoint,mechanismoflubrication(thickfilm, thinfilmandextremepressure).

Refractories: Classificationofrefractories,characteristicsofgoodrefractories.Applicationsofrefractories.

TEXTBOOKS:

1. EngineeringChemistry byP.C.JainandM.Jain,DhanpatraiPublishingCompany,2010
2. EngineeringChemistrybyRamaDevi,VenkataRamanaReddy andRath,Cengagelearning,2016
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. LaxminarayanaandK.Shashikala,PearsonPublications,2021.
4. TextbookofEngineeringChemistrybyJayaShreeAnireddy,WileyPublications.

REFERENCEBOOKS:

1. EngineeringChemistrybyShikhaAgarwal,CambridgeUniversityPress,Delhi(2015)
2. EngineeringChemistrybyShashiChawla,DhanpatraiandCompany(P)Ltd.Delhi(2011)

COMPUTER AIDED ENGINEERING GRAPHICS

(Course Code: 23ME203ES)

B.Tech. I Year II Sem.

L	T	P/D	C
1	0	4	3

Course Objectives:

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

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

- CO 1: To learn basic engineering graphic communication skills, sketch conic sections, cycloids and scales manually and using computer aided drafting.
- CO 2: To learn the 2D principles of orthographic projections and multiple views of the same.
- CO 3: To know the solid Projection and its Sectional Views
- CO 4: Appreciate the need of Development of solid surfaces.
- CO 5: Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting.

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, Developmentof 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 ofIsometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

Note: - External examination is conducted in conventional mode and internal evaluation to be done byboth conventional as well as using computer aided drafting.

ENGINEERING MECHANICS

(Course Code: 23ME204ES)

B.Tech. I Year II Sem.

L	T	P/D	C
3	0	0	3

Course Objectives: The objectives of this course are to

- Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
- Perform analysis of bodies lying on rough surfaces.
- Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
- Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
- Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

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

- CO 1:Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to system of forces.
- CO 2:Solve problem of bodies subjected to friction.
- CO 3:Find the location of centroid and calculate moment of inertia of a given section.
- CO 4:Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
- CO 5:Solve problems using work energy equations for translation, fixed axis rotation andplane motion and solve problems of vibration.

UNIT - I:

Introduction to Engineering Mechanics - Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy

UNIT - II:

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack; Centroid and Centre of Gravity - Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus

UNIT - III:

Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem, Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of composite bodies.

UNIT - IV:

Review of particle dynamics - Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work -kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

UNIT - V:

Kinetics of Rigid Bodies -Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D' Alembert's principle and its applications in plane motion and connected bodies; Work Energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation

TEXT BOOKS:

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics –Statics & Dynamics

REFERENCE BOOKS:

1. Beer F.P & Johnston E.R Jr., Vector Mechanics for Engineers – Statics and Dynamics, McGraw Hill, 12th Edition.
2. Dumir P.C, Sengupta, Srinivas, Engineering Mechanics- Universities Press, 2020.
3. Hibbeler R.C, Engineering Mechanics, Pearson, 14th Edition.
4. Arshad Noor, Zahid & Goel, Engineering Mechanics, Cambridge University Press, 2018.
5. Khurmi R.S, Khurmi N., Engineering Mechanics, S. Chand, 2020.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press

ENGINEERING MATERIALS

(Course Code: 23ME205PC)

B.Tech. I Year II Sem.

L	T	P/D	C
2	0	0	2

Course Objectives: The objectives of this course are to

- Provide basic understanding of engineering materials, their structure, classification and usage.
- Introduce the testing methods for various material properties and ASTM standards used intesting.
- Understand the various materials used in mechanical engineering like metals, ceramics,polymers, composite materials and other new materials.

COURSE OUTCOMES: At the end of the course, students will be able to**:**

- CO 1: Select and classify the various mechanical properties of engineering materials that will be essential for engineering applications.
- CO 2: Understand the classification, composition, properties and usage of ferrous and non ferrous alloys.
- CO 3: Understand the application of composite materials and their processing
- CO 4: Understand the classification, structure and processing of ceramic as well as polymers.
- CO 5: Understand the need for the development of the nano material, bio material and new material.

UNIT-I:

Classification of Engineering Materials, selection of material in the design, Introduction to Ashby chart, Mechanical Properties of Metals and their testing equipment/procedures- Tensile test, compression test, Impact test and hardness test, ASTM standards for testing, Stress–Strain Behavior of various materials, Sources of Material Data, Analysis of Chemical Properties of materials using Spectroscopy.

UNIT –II:

Metals and Metal Alloys, Classification of Metal Alloys, Classification, composition, properties and usage of Ferrous alloys, steel, HSS, grey cast iron, white cast iron; Classification, composition, properties and usage of Non-ferrous materials, Aluminum, Titanium, Zinc, Copper, Nickel, Cobalt and their alloys

UNIT –III:

Composites: Definitions, Reinforcements and matrices, Types of reinforcements, Types of matrices, Classification of composites, Properties of composites in

comparison with standard materials Manufacturing methods: Hand and spray lay - up, injection molding, resin injection, filament winding,pultrusion, centrifugal casting and prepregs.

UNIT – IV:

Ceramics, Classification of ceramic materials, Crystal Structure, Applications and Properties of Ceramics, Ceramic fabrication techniques, Carbon: Diamond and Graphite.

Polymer Structures, Chemistry of Polymer Molecules, Classification scheme of polymer molecules, Thermoplastic and Thermosetting Polymers, Characteristics, Applications, and Processing of Polymers,Elastomers.

UNIT – V:

Materials in nano technology: Semiconductor Nanomaterials (Zinc oxide nano materials, titanium dioxide nanoparticles, Metal nanoparticles, ceramic nano materials metal nano particles (Silver, gold, iron and copper), applications, bio materials and other recent materials

TEXT BOOKS:

1. George Murray, Charles V. White, Wolfgang Weise, “Introduction to Engineering Materials”,CRC Press, 2007.
2. William. D. Callister, David G. Rethwisch, “Materials Science and Engineering: An Introduction”,John Wiley & Sons, 2018.

REFERENCE BOOKS:

1. Myer Kutz, “Mechanical Engineers’ Handbook”, John Wiley & Sons, 2015.
2. M.A. Shah, K.A.Shah, Nano technology, the science of Small, WILEY, Second Edition, 2019.
3. E. Paul De Garmo, J.T. Black, R.A. Kohler. Materials and Processes in Manufacturing, JohnWiley and Sons, Inc., NY, 11 th Edition, 2012.
4. R.J. Crawford, plastics engineering, Pergamon Presss, 2013.
5. Donald R Askland and Pradeep P Phule “Essentials of Materials Science and Engineering”, byPradeep P. Fulay (Author), Donald R. Askeland, 2013.
6. K. K. Chawala, Cermic Matrix composite Materials, Kluwer Academic Publishers, 2002.

PYTHON PROGRAMMING LABORATORY

(Course Code: 23CS206ES)

B.Tech. I Year II Sem

L	T	P/D	C
0	1	2	2

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 uppercasecharacter 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 thatappears 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 theunique 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 itscontent. 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 everyword 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 geometricalshapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

Week-6:

1. a. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.
   b. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.
   c. Write a function called draw_point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.
   d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiplelevels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it forcorrectness.

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, blankspaces, 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, Cengag

ENGINEERING CHEMISTRY LABORATORY
(CourseCode:23CH207BS)

B.Tech.IYearII Sem.

L	T	P/D	C
0	0	2	1

CourseObjectives: Thecourseconsistsofexperimentsrelatedtotheprinciplesofchemistry requiredfor engineering student. The student will learn:

- Estimationofhardnessofwatertocheckitssuitabilityfor drinkingpurpose.
- Students are able to perform estimations of acids and bases using conductometry,potentiometry and pH metry methods.
- Studentswilllearntopreparepolymers suchasBakeliteandnylon-6:6 inthelaboratory.
- Studentswilllearnskillsrelatedtothelubricantpropertiessuchassaponification value, surface tension and viscosity of oils.

CourseOutcomes: Theexperimentswillmakethestudentgainskillson:

- Determinationofparameterslike hardnessofwater.
- Able to perform methodssuchas conductometry, potentiometryand pH metry in order to findout the concentrationsor equivalence pointsofacidsand bases.
- Studentsareabletopreparepolymerslikebakeliteandnylon-6:6.
- Estimationssaponificationvalue,surfacetensionandviscosityoflubricantoils.

ListofExperiments:

I. **VolumetricAnalysis:**EstimationofHardnessofwaterbyEDTAComplexometrymethod.

II. **Conductometry:**Estimationoftheconcentrationofaweakacidby Conductometry.

III. **Potentiometry:**Estimationoftheconcentrationofastrongacidby Potentiomentry.

IV. **pHMetry:**Determinationoftheconcentrationofastrongacidbyusing pHmeter.

V. **Preparations:**

1. PreparationofBakelite.
2. PreparationNylon–6:6

VI. **Lubricants:**

1. Determinationofsurfacetensionofagivenliquidbyusingstalagmometer.
2. EstimationofViscosityoflubricantoilusingOstwald'sViscometer.

VII. **Colorimetry:**DeterminationofFerrousIroninCementbyColorimetricmethod.

VIII. **Virtuallabexperiments**

1. ConstructionofFuelcellanditsworking.
2. Batteriesforelectricalvehicles.
3. Functioningofsolar cellanditsapplications.

REFERENCEBOOKS:

1. Lab manualforEngineeringchemistrybyB. Ramadeviand P.Aparna, SChand Publications,New Delhi (2022)
2. Vogel'stextbookofpracticalorganicchemistry5thedition
3. InorganicQuantitativeanalysisbyA.I.Vogel,ELBSPublications.
4. CollegePracticalChemistrybyV.K.Ahluwalia,NarosaPublicationsLtd.NewDelhi(2007).

FUELS AND LUBRICANTS LABORATORY

(Course Code: 23ME208PC)

B.Tech. I Year II Sem.

L	T	P/D	C
0	0	2	1

Prerequisite: Chemistry

Course Objectives: To Understand the fuel and lubricants properties.

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

- CO1: Determine the flash point, fire point, cloud point and pour point of liquid fuels.
- CO2: Find the kinematic viscosity of lubricants and its variation with temperature.
- CO3: Determine the calorific value of solid, liquid and gaseous fuels.
- CO4: Determination of the dropping point of lubricating grease
- CO5: Determination of distillation characteristics of petroleum products

List of Experiments:

1. Determination of Flash and Fire points of Liquid fuels/Lubricants using: Abels Apparatus
2. Determination of Flash and Fire points of Liquid fuels/Lubricants using: Pensky Martens Apparatus
3. Carbon residue test: Liquid fuels.
4. Determination of Viscosity of Liquid lubricants and Fuels using: Saybolt Viscometer
5. Determination of Viscosity of Liquid lubricants and Fuels using: Redwood Viscometer
6. Determination of Viscosity of Liquid lubricants and Fuels using: Engler Viscometer
7. Determination of Calorific value: of Gaseous fuels using: Junkers Gas Calorimeter.
8. Determination of Calorific value: Solid/Liquid/ fuels using: Bomb Calorimeter.
9. Drop point and Penetration Apparatus for Grease.
10. ASTM Distillation Test Apparatus.
11. Cloud and Pour Point Apparatus.