VIGNAN INSTITUTE OF TECHNOLOGY AND SCIENCE, DESHMUKHI
(AN AUTONOMOUS INSTITUTION)
B.Tech. in ELECTRONICS AND INSTURMENTATION 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.	23EI103ES	Elements of Electronics and Instrumentation 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.	23CA106ES	C Programming for Engineers	3	0	0	3
7.	23PH107BS	Applied Physics Laboratory	0	0	3	1.5
8.	23CA108ES	C Programming for Engineers 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.	23EE204ES	Basic Electrical Engineering	2	0	0	2
5.	23EC205ES	Electronic Devices and Circuits	2	0	0	2
6.	23CA206ES	Applied Python Programming Laboratory	0	1	2	2
7.	23CH207BS	Engineering Chemistry Laboratory	0	0	2	1
8.	23EE208ES	Basic Electrical Engineering Laboratory	0	0	2	1
9.	23EC209ES	Electronic Devices and Circuits Laboratory	0	0	2	1
		Total	**11**	**3**	**12**	**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. The student will be able to find the Rank of a matrix and analyze solutions of system of linear equations.
2. The 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. The student will be able to verify mean value theorems and Evaluate Improper Integrals using Beta and Gamma Functions.
4. The 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.

The 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 nanoscale, 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 Nanomaterials.

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, **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 processes-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.

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 ELECTRONICS AND INSTRUMENTATION ENGINEERING
(Course Code: 23EI103ES)

B.Tech. I Year I Sem.

L	T	P/D	C
0	0	2	1

Course outcomes: Students will be able to:

1. Identify the different components used for electronics applications
2. Measure different parameters using various measuring instruments

List of Experiments:

1. Identify the different passive and active components

2. Color code of resistors, finding the types and values of capacitors

3. Measure the voltage and current using voltmeter and ammeter

4. Measure the voltage, current with Multimeter and Study the other measurements using Multimeter

5. Study the CRO and measure the frequency and phase of given signal

6. Draw the various Lissajous figures using CRO

7. Study the function generator for various signal generations

8. Study of Spectrum analyzer and measure the spectrum

9. Operate Regulated power supply for different supply voltages

10. Study the various gates module and write down the truth table of them

11. Identify various Digital and Analog ICs

12. Know the available Software's for Electronics and Instrumentation applications

13. Learn how to use analytic, biomedical Instruments.

14. Study of Digital to Analog converter

15. Study of Analog to Digital converter

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.

Course Objectives: This course will enable the students to:

L	T	P/D	C
2	0	0	2

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 FOR ENGINEERS
(Course Code: 23CA106ES)

L	T	P/D	C
3	0	0	3

B.Tech. I Year I Sem.

Course Objectives:
1. To learn the fundamentals of computers.
2. To understand the various steps in Program development.
3. To learn the syntax and semantics of C Programming Language.
4. To learn the usage of structured programming approach in solving problems.

Course Outcomes: Upon completing this course, the students will be able to
   CO1: Draw flowcharts for solving arithmetic and logical problems
   CO2: Formulate algorithms and programs using Conditional Statements.
   CO3: Develop modular reusable code by understanding concepts of functions and arrays.
   CO4: Formulate algorithms and programs using pointers and files.
   CO5: Develop programs using Searching and sorting algorithms

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1		1					1	1
CO2	3	3	3	2							1	1
CO3	3	2	3	2	1						1	1
CO4	3	3	2	1		1		1			1	1
CO5	3	3	3	2		1		1			1	1

UNIT- I

Introduction to Computer Algorithms and Programming
Components of a computer system: Memory, processor, I/O devices, storage, operating system, the concept of assembler, compiler, interpreter, loader, and linker.

From algorithm to program: Representation of an algorithm, flowchart, Pseudocode with examples, converting algorithms to programs.

Programming Basics: Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, object, and executable code. Components of C language, standard I/O in C, data types, variables and constants, memory storage, and storage classes.

UNIT – II
Expressions and Statements
Expressions and their evaluation: Operands and Operators, formation of expressions using arithmetic, relational, logical, and bitwise operators, precedence and associativity rules, mixed operands, type conversion, and evaluation of expressions.

Statements: Simple and compound statements, Conditional Branching: if and switch statements, nested if-else, dangling else problem, use of break and default with switch. Iteration and loops: use of while, do-while and for loops, nested loops, use of break and continue statements.

UNIT - III
Functions and Arrays
Designing Structured Programs: Introduction to functions, advantages of modularizing a program into functions, types of functions, passing parameters to functions: call by value, call by reference, passing arrays to functions, recursion with example programs.

Arrays: Array notation and representation, manipulating array elements, using multi-dimensional arrays, character arrays, C strings, string input/output functions, Array of strings, string manipulation functions with example programs.

UNIT – IV
Pointers and File handling

Pointers: Introduction, declaration, applications, dynamic memory allocation (malloc, calloc, realloc, free), use of pointers in self-referential structures.

File handling: File I/O functions, standard C pre-processors, defining and calling macros, command-line arguments.

UNIT – V
Derived types And Basic Algorithms:
Structures, Union, Enums and Bit-fields: Defining, declaring, and usage of structures, unions, and their arrays, passing structures, and unions to functions, introduction to enums and bit-fields.

Basic Algorithms: Searching and Sorting Algorithms (Bubble, Insertion, and Selection), finding rootsof equations, notion of order of complexity through example programs.

TEXT BOOKS:
1. B. A. Forouzan and R. F. Gilberg -Programming & Data Structures, 3rd Ed., Cengage Learning`
2. Byron Gottfried - Schaum's Outline of Programming with C, McGraw-Hill

REFERENCE BOOKS:
1. Ajay Mittal - Programming in C: A practical approach, Pearson Education, 2010
2. Kernighan Brian W. and Ritchie Dennis M.- The C programming, Pearson Education.
3. J. R. Hanlyand, E. B. Koffman -Problem Solving and Program Design, 5th Ed., PearsonEducation.
4. H. Cheng - C for Engineers and Scientists, McGraw-Hill International Edition
5. V. Rajaraman - Computer Basics and C Programming, PHI Learning, 2015.

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

resistivity of semiconductor materials.

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. Study the behavior of passive components.

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. Learn the characteristics of passive components like L, C and R and their applications.

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

7. V-I Characteristics of solar cell

8. a) Determination of the wavelength of laser by using diffraction Gratting method

   b) Determination of Acceptance Angle and Numerical Aperture of an optical fiber.

9. Determination of Energy gap of a semiconductor.

10. RC Circuit: Growth and Decay.

11. Study B-H curve of a magnetic material.

12. Determination of dielectric constant of a given material.

13. 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 FOR ENGINEERS LABORATORY
(Course Code: 23CA108ES)

B.Tech. I Year I Sem.

L	T	P/D	C
0	0	2	1

Course Outcomes: Upon completing this course, the students will be able to

CO1: Write algorithms and to draw flowcharts for solving problems and translate the algorithms/flowcharts to programs (in C language).

CO2: Use functions to develop modular reusable code.

CO3: Use arrays, pointers, strings and structures to formulate algorithms and programs.

CO4: Understand Searching and sorting algorithms

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	1	1			1		1	1
CO2	3	2	3	2	1	2			1		1	1
CO3	3	3	2	1	1	2			1		1	1
CO4	3	3	3	2	1	1			1		1	

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.
3. Write a C program to generate the first n terms of the sequence.
4. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
5. Write a C program to find the roots of a quadratic equation.
6. Write a C program to find the factorial of a given integer.
7. Write a C program to find the GCD (greatest common divisor) of two given integers.
8. Write a C program to solve Towers of Hanoi problem.
9. 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)
10. Write a C program to find both the largest and smallest number in a list of integers.
11. Write a C program that uses functions to perform the following:
    i) Addition of Two Matrices   ii) Multiplication of Two Matrices

12. 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.

13. Write a C program to determine if the given string is a palindrome or not

14. 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.

15. Write a C program to count the lines, words and characters in a given text.

16. Write a C program to generate Pascal's triangle.

17. Write a C program to construct a pyramid of numbers

18. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:
    $$1+x+x^2+x^3+.......... +x^n$$
    For example: if n is 3 and x is 5, then the program computes 1+5+25+125.
    Print x, n, the sum
    Perform error checking.
    For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair ofnumbers of without computing the sum. Are any values of x also illegal ? If so, test for them too.

19. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

20. Write a C program to convert a Roman numeral to its decimal equivalent.

21. 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.)

22.
    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.)

23.
  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 file followed by those of the second are put in the third file)

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

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

English Language Communication Skills Lab
(Course Code: 23EN109HS)
B.Tech. I Year II Sem.

L	T	P	C
0	0	2	1

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 and independent language learning

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

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

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

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

Course Outcomes: Students will be able to:

 Understand the nuances of English language through audio- visual experience and group activities
 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 LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

• Listening for general content

- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and 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 and Seeking 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 and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise IV CALL Lab:
Understand: Listening for General Details.

Practice: Listening Comprehension Tests - *Testing Exercises*

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

Exercise – V CALL Lab:
Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests -*Testing Exercises*

ICS Lab:
Understand: Group Discussion

Practice: Group Discussion

Minimum Requirement of infrastructural facilities for ELCS Lab:

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

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

     i)   Computers with Suitable Configuration
     ii)   High Fidelity Headphones

2. **Interactive Communication Skills (ICS) Lab :**
The Interactive Communication Skills Lab: A Spacious room with movable chairs and 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 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 using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, 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-situ conservation. 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.

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),Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha 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 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

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 Equations and 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
(Course Code: 23CH202BS)

B.Tech. I Year II Sem.

L	T	P/D	C
3	1	0	4

Course Objectives:

1. To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
2. To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion it's control to protect the structures.
3. To imbibe the basic concepts of petroleum and its products.
4. To acquire required knowledge about engineering materials like Cement, lubricants and refractories.

Course Outcomes:
1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can learn the fundamentals and general properties of polymers and other engineering materials.
4. They can predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT - I: Water and its treatment: [8]
Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications-Steps involved in the treatment of potable water-Disinfection of potable water by chlorination and break point of chlorination.

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

UNIT – II Battery Chemistry & Corrosion [8]
Introduction of **Electrochemistry**-Electro chemical cells, Electrode potential, standard electrode potential, Nernst equation, Numerical problems.

Batteries: Classification of batteries-Basic requirements for commercial batteries. Primary battery-Li cell, Secondary battery-Construction, working and applications of Lithium ion battery and Lead-acid battery. Fuel Cells-Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell.

Corrosion: Causes and effects of corrosion–theories of chemical and electrochemical corrosion–mechanism of electrochemical corrosion. Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods-Cathodic protection–Sacrificial anode and impressed current methods. Electro plating-copper plating, Electro less plating-Ni plating.

UNIT - III: Polymeric materials: [8]
Definition–Classification of polymers with examples–Types of polymerization–addition (free radical addition) and condensation polymerization with examples.
Fibers: Nylon 6:6 and Terylene
Plastics: Definition and characteristics-thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP).
Rubbers: Natural rubber and its vulcanization. **Elastomers:** Characteristics, preparation, properties and applications of Buna-S, Butyl and Thiokolrubber.
Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in Trans-polyacetylene and applications of conducting polymers.
Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Energy Sources: [8]
Introduction, Calorific value of fuel – HCV, LCV -Dulongs formula, Calorific value numerical problems.

Classification of fuels. **Solid fuels**: analysis of coal–proximate and ultimate analysis and their significance. **Liquid fuels**: petroleum and its refining, cracking types–moving bed catalytic cracking. Knocking–octane and cetane rating, synthetic petrol-Fischer-Tropsch's process; **Gaseous fuels**: Composition and uses of natural gas, LPG and CNG.

UNIT - V: Engineering Materials: [8]
Cement: Portland cement, its composition, classification of cements, setting and hardening of cement.
Lubricants: Classification of lubricants with examples-characteristics of a good lubricants, properties of lubricants: viscosity, cloud point, pour point, flash point and fire point, mechanismof lubrication (thick film, thin film and extreme pressure).
Refractories: Classification of refractories, characteristics of good refractories. Applications of refractories.

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

REFERENCE BOOKS:

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

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, Development of surfaces using computer aided drafting

UNIT – V:
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and

Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion 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.

BASIC ELECTRICAL ENGINEERING
(Course Code: 23EE204ES)

B.Tech. I Year II Sem.

L	T	P	C
2	0	0	2

Prerequisites: Mathematics

Course Objectives:
- To understand DC and Single & Three phase AC circuits
- To study and understand the different types of DC, AC machines and Transformers.
- To import the knowledge of various electrical installations and the concept of power, powerfactor and its improvement.

Course Outcomes: After learning the contents of this paper the student must be able to
- Understand and analyze basic Electrical circuits
- Study the working principles of Electrical Machines and Transformers
- Introduce components of Low Voltage Electrical Installations.

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

UNIT-II:
A.C. Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations series resonance in series R-L-C circuit.

UNIT-III:
Transformers: Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV:
Electrical DC Machines: Construction and working principle of dc machine, performance characteristics of dc shunt machine.

Electrical AC Machines Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Construction and working of Single-phase induction   motor.

UNIT-V:

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.

2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

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

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

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

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

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

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

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

ELECTRONIC DEVICES AND CIRCUITS
(Course Code: 23EC205ES)

B.Tech. I Year II Sem.

L	T	P/D	C
2	0	0	2

Course Objectives:
1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of devices.
3. To know the switching characteristics of devices.

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

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

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

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

UNIT - III
Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

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

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

TEXT BOOKS:
1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson.

REFERENCE BOOKS:
1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford.
2. ChinmoySaha, ArindamHalder, DebaatiGanguly - Basic Electronics-Principles and Applications, Cambridge, 2018

APPLIED PYTHON PROGRAMMING LABORATORY
(Course Code: 23CA206ES)

I Year B.Tech. II Sem

L	T	P/D	C
0	1	2	2

Course Outcomes: Upon completing this course, the students will be able to

CO1: Build basic programs using fundamental programming constructs

CO2: Write and execute python codes for different applications

CO3: Capable to implement on hardware boards

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	1	1			1		1	1
CO2	2	3	2	1	1	2			1		1	1
CO3	2	3	2	1	1	2			1		1	1

LIST OF EXPERIMENTS:
Cycle - 1

1. Downloading and Installing Python and Modules
   a) Python 3 on Linux
      Follow the instructions given in the URL https://docs.python-guide.org/starting/install3/linux/
   b) Python 3 on Windows
      Follow the instructions given in the URL https://docs.python.org/3/using/windows.html
      (Please remember that Windows installation of Python is harder!)
   c) pip3 on Windows and Linux
      Install the Python package installer by following the instructions given in the URL
      https://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/
   d) Installing numpy and scipy
      You can install any python3 package using the command pip3 install <packagename>
   e) Installing jupyterlab
      Install from pip using the command pip install jupyterlab
2. Introduction to Python3
   a) Printing your biodata on the screen
   b) Printing all the primes less than a given number
   c) Finding all the factors of a number and show whether it is a perfect number, i.e., the sumof all its factors (excluding the number itself) is equal to the number itself

3. Defining and Using Functions
    a) Write a function to read data from a file and display it on the screen
    b) Define a boolean function is palindrome(<input>)
    c) Write a function collatz(x) which does the following: if x is odd, x = 3x + 1; if x is even, then x = x/2. Return the number of steps it takes for x = 1
    d) Write a function $N(m, s) = \exp(-(x-m)^2/(2s^2))/\mathrm{sqrt}(2\pi)s$ that computes the Normal distribution

4. The package numpy
    a) Creating a matrix of given order m x n containing random numbers in the range 1 to 99999
    b) Write a program that adds, subtracts and multiplies two matrices. Provide an interface such that, based on the prompt, the function (addition, subtraction, multiplication) should be performed
    c) Write a program to solve a system of n linear equations in n variables using matrix inverse

5. The package scipy and pyplot
    a) Finding if two sets of data have the same mean value
    b) Plotting data read from a file
    c) Fitting a function through a set a data points using polyfit function
    d) Plotting a histogram of a given data set

6. The strings package
    a) Read text from a file and print the number of lines, words and characters
    b) Read text from a file and return a list of all n letter words beginning with a vowel
    c) Finding a secret message hidden in a paragraph of text
    d) Plot a histogram of words according to their length from text read from a file

Cycle -2

7. Installing OS on Raspberry Pi
   a) Installation using PiImager
   b) Installation using image file
      - Downloading an Image
      - Writing the image to an SD card
        - using Linux
        - using Windows
      - Booting up

   Follow the instructions given in the URL
   https://www.raspberrypi.com/documentation/computers/getting-started.html

8. Accessing GPIO pins using Python
   a) Installing GPIO Zero library.
      First, update your repositories list:
      sudo apt update
      Then install the package for Python 3:
      sudo apt install python3-gpiozero
   b) Blinking an LED connected to one of the GPIO pin
   c) Adjusting the brightness of an LED
   d) Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.

9. Collecting Sensor Data
   a) DHT Sensor interface
   ◦ Connect the terminals of DHT GPIO pins of Raspberry Pi.
   ◦ Import the DHT library using import Adafruit_DHT
   ◦ Read sensor data and display it on screen.

ENGINEERING CHEMISTRY LABORATORY
(Course Code: 23CH207BS)

B.Tech. I Year II Sem.

L	T	P/D	C
0	0	2	1

Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

- Estimation of hardness of water to check its suitability for drinking purpose.
- Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
- Students will learn to prepare polymers such as Bakelite and nylon-6:6 in the laboratory.
- Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.

Course Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness of water.
- Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
- Students are able to prepare polymers like bakelite and nylon-6:6.
- Estimations saponification value, surface tension and viscosity of lubricant oils.

List of Experiments:
I. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometry method.
II. Conductometry: Estimation of the concentration of a weak acid by Conductometry.
III. Potentiometry: Estimation of the concentration of a strong acid by Potentiomentry.
IV. pH Metry: Determination of the concentration of a strong acid by using pH meter.
V. Preparations:
    1. Preparation of Bakelite.
    2. Preparation Nylon–6:6
VI. Lubricants:
    1. Determination of surface tension of a given liquid by using stalagmometer.
    2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
VII. Colorimetry: Determination of Ferrous Iron in Cement by Colorimetric method.
VIII. Virtual lab experiments
    1. Construction of Fuel cell and its working.
    2. Batteries for electrical vehicles.
    3. Functioning of solar cell and its applications.
REFERENCE BOOKS:
    1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
    2. Vogel's text book of practical organic chemistry 5th edition
    3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
    4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

BASIC ELECTRICAL ENGINEERING LAB
(Course Code: 23EE208ES)

B.Tech. I Year II Sem.

L	T	P	C
0	0	2	1

Prerequisites: Basic Electrical Engineering

Course Objectives:
- To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach.
- To study the transient response of various R, L and C circuits using different excitations.
- To determine the performance of different types of DC, AC machines and Transformers.

Course Outcomes: After learning the contents of this paper the student must be able to
- Verify the basic Electrical circuits through different experiments.
- Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.
- Analyze the transient responses of R, L and C circuits for different input conditions.

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

1 Verification of KVL and KCL
2 Verification of Thevenin's and Norton's theorem
3 Transient Response of Series RC circuit for DC excitation
4 Resonance in series RLC circuit
5 Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6 Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7 Performance Characteristics of a DC Shunt Motor
8 Verification of Superposition theorem

PART-B (any two experiments from the given list)

1 Torque-Speed Characteristics of a Three-phase Induction Motor.
2 Three Phase Transformer: Verification of Relationship between Voltages and Currents(Star-Delta, Delta-Delta, Delta-star, Star-Star)
3 Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
4 Measurement of Active and Reactive Power in a balanced Three-phase circuit
5 No-Load Characteristics of a Three-phase Alternator

TEXT BOOKS:

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

REFERENCE BOOKS:

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

ELECTRONIC DEVICES AND CIRCUITS LABORATORY
(Course Code: 23EC209ES)

B.Tech. I Year II Sem.

L	T	P/D	C
0	0	2	1

Course Outcomes: Students will be able to

1. Acquire the knowledge of various semiconductor devices and their use in real life.
2. Design aspects of biasing and keep them in active region of the device for functional circuits
3. Acquire the knowledge about the role of special purpose devices and their applications.

List of Experiments (Twelve experiments to be done):

Verify any twelve experiments in H/W Laboratory

1. PN Junction diode characteristics   A) Forward bias B) Reverse bias.
2. Full Wave Rectifier with & without filters
3. Types of Clippers at different reference voltages
4. Types of Clampers at different reference voltages
5. The steady state output waveform of clampers for a square wave input
6. Input and output characteristics of BJT in CB Configuration
7. Input and output characteristics of BJT in CE Configuration
8. Input and output characteristics of BJT in CC Configuration
9. Input and output characteristics of MOSFET in CS Configuration
10. Input and output characteristics of MOSFET in CD Configuration
11. Switching characteristics of a transistor
12. Zener diode characteristics and Zener as voltage Regulator
13. SCR Characteristics.
14. UJT Characteristics and identify negative region
15. Photo diode characteristics
16. Solar cell characteristics
17. LED Characteristics
    * Design a circuit to switch on and off LED using diode /BJT/FET as a switch.

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters, voltmeters and Ammeters
5. Electronic Components and devices