HYDERABAD INSTITUTE OF TECHNOLOGY AND MANAGEMENT

B.TECH. HR-22 COURSE STRUCTURE

CSE-IoT

(Applicable for the batch admitted from 2022-23 onwards)

Induction Program-2 Weeks

I-Semester (1 Year)

S. No.	Course code	Course title	Hours Per Week			Credits
			L	T	P	
1	22BS1MT01	Matrix Algebra and Calculus	3	1	0	4
2	22BS1CH01	Engineering Chemistry	3	0	0	3
3	22ES1CS01	Problem Solving using C*	3	1	2	5
4	22ES1ME03	Computer Aided Engineering Graphics*	2	0	2	3
5	22ES1EE19	Basic Electrical and Electronics Engineering	2	0	0	2
6	22ES1EE20	Basic Electrical and Electronics Engineering Lab	0	0	4	2
7	22BS1CH02	Engineering Chemistry Lab	0	0	2	1
		TOTAL	**13**	**2**	**10**	**20**
8	22MC1HS01	Social and Health Consciousness	0	2	0	0

II-Semester (1 Year)

S. No.	Course code	Course title	Hours Per Week			Credits
			L	T	P	
1	22BS2MT02	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	22ES2CS02	Python Programming*	3	1	2	5
3	22BS2PH01	Applied Physics	3	0	0	3
4	22ES2ME01	Engineering Prototyping Lab	0	1	2	2
5	22ES2ME02	Design Thinking Lab	0	1	2	2
6	22BS2EG01	English for Skill Enhancement	2	0	0	2
7	22BS2EG02	English Language & Communication Skills Lab	0	0	2	1
8	22BS2PH02	Applied Physics Lab	0	0	2	1
		TOTAL	**11**	**4**	**10**	**20**
9	22MC2HS02	Environmental Science	0	2	0	0

B. Tech I Year–I Sem   **L   T   P   C**

Subject Code:22BS1MT01   **3   1   0   4**

MATRIX ALGEBRA AND CALCULUS
(Common to EEE/MECH/ECE/CSE/CSC/CSD/CSM/CSO)

Pre-requisite: Basics of Matrices, Differentiation and Integration

Course Objectives: To provide the student with

1. Concept of rank of a matrix and applying this concept to find the solution for system of equations, if it exists.
2. Concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form of a matrix.
3. Geometrical approach to the mean value theorems and their applications to the mathematical problems.
4. Evaluation of surface areas and volumes of revolutions of curves.
5. Evaluation of improper integrals using Beta and Gamma functions.
6. Partial differentiation, concept of total derivative.
7. Finding maxima and minima of function of two and three variables.
8. Evaluation of multiple integrals and their applications.

MODULE I
Matrices: Rank of a matrix by echelon reduction, Normal form. Inverse of Non-singular matrices by Gauss-Jordan method.
System of Linear Equations: Solution of a linear algebraic system of equations (homogeneous and non-homogeneous). Gauss's-Elimination and LU decomposition method.

MODULE II

Eigen Values and Eigen Vectors: Linear Transformation and Orthogonal Transformation: Eigen values, Eigen Vectors and their properties with reference to inverse, transpose, symmetric, skew-symmetric, Hermitian, skew-Hermitian. Orthogonal and Unitary matrices. Cayley - Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem Diagonalization of a matrix, Orthogonal diagonalization of real symmetric matrices.
Quadratic form: Canonical form, Index, Signature and Nature of a quadratic form. Reduction of quadratic form to canonical form by orthogonal transformation.

MODULE III

Differential Calculus: Mean Value Theorems: Rolle's Theorem, Lagrange's theorem (Statement and Geometrical Interpretation) Cauchy's mean value theorem (Statement). Taylor's, Maclaurin's series, applications and approximation of a function by Taylor's series.

Integral Calculus: Applications of definite integrals to evaluate surface areas and volumes of revolution of curves (only in Cartesian coordinates). Improper integral: Beta and Gamma functions and their applications.

MODULE IV
Partial Differentiation: Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Taylor's Series for two variables.
Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

MODULE V

Multiple Integrals: Double integrals: Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), change of variables (Cartesian to polar coordinates).

Triple Integrals: Evaluation of triple integrals, Change of variables (Cartesian to Spherical and Cylindrical polar coordinates).

Applications: Areas of plane region (by double integrals) and volumes (by double integrals and triple integrals).

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 36th Edition, 2010
2. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, R.K. Jain and S.R.K.Iyengar, Narosa publishing house, Fourth edition 2014
2. Advanced Modern Engineering Mathematics Glyn James, 5th edition, Prentice Hall, 2018.
3. Engineering Mathematics, Srimanta Pal, Subodh C. Bhunia, Oxford University Press, 2015

MOOC Courses:

1. Calculus: https://nptel.ac.in/courses/111/107/111107108/
2. Calculus: https://nptel.ac.in/courses/111/105/111105122/

E- Books:
1.Advanced Engineering Mathematics by R.K. Jain https://1lib.in/book/16822856/8e87eb
2.Higher Engineering Mathematics" B.S. Grewal https://1lib.in/book/2352263/9368cb
3.Advanced Engineering Mathematics by Erwin kreyszig https://1lib.in/book/1213502/92e465
4.Advanced Modern Engineering Mathematics by Glyn James
https://1lib.in/book/1204739/431eb2

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

CO1: Determine the rank of a matrix, solution of the system of equations, Eigen values and Eigen vectors of the matrix also canonical form of quadratic form by orthogonal transformation**s.**

CO2: Evaluate surface areas, volumes of solids of revolution, improper integrals and multiple integrals.

CO3: Find the extremum of a multi-variable function with or without constraints.

CO4: Apply Multiple integrals and mean value theorems in relevant to engineering problems.

<table>
<tr><td colspan="13">CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – High; 2 – Medium; 1 – Low</td></tr>
<tr><td rowspan="3">Course Outcomes (COs)</td><td colspan="12">Program Outcomes (POs)</td></tr>
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<tr><td>CO1</td><td>3</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td>3</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td>3</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td>3</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

B.Tech I Year–I Sem

	L	T	P	C

Subject Code: 22ES1CS01   3   0   4   5

Problem Solving Using C
(Common to CSE/CSM/CDS/CSC/CSO/ECE/EEE/IOT)

Prerequisite: Basic mathematical, analytical and logical capability

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- Enable learners to design, develop and apply logic to solve mathematical and scientific problem.

Course Outcomes:

- Apply the fundamentals of computer and programming language, to draw flow chart, algorithm to solve given program.
- Comprehend the general structure of C program using control structures, functions, recursion to support reusability.
- Apply searching and sorting algorithms for the given list of elements
- Design an application to solve real world problem.

Module I

Introduction to Computer

Van-Neumann Neuann computer architecture, data representation in computer-number systems, types of software, problem techniques-algorithm- properties, constituent of algorithms / different strategies- sequence, selection and repetition, flow chart examples. Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs

Basic Elements of C

Introduction to programming paradigms - Structure of C program - C programming: Data Types – Storage classes - Constants – Enumeration Constants - Keywords – variable, declarations, expressions, symbolic constants, Operators and Expressions Operator precedence and associativity of operators -Input and Output Functions-Library Functions - Header Files - Input/output statements, Assignment statements – Pre-processor directives - Compilation process

Programs:

1. Write an algorithm and draw a flowchart that will read the two sides of a rectangle and calculate its area.
2. Write an algorithm to determine a student's final grade and indicate whether it is passing or failing. The final grade is calculated as the average of four marks.

3. Draw a flowchart to compute the final price of an item after figuring in sales tax.
4. Write a C program to evaluate algebraic expression $(ax+b)/(ax-b)$
5. Write a simple program that prints the results of all the operators available in C (including pre/ post increment, bitwise and/or/not, etc.). Read required operand values from standard input.
6. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values form standard input.

Module II

Selection/Decision Making and Repetition

Decision Making and Branching: simple if, if else, if else ladder, nested if, switch, nested switch-syntax, flowchart and example programs. switch statement – the break statement -? : operator, Decision Making and Looping: while, do-while, for, nested loops-syntax, flowchart and example programs. Unconditional Branching Statements: break, continue and go to-syntax, flowchart and example programs.

Decision Making: if statement - if-else statement - else-if ladder –Looping statements –While –do-while- Still more looping-For statement, Nested control statements- - Continue statement - goto statement.

User Defined Functions

Need for User defined functions, a multifunction program- Elements of user defined functions Definition of Functions- Return values and their Types- Function Calls-Function Declaration Category of functions- Nesting of functions – Built-in functions (string functions, math functions) – Recursion.

Programs:

1. Write a C program to find whether a character is consonant or vowel using switch statement.
2. Write a C program to find the factorial of a given integer using recursive function.
3. Write a program to print the value of $f(x) = ax2 + bx + c$ for a = 1.0, b=2.0 and c = 1.0 for x = 3.0, and 4.0 respectively.
4. Write a program to check whether the binary representation of an integer is palindrome or not.
5. Write a program to check whether a number is Armstrong or not (e.g. 153=13+53+33).
6. Write a program to compute the value of nCm using Recursion where n and m are input by user.

Module III

Arrays and Strings

variable Vs array, types of arrays- one dimensional array -declaration, initialization, accessing elements, example programs, two-dimensional array-declaration. initialization. accessing elements, example programs and multi-dimensional array example programs., Passing Arrays to Functions.

Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Pointers

Address and indirection operators, Pointer type declaration, assignment, initialization – Pointer arithmetic – Functions and pointers – Arrays and pointers -Strings and pointers – Multi-dimensional arrays using pointers – Pointer to arrays – Pointers to functions – Dynamic memory management

Programs:

1. Write a C program to compute sum of the elements stored in an array using pointers and user defined function.
2. Write a C program to perform the basic Matrix operations
   - i)   Subtraction
   - ii)   Addition
   - iii)   Multiplication
   - iv)   Transpose.
3. Write a C program to count the lines, words and characters in a given text
4. Write a C program to input any string and delete the extra blanks spaces present in the same
5. Write a program to concatenate 2 strings using pointers. Do not use strcat function.
6. Write a program that will read an array of integers. The program should display the elements appearing at even and odd subscript position separately.

Module- IV

Dynamic Memory Management

Dynamic Memory Allocation –Allocating a Block of memory, multiple blocks, releasing used space, altering the size of block.

Structures & Unions

Defining a Structure- initializing structures - Processing a Structure – User defined Data Types – Nested structure - Structures and Pointers - Passing Structures to Functions - Self Referential Structures- Array of structures, Union.

Programs:

1. Write a C program to Display array elements using calloc( ) function
2. Write a C program, by using structure to read and print data of n employees (Name, Employee Id and Salary)
3. Write a C program, which Declare a union containing 5 string variables (Name, House Name, City Name, State and Pin code) each with a length of C_SIZE (user defined constant). Then, read and display the address of a person using a variable of the union.
4. Write a C program to extract individual bytes from an unsigned int using union.
5. Write a C program to calculate the sum of n numbers entered by the user
6. Write a C program to Calculate Total and Percentage marks of a student using structure.

Module V

Data Files

Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

Opening and Closing a Data File - Creating a Data File – Reading & writing a data file. Processing and Updating of Data Files - Unformatted Data Files - Programs using merging, searching of data file contents.

Preprocessor Directives

Commonly used Preprocessor commands like include, define, elif, else, endif, undef, if, ifdef, ifndef

Programs:

1. Write a C program to print every 5th character from current position in a given file.
2. Write a C program to merge two files into a third file
3. Write a C program for #ifdef, #else and #endif
    - "#ifdef" directive checks whether particular macro is defined or not. If it is defined, "If" clause statements are included in source file.
    - Otherwise, "else" clause statements are included in source file for compilation and execution.
4. Write a C program to display the contents of a file to standard output device.
5. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
6. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

TEXT BOOKS:

1. Byron S. Gottfried, "Programming with C", Second Edition, Tata McGraw Hill, 2010.
2. Reema Thareja, "Programming in C", Oxford university press, 2nd Edition, 2016.
3. Computer Science: A Structured Programming Approach Using C - B. A. Forouzan and R.F. Giliberg, Third Edition, Cengage Learning'

REFERENCE BOOKS:

1. W. Kernighan Brian, Dennis M. Ritchie, "The C Programming Language", PHI Learning, 2nd Edition, 1988.
2. Yashavant Kanetkar, "Exploring C", BPB Publishers, 2nd Edition, 2003.
3. Schildt Herbert, "C: The Complete Reference", Tata McGraw Hill Education, 4th Edition, 2014.
4. R. S. Bichkar, "Programming with C", Universities Press, 2nd Edition, 2012.
5. Dey Pradeep, Manas Ghosh, "Computer Fundamentals and Programming in C", Oxford University Press, 2nd Edition, 2006.
6. Stephen G. Kochan, "Programming in C", Addison-Wesley Professional, 4th Edition, 2014.

WEB RESOURCES:

- http://computer.howstuffworks.com/c.htm

- http://www.le.ac.uk/cc/tutorials/c/

- http://www.eskimo.com/~scs/cclass/notes/top.html (for notes)

- http://www.cprogramming.com/tutorial.html

- http://www2.its.strath.ac.uk/courses/c/

Course Outcomes (COs)	CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low			
	Program Outcomes (POs)												Program Specific Outcomes*		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1	2										2		
CO2	3	1	2										1		
CO3					2								1		
CO4					2								1		

Subject Code: **2**   **0**   **2**   **3**
22ES1ME03/ 22ES2ME03

Computer-Aided Engineering Graphics
(Common to Mechanical, EEE, ECE,CSE, CSM,CSO,CSD and CSC)

Pre-requisite: Basic Geometry and maths.

Course Objectives:
1. To provide basic concepts in engineering drawing.
2. To impart knowledge about standard principles of orthographic projection of objects
3. To draw sectional views and pictorial views of solids.
4. To know development of different types of surfaces.
5. To draw Isometric to Orthographic Projections and Vice-versa.

Module I

Introduction to Engineering Graphics and CAD:
Drawing Instruments and their uses, types of lines, Lettering, Rules of dimensioning. Construction of polygons - practice only. Conic Sections: Ellipse, Parabola, Hyperbola including the Rectangular Hyperbola - General method only.

Cycloid, Epicycloid, and Hypocycloid, Scales – Construction of Plain & Diagonal scales. Introduction to CAD software packages commands.

Module II
Orthographic Projections of Points and Lines:
Orthographic Projection of points: Projection of points placed in different quadrants, Orthographic Projection of straight lines inclined to one and two reference planes placed in the first quadrant only.

Module III
Orthographic Projections of Planes and Solids:
Projections of Planes inclined to one and two reference planes placed in the first quadrant only.

Projections of Solids: Projections of Regular Solids – Regular Polyhedra, solids of revolution, Axis inclined to both planes. Computer aided projections of solids.

Module IV

Sections of Solids and Development of Lateral Surfaces

Introduction to Auxiliary views, Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone .

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

Module V

Isometric Projections/views:
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. Conversion of orthographic views to Isometric views using computer aided drafting.

Transformation of Projections:
Conversion of Isometric views to orthographic views.
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Note: - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as 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

Equivalent Mooc Courses :

1. **https://nptel.ac.in/courses/112/104/112104172/**
2. https://nptel.ac.in/courses/112/103/112103019/
3. **https://www.classcentral.com/course/swayam-engineering-graphics-5305**

4. https://www.greatlearning.in/academy/learn-for-free/courses/engineering-graphics-drawing
5. https://www.classcentral.com/course/swayam-engineering-architectural-graphics-part-i-orthographic-projection-22964

Course Outcomes:

At the end of the course student able to

1. CO1 – Identify the suitable scale and Construct engineering curves using CAD.
2. CO2 – Demonstrate the orthographic projections of all planes and Solids.
3. CO3 – Illustrate the position of the sectional planes for given sections of solids using CAD.
4. CO4 – Convert the isometric to orthographic projections and orthographic to isometric projections of solids.

<table>
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<tr><td>CO3</td><td>H</td><td>M</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td>H</td><td>M</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

B.Tech I Year – I Sem	L	T	P	C
Subject Code: 22ES1EE19	2	0	0	2

Basic Electrical & Electronics Engineering
(IOT)

Pre-requisite: Basic Mathematics & Physics

Course Objectives:
1) To introduce the concepts of electrical circuits and their components
2) To understand DC circuits and AC single-phase & three-phase circuits
3) To study and understand the different types of AC machines.
4) To introduce the concept of power, power facto and its improvement.
5) To introduce the concepts of diodes & transistors.

Module I: D.C. Circuits

Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, Mesh and Nodal analysis, Voltage and current divide rule, source transformation technique and star delta conversion, analysis of simple circuits with dc excitation. Superposition, Thevenin's, Norton's theorems with problems.

Module II: A.C. Circuits

Representation of sinusoidal waveforms, Average and rms values, peak factor and Formfactor. 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 RLC circuits. Three-phase balanced circuits, voltage and current relations in star and delta connections.

Module III: Electrical Machines

Construction and working principle of DC generators, EMF equation, working principle of DC motors, Back EMF. Single Phase Transformers: Working principle of Single-phase transformer, EMF equation, losses in transformers, efficiency, Three-phase transformer connections. Three Phase Induction motors - Principle of operation, slip, slip -torque characteristics.

Module IV: Diodes & Rectifiers

Principle of Operation of Diode, Volt-Ampere characteristics, Zener diode characteristics, applications. P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier.

Module V: TRANSISTORS

Construction, Principle of Operation, Current amplification factor, Transistor as amplifier. MOSFET, Input – output characteristics.

TEXT BOOKS:

 1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University

 2. Basic Electrical and electronics Engineering-D P Ko

thari. I J Nagarath, McGraw Hill Education

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006. 2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.

2. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.

3. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010 5. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.

4. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

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

Web Resources:
   1. **https://nptel.ac.in/courses/108/104/108104139/**
   2. **https://nptel.ac.in/courses/117/103/117103063/**

E- Books:

   1. **https://www.academia.edu/42933156/Basic_Electrical_Engineering_VK_Mehta**
   2. **https://www.opentextbooks.org.hk/system/files/export/9/9648/pdf/Fundamentals_of_Electrical_Engineering_I_9648.pdf**

Course Outcomes:
- CO1 – To analyze the electrical circuits with DC excitation.
- CO2 – To analyze electrical circuits with AC excitation
- CO3 – To Explain the working principles of electrical machines
- CO4 – To Analyze the characteristics of Electronic devices like diodes and transistors

Course Outcomes (COs)	Program Outcomes (POs)											
CO-PO/PSO Mapping Chart **(3/2/1 indicates strength of correlation)** **3 – High; 2 – Medium; 1 – Low**												
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2			2							
CO2	3	3										
CO3	3	2										
CO4	3	3										

	L	T	P	C
B.Tech I Year – I Sem				
Subject Code: 22ES1EE20	**0**	**0**	**4**	**2**

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING Laboratory (IOT)

Pre-requisite: Basic Electrical and Electronics Engineering.

Course Objectives:
1. To introduce the concepts of electrical circuits and its components.
2. To get the practical experience with the operation and applications of electromechanical energy conversion devices.
3. To get the knowledge of the different electronic devices like diodes, rectifiers, transistors.
4. To learn how to measure the electrical quantities with different measuring devices and with CRO

PART A: ELECTRICAL
Note: All experiments are mandatory
1. Verification of ohms law
2. Verification of KVL and KCL
3. Verification of Superposition theorem.
4. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
5. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
6. Performance Characteristics of a Three-phase Induction Motor
7. Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta star, Star-Star) in a Three-Phase Transformer

PART B: ELECTRONICS
Note: Any three experiments should be conducted
1. Study and operation of (i) multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as Voltage Regulator
4. Half Wave Rectifier Circuit
5. Full Wave Rectifier Circuit

Text Books:
1. Basic Electrical and Electronics Engineering –M S Sukija TK Nagasarkar Oxford University

2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

Reference Books:
1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998
3. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications

Course Outcomes:
• Analyze the electrical circuits using network laws.
• Understand the operation and applications of electromechanical energy conversion devices.
• Understand the working of various electrical and electronic components
• Analyze the characteristics of various electronics components.

Course Outcomes (COs)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	M	H		H								
CO2	M	M		H								
CO3	M	M		H								
CO4	M	H		H								

CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – High; 2 – Medium; 1 – Low
Program Outcomes (POs)

B.Tech. I Year–I Sem/II Sem	L	T	P	C
Subject Code: 22BS1CH02/22BS2CH02	0	0	2	1

ENGINEERING CHEMISTRY LAB
(Common to CSE/ECE/CSM/CSD/CSC/CSO)

Pre-requisite: Concepts of Chemistry at 10+2 level

Course Objectives:

The student will learn

- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- Students are able to perform estimations of acids, bases and ions using conductometry, potentiometry and colorimetric methods.
- Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.
- To check the purity of organic molecules by thin layer chromatographic (TLC) technique.

List of Experiments:

I. Volumetric Analysis

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry

II. Instrumental Analysis

1. Estimation of an HCl by Conductometric titrations
2. Estimation of Acetic acid by Conductometric titrations
3. Estimation of HCl by Potentiometric titrations
4. Estimation of copper ion by colorimetric method.

III. Lubricants

1. Determination of acid value of coconut oil.
2. Determination of viscosity of castor oil by using Ostwald's viscometer
3. Determination of surface tension of a give liquid using stalagmometer.

IV. Virtual Lab Experiments

    1. Batteries for electrical vehicle

    2. Functioning of solar cell and its applications

    3. Homology modelling of proteins

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).

Course Outcomes: Students will be able to

CO1: Estimate the hardness and chloride content in given water sample.

CO2: Determination of physical properties like acid value, surface tension and viscosity.

CO3: Determine the strength of the given sample by appropriate instrumental method.

CO4: Execute the virtual lab experiments using simulation tool-Functioning of electric vehicle, solar cell and homology modelling.

CO-PO Mapping Chart

(3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low

Course Outcomes (COs)	Program Outcomes (POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3											
CO2	3											
CO3	3											
CO4	3				2							

B. Tech I Year–I/II Sem	**L**	**T**	**P**	**C**

B. Tech I Year–I/II Sem

Subject Code:
22MC1HS01/22MC2HS01

	L	**T**	**P**	**C**
	0	2	0	0

SOCIAL AND HEALTH CONSCIOUSNESS
(Common to (ECE, EEE, ME, CSE, CSD, CSO, CSC, CSM)

Course Objectives:
1. To promote positive health, prevention of stress related to health problems and rehabilitation through Yoga.
2. To impart skills in the students to introduce Yoga for health to general public
3. To invoke scientific attitude and team spirit to channelize their energies in to creative and constructive endeavours.
4. The main objective of National Service Scheme is personality development through social service or community service and through physical education.

Module I

Unit 1:Introduction to Yoga and Importance of Yogic practices
Definition, nature and scope of yoga-Elements of Yoga in Vedic and Upanashadic literature. -Development of yoga through the ages. - Schools of yoga: Karma Yoga, Bhakti Yoga, Jnana Yoga, Hatha yoga, Raja yoga and Mantra Yoga.General benefits of Yoga Practices, preparing oneself for yoga practices, Comparison between yoga practices and other systems of physical exercises though practical examples.

Unit 2: Concept of Yoga Practices and its Types
Types of Yoga -Hatha Yoga, Raja Yoga, Laya Yoga, Bhakti Yoga, Gyan Yoga, Karma Yoga,Asthang Yoga, Relevance of Yoga in modern life. Yama and Niyama (Attitude Training Practices), Asana (Steady Postures), Pranayama (control of the breathing process), Mudras and Bandhas (seal and lock for energy), Shat Kriya (six purification techniques), Dhyana (Meditation)

Module   II

Unit 3:Asana
Definition, Scope and limitations of Asana, Classification of Asanas and different types of Asanas relating to posture**,** Role of asana in yogic spiritual Yogic culture and Physical culture, different stage and phases in the performing of asana, Comparison between Asanas and other systems of physical exercises through practical examples**.**

Unit 4:Pranayama
Definition, Different phases of Pranayama, Importance of Pranayama in Yogic Curriculum, Comparison between pranayama & deep breathing exercises with practical examples.

Module III

Unit 5: Introduction to the physical education and ethics in sports

Meaning&DefinitionsofEducation- Aim&ObjectivesofEducation-
ImportanceofEducationintheModern Era-Meaning&DefinitionsofPhysicalEducation.

Values- Importance, Sources of Value System, Types, Loyalty. Ethics in Sports– Nature, Characteristics and Needs, Ethical practices in the field of Sports, Sports Code of Conduct. Sports As a Profession– Organization demand, Individual needs and professional ideal.

Unit 6:Olympic,CommonwealthandAsianGames

Ancient Olympic Games –Historical Background, Significance ofAncientGames. -
ModernOlympicGames:OlympicMotto,Emblem,Rings,InternationalOlympicCommittee(IOC),functionsofIOC - AsianGames

Module 4

Unit 7: Philosophy of National Service Scheme (NSS)

Introduction and Basic Concepts of NSS, History and Philosophy & Definition of NSS, Aims & Objectives of NSS, Emblem, flag, Motto, Song, Badge, NSS day etc., Organizational structure (from national to regional level), Roles and responsibilities of various NSS functionaries

Unit 8: NSS Programmes and Activities

NSS Programmes and Activities, Concept of regular activities (one day camp), special seven-day conduction camping, day and night camps and relevance of celebration of important days recognized by united nations, Centre, State Govt. & University, Basis of adoption of village/slums, methodology of conduction survey, financial pattern of the scheme, Coordination with different agencies, Maintenance of the diary

Module 5

Unit 9:Community Mobilization

Functioning of community stakeholders, Designing the message in the context of the problem and the culture of the community, Identifying methods of mobilization, Youth-Adult partnership, Concept of Community development

Unit 10:Volunteerism and Government Organisations /Non-Government Organisations

Indian tradition of volunteerism, Value system of volunteerism, Motivation and constraints of volunteerism, Role of NSS volunteers in Swatch Bharat Abhiyan, Role of NSS volunteers in Digital India, Sources of funding National Service Scheme (NSS)-Government organisations (GO) and Non-Government organisations (NGO).

Text Books:

1. The Heart of Yoga: Developing a Personal Practiceby T.K.V. Desikachar
2. The Yoga Sutras by Satchidananda
3. Freeman–PhysicalEducationinChangingSociety
4. SinghAjmer,et.al.ModernTextBookofPhysicalEducationHealth&Sports,Kal yaniPublisher.
5. National Service Scheme: A Youth Volunteers Programme for Under Graduate Students as Per UGC Guidelines 2nd Semester (PB),1 January 2020, by Amit Kumar Jain & Brijesh Kumar Rat Panwar, J D S

Reference Books:
1. Yoga The Spirit and Practice of Moving into Stillness by Erich Schiffmann
2. Yoga Anatomy by Leslie Kaminoff
3. Essentials of Physical Education" By Ajmer Singh & Jagdish

Web Resources:
1. https://www.yogapoint.com/info/basicmovement.htm
2. https://www.thecut.com/article/best-free-yoga-classes-online.html
3. https://www.futurelearn.com/courses/outstanding-physical-education
4. https://www.udemy.com/course/community_service_engineering

Course Outcomes: Upon completion of the Course, the students will be able to:
1. CO1:Enable the student to have good health and mental hygiene.
2. CO2:Possess emotional stability to integrate moral values through social service.
3. CO3:Attain higher level of consciousness in both physical and mental status.
4. CO4:Understand the concept of ill health and their remedies through yoga.

Course Outcomes (COs)	Program Outcomes (POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1						2		2				3
CO2						3		2				3
CO3						2		2				3
CO4						2		2				3

CO-PO/PSO Mapping Chart

(3/2/1 indicates strength of correlation)

3 – High; 2 – Medium; 1 – Low

B. Tech I Year–II Sem   **L   T   P   C**
Subject Code: 22BS2MT02   **3   1   0   4**

ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to EEE/MECH/ECE/CSE/CSC/CSD/CSM/CSO)

Pre-requisite: Mathematics of 10+2 level

Course Objectives: To provide the student with

1. Methods of solving Ordinary Differential Equations of first & higher order and their applications.
2. Concept of Laplace Transforms, inverse Laplace Transforms and their properties.
3. Solving ordinary differential equations using Laplace transforms techniques.
4. The Physical quantities involved in engineering field related to vector valued function.
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals.

MODULE I

First Order ODE: Geometric interpretation of solutions of first order ODE $\frac{dy}{dx} = f(x, y)$, Exact differential equations, Integrating factors, Linear and Bernoulli's equations.
Applications: Orthogonal trajectories, Newton's law of cooling, Law of natural growth/decay.

MODULE II
Higher Order Ordinary Differential Equations
Higher order homogeneous and non-homogeneous linear differential equations with constant coefficients. Non-homogeneous terms of the type e^{ax}, $\cos ax$, $\sin ax$, $x^k, e^{ax}V$ and $x^k V$. Method of variation of parameters.
Cauchy-Euler's and Legendre's differential equations. Applications: Electrical Circuits (Both first and second order).

MODULE III
Laplace Transforms: Laplace Transform of standard functions; first and second shifting theorems; Laplace transforms of functions when they are multiplied and divided by 't'. Laplace transforms of derivatives and integrals of function; Laplace transforms of Unit step and Impulse functions; Laplace transform of periodic functions.
Inverse Laplace Transforms: Finding inverse Laplace transforms by different methods, convolution theorem (without proof), Solving Ordinary Differential Equations with constant coefficient with given conditions by Laplace Transform method.

MODULE IV

Vector Differentiation: Scalar and vector point functions, Concepts of gradient, divergence and curl of functions in Cartesian framework, Solenoidal fields, irrotational fields, vector identities.

Vector Line Integral: Evaluation of the line integral, concept of work done by a force field, Conservative fields and Potentials.

MODULE V
Surface and Volume Integration: Evaluation of surface and volume integrals, flux across a surface.
Vector Integral Theorems: Green's, Gauss and Stokes theorems (without proofs) and their applications.

TEXT BOOKS:

1.Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 36th Edition, 2010
2. Advanced Engineering Mathematics, R.K. Jain and S.R.K.Iyengar, , Narosa publishing house, Fourth edition 2014.
REFERENCE BOOKS:
1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
2. Engineering Mathematics, Srimanta Pal, Subodh C. Bhunia, Oxford University Press, 2015.

3. Advanced Modern Engineering Mathematics Glyn James, 5th edition, Prentice Hall, 2018.

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

CO1: Solve first, higher order ODE and appreciate their applications in engineering problems.
CO2: Apply Laplace Transforms techniques to solve Ordinary Differential Equations with constant coefficient with given conditions.
CO3: Calculate Divergence, Curl of vector point function and gradient of scalar point function.
CO4: Evaluate Line, Surface and Volume integrals and converting them from one to another.

Course Outcomes (COs)	Program Outcomes (POs)											
CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low												
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1										
CO2	3	1										
CO3	3	1										
CO4	3	1										

B. Tech I Year–II Sem	L	T	P	C
Subject Code:22ES2CS02	3	1	2	5

PYTHON PROGRAMMING

(Common to CSE, DS, IOT, AIML, CS, ECE, ME)

Course Objectives:

- Acquire programming skills in core Python.
- Acquire Object-oriented programming skills in Python.
- Develop the skill of designing graphical-user interfaces (GUI) in Python.
- Develop the ability to handle files and exceptions in Python.

Course Outcomes:

Upon completing this course, the student will be able to

- Apply the concept of functions, class and objects to solve a given problem.
- Perform operations on different types of sequences.
- Develop GUI-based applications.
- Explain the concept of exceptions, multithreading, files and regular expressions.

Module-I
Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types, Python installation.
Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators
Conditional Statements: Selection/Conditional Branching Statements: if, if-else, nested if, if-elif-else statement(s).

Programming:

Week 1:
a) Read the temperature in centigrade and convert it into Fahrenheit.
b) Consider two numbers as input and swap those two values without using 3rd variable.
c) Consider two numbers as input and find the remainder without using % operator.
Week 2:
a) Read your name and age and write a program to display the year in which you will turn 100 years old.
b) Read the year and check whether that year is a leap year.
c) Read 3 numbers and find maximum and minimum among those numbers.

Module – II
Iterative Statements – while and for loop; Nested loops; break, continue, pass, else statements used with loops.
Sequences - String, List, Tuple, Dictionary and Set**.**

Programming:

Week 3:

a) Read your email id and write a program to display the no of vowels, consonants, digits and white spaces.

b) Write a Program to find the sum of a Series $1/1! + 2/2! + 3/3! + 4/4! + \ldots + n/n!$. (Input :n = 5, Output : 2.70833)

c) Read a list of numbers and print the sum of odd integers and even integers from the list.(Ex: [23, 10, 15, 14, 63], odd numbers sum = 101, even numbers sum = 24)

Week 4:

a) Given a list of tuples. Write a program to find tuples which have all elements divisible by K from a list of tuples. test_list = [(6, 24, 12), (60, 12, 6), (12, 18, 21)], K = 6, Output : [(6, 24, 12), (60, 12, 6)]

b) Write a program to perform union, intersection and difference using Set A and Set B.

Week 5:

a) Write a program to do the following operations:
- Create a empty dictionary with dict( ) method
- Add elements one at a time
- Update existing key's value
- Access an element using a key and also get( ) method
- Deleting a key value using del( ) method

b) Write a program to check if the string is symmetrical and palindrome or not. A string is said to be symmetrical if both the halves of the string are the same and a string is said to be a palindrome string if one half of the string is the reverse of the other half or if a string appears same when read forward or backward.

Module - III

Functions: Communicating with functions, Variable Scope and lifetime, return statement, Types of arguments, modules, packages, Lambda functions.

Classes and Objects – Defining Classes, Creating Objects, Class variables and Object variables, __init()__ and __del__() method.

Programming:

Week 6:

a) Write a function merge_dict(dict1, dict2) to merge two Python dictionaries.

b) Given a list of n elements, write a linear_search() function to search a given element x in a list.

c) Write a program to demonstrate the working of built-in statistical functions mean( ), mode( ), median( ) by importing statistics library.

Week 7:

a) Write a program to create a Bank Account class. Your class should support the following methods for
    i) Deposit
    ii) Withdraw
    iii) Get Balance
    iv) Pin Change

Week 8:
        a) Write a program to create an employee class and store the employee name, id, age, and salary using the constructor. Display the employee details by invoking employee_info () method and also using dictionary(__dict__).

Module – IV
Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Raising Exceptions, Related Modules
Regular Expressions: Introduction, Special Symbols and Characters, Res and Python.
GUI Programming: Introduction, Tkinter Widgets and event handling.

Programming:

Week 9:
        a) Write a Python Program to find the roots of a quadratic equation and handle the appropriate exception.
        b) Write a python program to check a given phone number is valid or not.
Week 10:
        a) Write a python program to check a given password is valid or not. A password is considered valid if all the following constraints are satisfied:
- Minimum 8 characters.
- The alphabet must be between [a-z]
- At least one alphabet should be of Upper Case [A-Z]
- At least 1 number or digit between [0-9].
- At least 1 character from [_ or @ or $]

        b) Write a python program to calculate the factorial of a number entered in textfield1 and place the result in textfield2 when the button is clicked.
Week 11:
        a) Write a Python GUI program to create a simple GUI calculator using tkinter.

Module – V
Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules
FILES: File Objects, File Built-in Function [open ()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments.

Programming:

Week 12:
        a) Write a Python program to create two threads where thread1 will print the value from 1-20 and thread2 prints from 21-40.
        b) Write a Python program to multiply two n*n matrices using n threads.
Week 13:
        a) Write a Python program to copy the content of given file to another a file.
        b) Write a Python program to compute the number of characters, words and lines in a file.

Text Books:

1. Reema Thareja, "Python Programming - Using Problem Solving Approach", Oxford Press, 1st Edition, 2017.

2. Philips, "Python 3 Object Oriented Programming", PACKT Publishing, 2nd Edition, 2015.

Reference Text Books:

1. Yashavant Kanetkar, Aditya Kanetkar, "Let Us Python", BPB Publications, 2nd Edition, 2019.
2. Martin C. Brown, "Python: The Complete Reference", McGraw Hill, Indian Edition, 2018.
3. Michael H.Goldwasser, David Letscher, "Object Oriented Programming in Python", Prentice Hall, 1st Edition, 2007.

Web Resources & E-Books:

1. https://www.w3resource.com/python-exercises/
2. https://www.geeksforgeeks.org/python-gui-tkinter/

MOOC's Courses:

1. **"The Joy of computing using Python", NPTEL.**
2. **"Python Programming", NPTEL.**

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3												2		
CO2	3												2		
CO3	3	2			3								2		
CO4	2												2		

Table title: CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low

B.Tech. I Year I Sem/II Sem   **L T P C**
Course Code: 22BS1PH01/ 22BS2PH01   **3 0 0 3**

APPLIED PHYSICS
(Common to CSE/EEE/ECE/MEC/CSM/CSD/CSC/CSO)

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. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
4. Study the characteristics of lasers and optical fibres.
5. Study the fundamental concepts related to the dielectric, magnetic and energy materials.

Pre-requisite: Basic definitions and concepts of Intermediate Physics (10+2)

Module I QUANTUM PHYSICS AND SOLIDS (12hr)
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's hypothesis, Davisson and Germer experiment – Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box. Bloch's theorem -Kronig-Penney model – E-K diagram- effective mass of electron- origin of energy bands- classification of solids.

Module II   SEMICONDUCTORS AND DEVICES (8hr)
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.

Module III: WAVE OPTICS & NANOTECHNOLOGY (10 hrs)
Interference: Coherence, division of amplitude and division of wave front, interference in thin films (transmitted), and Newton's rings experiment.
Diffraction: Distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction due to single slit, diffraction grating, determination of wavelength of light using diffraction grating.

Nanotechnology: Nano scale, 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)

Module IV: LASERS AND FIBRE OPTICS (10 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.

Module V: DIELECTRIC, MAGNETIC AND ENERGY MATERIALS (10 hrs)
Dielectric Materials: Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials – applications – liquid crystal displays (LCD) and crystal oscillators.
Magnetic Materials: Hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance - applications - bubble memory devices, magnetic field sensors and multiferroics.
Energy Materials: Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors - rechargeable ion batteries, solid fuel cells.

Text Books:
1. Applied Physics, Dr. M. N. Avadhanulu, Dr. TVS Arun Murthy, - S Chand and Company Ltd. Publications.
2. Engineering Physics, P. K. Palanisamy, SCITECH Publications, Enlarged & Revised 2014 Edition.
3. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
4. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4thEdition,2021
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.
6. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2ndEdition, 2022.
7. Gerd Keiser, " Optical Fiber Communication", Mc Graw hill, 4th Edition

Reference Books:
1. Concepts of modern Physics by Arthur Beiser, McGraw-Hill Education, 7th edition, SIE
2. Semiconductor Optoelectronics: Physics and Technology, J. Singh, Mc Graw-Hill Inc., (1995).

3. Modern Engineering Physics by Dr.K.Vijaya Kumar, Dr. S.Chandralingam, S.CHAND & COMPANY LTD., Publishers.
4. Applied Physics by P.K.Mittal, I K International Publishers
5. Introduction to Solid State Physics by Charles Kittel, Wiley India Pvt Ltd, 7th Edition
6. Modern Physics R Murugeshan , Kiruthiga Sivaprasath S.Chand publications
7. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012
8. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons,11th Edition, 2018
9. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019
10. Elementary Solid State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019

MOOC Courses:
1. "Semiconductor Optoelectronics" By Prof. M. R. Shenoy, Department of Physics, IIT Delhi NPTEL visit http://nptel.iitm.ac.in
2. "Laser: Fundamentals and Applications" By Prof. Manabendra Chandra, IIT Kanpur NPTEL visit https://onlinecourses.nptel.ac.in/noc20_cy17

Course Outcomes:
- CO1: Explain the concepts of Quantum Physics in describing particle at micro state and its implications in formation of bands in solids
- CO2: Understand the working mechanism and characteristics of semiconductor optoelectronic devices.
- CO3: Explore the characteristics of lasers & optical fibres and their applications in various sectors by using the concepts of wave optics.
- CO4: Apply the properties of dielectric, magnetic and Nano materials in diver's fields of applications.

CO-PO Mapping Chart												
(3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low												
Course Outcomes (COs)	Program Outcomes (POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3									2		1
CO2	3									2		1
CO3	3									2		1
CO4	3									2		1

B.Tech I Year–I/II Sem

	L	T	P	C
Subject Code:	0	1	2	2

22ES1ME01/ 22ES2ME01

Engineering Prototyping Lab

(Common to CSE/EEE/ECE/CSM/CSD/CSC/CSO/MECH)

Prerequisites: Practical skill

Course Objectives:

1. To provide the basic knowledge of fundamental tools used by engineers in a manufacturing environment, wiring in electrical circuits, design of electronic components on PCB and knowledge on computer peripherals.

2. To gain a basic working knowledge required for the production of various engineering products.

List of Experiments:

PART A: Mechanical Workshop

Note: Any Seven experiments should be conducted from all Trades

1. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)

2. Fitting – (V-Fit, Step Fit , Dovetail Fit & Semi-circular fit)

3. Tin-Smithy – (Open Scoop, Rectangular Tray & Conical Funnel)

4. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)

5. Welding Practice – (Arc Welding- Lap or Butt joint)

6. Black Smithy – ('S' hook or Round rod to Ring)

7. House wiring-(One lamp control by using Two 2-way switches (staircase wiring), Wiring of distribution box with MCB, Wiring of three bulbs - Series & parallel connections).

PART B: IT Workshop

Note: Any three experiments should be conducted

1. Draw the block diagram of the PC and peripherals that can be assembled and disassembled.

2. Every student should individually install MS windows/ Linux/Duel Booting on the

personal computer.

3. Installation of Application software in PC (Modelling/Simulation /Automation)

4. Hardware Troubleshooting: Students have to be given a Pthatch does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

5. Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

6. Internet & World Wide Web: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations.

TEXTBOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha

3. Experiments in Basic Electrical Engineering by S.K.Bhattacharya , Rastogi- NAI.
4. Industrial Safety management by Deshmukh –TMH

REFERENCE BOOKS:

1. Work shop Manual - P. Kannaiah/ K. L. Narayana/ SciTech
2. Workshop Manual / Venkat Reddy/ BSP
3. Residential and Commercial Industrial Electrical systems Vol.2 by Joshi-TMH
4. Residential and Commercial Industrial Electrical systems Vol.3 by Joshi-TMH
5. Industrial Safety management by Deshmukh –TMH

Web resources:

1. https://www.electricaltechnology.org/2012/11/how-to-control-lamp-by-single-way-or.html

2. https://circuitdigest.com/electronic-circuits/5v-2a-smps-power-supply-circuit-diagram

Course Outcomes:

At the end of the course , students must be able to

1. Fabrication of electrical circuit.

2. Identify and apply suitable tools for different trades of engineering processes.

3. Apply the learnt knowledge for installing operating system, presentations, documentation.

4. Make a prototype by applying domain knowledge.

CO-PO Mapping:

Course Outcomes (COs)	CO-PO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low

Course Outcomes (COs)	Program Outcomes (POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	L	L			H							
CO2	H		L									L
CO3	H		L									L
CO4	H			L								

B.Tech I Year–I/II Sem		L	T	P	C
Subject Code: 22ES1ME02/ 22ES2ME02		0	1	2	2

Design Thinking Lab
(Common to Mechanical, EEE, ECE,CSE, CSM,CSO,CSD and CSC)

Pre-requisite:

Course Objectives:
1. Apply domain knowledge to the design of community based projects.
2. Identify and acquire new knowledge as a part of the problem solving / design process.
3. Design products on multidisciplinary concepts and an appreciation for the contributions from individuals from multiple disciplines.
4. Build a role that their discipline can play in social contexts.
5. Provide significant service to the community while learning; gain an understanding of the role that engineering (and their discipline) can play in society.

Module 1:
Problem Identification
Introduction to EPICS, Idea Generation, Brain storming

Societal Survey
Rural area Survey (societal issues), interaction with NGOs, Idea Generation and Group Discussions.

Module 2:
Specification Development
Customer Requirement, Design Constraints, Engineering Specifications
Product Survey
Community Partner allotment, Design Thinking activity

Module 3:
Conceptual Design
Decision matrix, community partner interview, Brainstorming (possible solutions)

Poster Presentation
Documentation & Team wise presentation

Module 4:
Project Specification
Prototype-1 Development, Testing, customer feedback

Project Specification
Prototype-1 presentation, Feedback Report of customer & advisor, Action plan for the next prototype

Module 5:

Detailed Design

Video preparation on conceptual design, Prototype-2 Development, Testing, customer feedback, Presentation

Detailed Design

Make progress on the project and appropriately engage project partners, Complete Design review feedback summary, and Individual and Project documentation

Text Books:

Dahir, M., "Educating Engineers for the Real World", Technology Review, Aug/Sept. 1993, pp. 14-16

Reference Books:

Govindarajan M, Natarajan S, Senthil Kumar V.S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

Web Resources:

https://engineering.purdue.edu/EPICS/Resources/Lectures.
https://unnatbharatabhiyan.gov.in:8443/new-website/
http://www.engineeringchallenges.org/GrandChallengeScholarsProgram.aspx
https://www.ewb-india.org/

Course Outcomes:

1. CO1 – Apply disciplinary knowledge to real and possibly ill-defined problems.
2. CO2 – Collaborate with people from other disciplines and develop an appreciation for multi-disciplinary contributions in design.
3. CO3 – Build the broad set of skills needed to be successful in the changing global workplace and world.
4. CO4 – Acquire knowledge regarding project management.

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	H	M	M	M		H		M	H	M	M	H	M	M
CO2	H	M	M	M		H		M	H	M	M	H	M	M
CO3	H	M	M	M		H		M	H	M	M	H	M	M
CO4	H	M	M	M		H		M	H	M	M	H	M	M

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low

* If more PSOs are there in a particular branch, required no of columns can be added.

B.Tech I Year -I Sem/IISem   L   T   P   C

Course Code: 22BS1EG01 /22BS2EG01   2   2 0   0

English for Skill Enhancement
(Common to CSE/EEE/ECE/CSM/CSD/CSO/CS/ME)

PREREQUISITE(S):

1. Basic knowledge of English language
2. Structure of Sentences/ Sentence formation
3. Basic Grammar rules.
4. Basic Communication Skills

COURSE OBJECTIVES:

1. To improve the language proficiency of students in English with an emphasis on vocabulary, Grammar, Reading and Writing skills.
2. To comprehend the given texts and respond appropriately
3. To integrate their ideas with those of others using summary, paraphrasing, analysis, and synthesis of relevant sources.
4. To develop learning skills and communication skills in formal and informal situations.
5. The students will analyse work(s) of literature in one or more interpretive contexts or frameworks

Module I

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

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

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.Types of Conjunctions and their usage.

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.

Module 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 –Study the use of graphic elements in texts. Skimming and Scanning – Exercises for Practice
Writing:	Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

Module 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 – Inferring meaning-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.

Module 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

Module 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 Academic Vocabulary 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 and-Exercises for Practice
Writing: Technical Reports- Introduction – Characteristics of a Report –
                  Categories of Reports Formats- Structure of Reports (Manuscript
                  Format) -Types of Reports -
                  Writing a Report

Note: Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- **Note: 1**. As the syllabus of English given in AICTE Model Curriculum-2018 for B. Tech First Year is Open-ended, besides following the prescribed textbook, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

- **Note: 2.** Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

TEXT BOOK:

1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.
2. https://www.cambridgeone.org/class/learner/user_clms_8241785/bundle/ic1
3. https://www.cambridge.org/bs/cambridgeenglish/catalog/adult-courses/interchange-5th-edition/components

REFERENCE BOOK

1. *Practical English Usage*, Swan, M. Oxford University Press. 2016
2. Effective Academic Writing by Liss and Davis (OUP)
3. *Communication Skills*. Kumar, S and Lata, P. Oxford University Press. 2018
4. Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge University Press
5. *Remedial English Grammar*. Wood, F.T. Macmillan. 2007
6. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
7. *On Writing Well* Zinsser, William. Harper Resource Book. 2001
8. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd.
9. *Study Writing.* Hamp-Lyons, L. Cambridge University Press. 2006
10. Technical Communication. Wiley India Pvt. Ltd. (2019).
11. Vishwa Mohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
12. Swan, Michael. (2016). Practical English Usage. Oxford University Press.

13. Academic Vocabulary in use Fourth Edition "Michael Mecharty".

E-books:
   1. High School English Grammar (issuhub.com)
   2.https://www.fluentu.com/blog/english/free-english-ebooks/

Eloquent MOOC Courses:

1. http://nptel.ac.in/courses/109106067/
2. http://nptel.ac.in/courses/109104031/
3. http://www.englishpage.com/listening/
4. https://onlinecourses.swayam2.ac.in/aic21_ge24/preview
5. https://onlinecourses.swayam2.ac.in/nos22_sc61/preview

Course Outcomes:
After undergoing this course, students will be able to:
CO 1: Understand explicit and implicit meaning of a text through known and unknown passages.
CO 2: Demonstrate Language skills in both formal and informal communication.
CO 3: Construct sentences using logical flow of thought and organize ideas.
CO 4: Select appropriate words, phrases & grammatical units and apply them in both
    spoken & written communications.

CO-PO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low											
Course Outcomes (COs)	Program Outcomes (POs)										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1									2	2		
CO2									2	2		
CO3										2		
CO4									3	3		

B. Tech I Year - I Sem/II Sem   **L**   **T**   **P**   **C**

Course Code: 22BS1EG02/22BS1EG02   **0**   **0**   **2**   **1**

English Language and Communication Skills Lab

(Common to CSE/EEE/ECE/CSM/CSD/CSC/CSO/ME)

Pre-requisite(s):

The knowledge of following concepts is essential to understand the subject
1. Basic knowledge of English language
2. Structure of Sentence / Sentence formation
3. Basic Grammar rules
4. Basic Communication Skills

Course Objectives:
1. To facilitate computer-assisted multimedia instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency of students speaking in English and neutralize their mother tongue interference.
5. To train students use language appropriately speaking in various activities like role plays, group discussions, interviews and presentation skills etc.

Note: All the given below exercises have to be performed
Exercise – I

CALL Lab:

Understand Listening Skill- Its importance – Purpose- Process- Types- Barriers-Effective Listening.
Practice: Introduction to Speech Sounds – Vowels and Consonants – Minimal Pairs Consonant Clusters - Past Tense Marker and Plural Marker- *Testing Exercises*

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English.
Practice: Ice-Breaking Activity ,Word game JAM Session- Situational Dialogues – Greetings – Taking Leave –
Introducing Oneself and Others in formal situations

Exercise – II

CALL Lab:
Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.
Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - *Testing Exercises*

ICS Lab:
Understand: Features of Good Conversation – Strategies for Effective Communication.
Practice: Situational Dialogues – Role Play- Expressions in Various Situations – Making Requests and Question tags.
Seeking Permissions - Telephone Etiquette, Telephonic interview.

Exercise - III

CALL Lab:
Understand: Errors in Pronunciation - Neutralising Mother Tongue Interference (MTI).
Practice: Common Indian Variants in Pronunciation – Differences between British and American
Pronunciation -*Testing Exercises*

ICS Lab:
Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing
Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and
Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV

CALL Lab:
Understand: Listening for General Details.
Practice: Listening Comprehension Tests - *Testing Exercises*

ICS Lab:
Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication Story telling, poster presentation
Presentation Skills,Progress,Graph Presentation,Topic specific conversations with vocabulary.
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, Debates,critical thinking
Practice: Group Discussion, Debates.

Lab Manuals
1. ELCS Lab Manual – A Workbook for CALL and ICS Lab Activities" by Board of Editors: Hyderabad: Orient Black Swan Pvt. Ltd. 2016. Print.
2. Hart, Steve; Nair, Aravind R.; Bhambhani, Veena. "EMBARK- English for undergraduates" Delhi: Cambridge University Press. 2016. Print.

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

Reference Books:
1. *Effective Communication Skills: Tips on How to Improve Your Social Skills and Interact with Others Effectively* by Robert Cunningham, Independently Published, 2018
2. *Professional Communication* by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. *English for Technical Communication for Engineering Students*, Ayesha Vishwamohan, Tata Mc Graw-Hill 2009.
4. *English Vocabulary in Use series*, Cambridge University Press 2008.

Course Outcomes:
1. CO1: Acquire vocabulary and use it contextually
2. CO2: Apply listening and speaking skills effectively
3. CO3: Develop proficiency in academic reading and writing
4. CO4: Build up the possibilities of job prospects

CO-PO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low												
Course Outcomes (COs)	Program Outcomes (POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1									2	3		
CO2									3	2		
CO3									2	2		
CO4									2	2		

B.Tech. I Year I Sem/II Sem   **L T P C**
Course Code: 22BS1PH02/ 22BS2PH02   **0 0 2 1**

APPLIED PHYSICS LAB
(Common to CSE/EEE/ECE/MEC/CSM/CSD/CSC/CSO)

Pre-requisite: Concepts of Applied Physics Theory and knowledge of intermediate (10+2) physics

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 behaviour of B-H curve of ferromagnetic materials.
5. Understanding the method of least squares fitting

List of Experiment   (Perform any 8 of the following experiment)

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. V-I characteristics of a p-n junction diode and Zener diode
4. Input and output characteristics of BJT (CE configurations)
5. Diffraction Grating:
   a) To determine the wavelength of given laser and grating parameters
   b) To determine the wavelength of a given light source using grating (spectrometer)
6. Newton's Rings Experiment:
   a) To determine the radius of curvature of given Plano convex lens
7. Optical fiber:
   a) To determine Numerical aperture and Acceptance angle of a given optical fiber cable.
8. Energy band gap of Semiconductor:
   a) To determine Energy band gap of a semiconductor diode
9. Optoelectronics Devices:
   a) Light Emitting Diode: To study the V-I characteristics of LED
   b) Solar Cell: To study the V-I characteristics of Solar cell
10. Study B-H curve of a magnetic material.
11. Determination of dielectric constant of a given material
12. Characteristics of series and parallel LCR circuits.
13. Determination of the resistivity of semiconductor by two probe method.

Text Books:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017
2. Laboratory manual of Engineering Physics, Dr. Y Aparna , Dr.K.Venkateswara Rao,VGS techno series, 2010.

Course Outcomes:
- CO1: 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.
- CO2: Analyse the V-I characteristics of semiconductor optoelectronic devices.
- CO3: Describe the variations in the magnetic field, the dielectric constant, and the hysteresis curve's behaviour.
- CO 4: Apply the concepts of optics for study the characteristics of laser & fiber optical devices

Course Outcomes (COs)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO-PO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low												
					Program Outcomes (POs)							
CO1	3											1
CO2	3											1
CO3	3											1
CO4	3											1

	L	**T**	**P**	**C**
B. Tech I Year-I Sem/II Sem				
Subject Code:	**2**	**0**	**0**	**0**

22MC1CHS02/22MC2CHS02

ENVIRONMENTAL SCIENCE
(Common to CSE/EEE/ECE/MECH/CSM/CSD/CSC/CSO)

Course Objectives:

1. Understanding the importance of ecological balance for sustainable development.

2. To educate students about natural resources and their exploitation

3. Understanding the concepts of green chemistry and its applications.

Module I ECOSYSTEMS AND ECOLOGY

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.

Module II NATURAL 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.

Module 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.

Module IV ENVIRONMENTAL POLLUTION AND SOLID WASTE

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. Municipal Solid Waste management, composition and characteristics of e- Waste and its management, 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.

Module V GREEN CHEMISTRY & HAZARDOUS CHEMICALS

Introduction & Principles, green solutions for chemical energy storage, green chemistry solutions will be discussed within the fields of Chemical production: choice of feedstock, solvents, catalysts, synthesis routes including microwave and ultrasonic assisted synthesis. Classification of hazardous chemicals, transportation of hazardous chemicals, Hazchem code, Storage and handling of hazardous substances, Emergency preparedness (on site & offsite),

Safety audit, Concept of fire and explosion, Major accidents involving hazardous substances

Text Books:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. Indu Tucker Sidhwani, Rakesh K. Sharma.

Course Outcomes:

CO-1: Understand the importance of ecosystem and ecological balance in conservation of biodiversity.
CO-2: Understand the concepts of natural resources and its exploitation.
CO-3: Explain the control of pollution for sustainable environment.
CO-4: Explain the concepts green chemistry, its applications.

CO-PO MAPPING:

CO-PO/PSO Mapping Chart(3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3						1							
CO2	3						1							
CO3	3						1							
CO4	3						1							