MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. I and II Semester
Scheme of Instruction and Examination

[Common to EEE & ECE]

(Choice Based Credit System)

With effect from the academic year **2021-22**

Vision of ECE Department

The Vision of the Department is to strive towards the development and dissemination of knowledge in the areas of Electronics and Communication Engineering and empower young engineers to acquire technical excellence imbibed with ethical and moral values that leads to collective global success.

Mission of ECE Department

The Mission of the Department is to inspire and motivate the students to acquire knowledge to develop and serve the industry and society with great zeal. It aims to impart value based technical education of global standards and transform the students into disciplined, talented citizens of impeccable character, fused with hands on training to make them good entrepreneurs with an emphasis to develop social, cultural, ethical and environmental consciousness and life-long learning.

Program Educational Objectives (PEOs)

1. Prepare the students to have strong foundation in Mathematical, Scientific, Engineering fundamentals and Communication skills to formulate, understand, analyze and solve the technological problems and also assimilate knowledge through life-long learning.
2. Inculcate the managerial skills, basic concepts in Electrical Engineering and modern engineering IT tools that help the students to work in multidisciplinary environments.
3. Impart sufficient knowledge to solve complex problems in the field of Electronics and Communication Engineering for a successful career through global education standards.
4. To mould the graduates for approaching the process of formulating a design solution for the given specifications with optimum performance including ethical, economic considerations and societal impacts.

Program Outcomes (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with anunderstanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO1	Able to work in multidisciplinary project areas
PSO2	Able to design and carry out the experimental work and assimilate knowledge in the field of Electronic Communication Engineering to meet the future Industrial challenges

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B.Tech. I and II Semester
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(Choice Based Credit System)

For the batches to be admitted with effect from the academic year **2021-22**

I Semester

S.No.	Course Code	Course Title	Instruction Hours Per Week			Examination Max. Marks		Duration of SEE in Hours	Credits
			L	T	P/D	CIE	SEE		
Induction Program									
1	MA101BS	Mathematics-I	3	1	0	30	70	3	**4**
2	PH102BS	Applied Physics	3	1	0	30	70	3	**4**
3	CS101ES	Programming for problem solving	3	1	0	30	70	3	**4**
4	ME101ES	Engineering Graphics	1	0	4	30	70	3	**3**
5	MC101ESC	Environmental Science	3	0	0	30	70	3	**0**
6	PH152BS	Applied Physics Lab	0	0	3	30	70	3	**1.5**
7	CS151ES	Programming for problem solving Lab	0	0	3	30	70	3	**1.5**
Total Hours/Marks/Credits			**13**	**3**	**10**	**210**	**490**		**18**

II Semester

S. No.	Course Code	Course Title	Instruction Hours Per Week			Examination Max. Marks		Duration of SEE in Hours	Credits
			L	T	P/D	CIE	SEE		
1	EN201HS	English	2	0	0	30	70	3	**2**
2	MA202BS	Mathematics-II	3	1	0	30	70	3	**4**
3	CH201BS	Chemistry	3	1	0	30	70	3	**4**
4	EE201ES	Basic Electrical Engineering	3	0	0	30	70	3	**3**
5	EN251HS	The English Language and Communication skills Lab	0	0	2	30	70	3	**1**
6	CH251BS	Engineering Chemistry Lab	0	0	3	30	70	3	**1.5**
7	ME251ES	Engineering Workshop	1	0	3	30	70	3	**2.5**
8	EE251ES	Basic Electrical Engineering Lab	0	0	2	30	70	3	**1**
Total Hours/Marks/Credits			**12**	**2**	**10**	**240**	**560**		**19**

L: Lecture T: Tutorial D: Drawing P: Practical

CIE - Continuous Internal Evaluation SEE - Semester End Examination

L	T	P	C
3	1	0	4

B.Tech. I Semester
MA101BS: Mathematics-I
(Common to all Branches)

Course Objectives

To learn
- The concept of the rank of a matrix and applying it to know the consistency and solution of the system of linear equations.
- The concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form.
- Concept of Sequences and Series.
- Geometrical approach to the mean value theorems and their application and evaluation of improper integrals using Beta and Gamma functions.
- The concept of partial differentiation, total derivative and finding maxima and minima of function of two and three variables.

Course Outcomes

After learning the contents of this paper, the student must be able to
- Write the matrix representation of a set of linear equations and analyze the solution of the system of equations.
- Find the eigen values and eigen vectors & reduce the quadratic form to canonical form using orthogonal transformations.
- Analyze the nature of sequences and series.
- Evaluate the improper integrals using Beta and Gamma functions.
- 5. Find the extreme values of functions of two variables with/ without constraints.

Unit-I: Matrices

Types of Matrices - Real Matrix, Symmetric, Skew-Symmetric and Orthogonal Matrices, Complex matrix, Hermitian, Skew-Hermitian and Unitary Matrices; Elementary Transformations, Definition of rank of a Matrix, Computation of rank of a matrix by reducing it into Echelon form and Normal form; Inverse of a Matrix by Gauss-Jordan method; System of linear equations-Solution of Homogeneous Systems, Consistency and Solution of system of Non-Homogeneous linear equations by Rank Method; Direct Method-Gauss elimination method; Indirect Method-Gauss Jacobi Method, Gauss Seidel Iteration Method.

Unit-II: Eigen values and Eigen vectors

Definition of Vectors, Norm of a vector, Linearly dependent, Linearly independent and Orthogonal Vectors; Linear Transformation and Orthogonal Transformation, Eigen values and Eigenvectors and their properties; Diagonalization of a Matrix, Modal Matrix, Normalised Modal Matrix; Cayley-Hamilton Theorem (without proof), finding inverse and power of a Matrix by Cayley-Hamilton Theorem; Quadratic Forms, Index, Signature and Nature of the Quadratic Forms, reduction of Quadratic Form to Canonical Forms by Orthogonal Transformation.

Unit-III: Sequences & Series

Sequence: Definition of a Sequence, Limit, Convergent, Divergent and Oscillatory Sequences; Series: Convergent, Divergent and Oscillatory Series; Geometric Series Test; Series of positive terms- Comparison test, p-test, D-Alembert's ratio test, Raabe's test, Cauchy's Integral test, Cauchy's n^{th} root test, Logarithmic test; Alternating series; Leibnitz test, Absolute and Conditionally Convergence.

Unit-IV: Calculus

Basic concepts of limit, continuity and differentiability of function of single variables; Mean value theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation and applications, Cauchy's mean value Theorem. Taylor's series; Definition of Improper Integral: Beta, Gamma functions and their properties.

Unit-V: Multivariable calculus

Definitions of limit and continuity for functions of several variables; Partial Differentiation- Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence; Maxima and Minima of functions of two variables and three variables using method of Lagrange multipliers.

Suggested Readings:

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

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

L	T	P	C
3	1	0	4

B.Tech. I Semester
PH102BS: Applied Physics
(Common to EEE & ECE)

Course Objectives

The objectives of the course is to make the student
- To understand the basic principles of quantum mechanics
- Acquire knowledge on the basic semiconductor devices and its physics
- Study on optoelectronic devices, specifically focusing on photo detector and emissive devices.
- Able to familiarize with light-matter interaction.
- Able to apply the concepts on dielectric and magnetic properties of materials

Course Outcomes

At the end of the course, the student will be able to
- Gain knowledge on different principles of quantum mechanics, semiconductor physics, opto-electronic devices, principles of lasers and fiber optics, dielectric and magnetic properties of materials.
- Acquaint knowledge on basic understandings of quantum mechanics.
- Understand the physics relying on semiconductor and optoelectronic devices and utilize them for various problems in their respective engineering fields.
- Familiarize and apply the concepts of optics and radiation-matter interaction.
- Understand and apply the concepts for dielectric and magnetic properties of materials towards better engineered products.

Unit-I: Principles of Quantum Mechanics

Drawbacks of classical physics, black body radiation, photoelectric effect, origin of quantum mechanics, Planck's law, Einstein's explanation for photoelectric effect, Compton effect, waves and particles, de-Broglie's hypothesis - wave-particle duality, Davisson and Germer experiment.

Schrodinger's time independent wave equation – significance of wavefunction, application - particle in 1-D box, Heisenberg's uncertainty principle: non-existence of electrons in nucleus.

Unit-II: Semiconductor Physics and Devices

Introduction to semiconductors, intrinsic and extrinsic semiconductors, Fermi energy level, carrier-concentration in intrinsic and extrinsic semiconductor, variation of Fermi level with doping concentration and temperature, carrier transport mechanisms in semiconductors - diffusion and drift, Hall effect.

p-n junction diode: energy level diagram, V-I characteristics, Zener diode and its V-I characteristics, introduction to Bipolar Junction Transistor (BJT): principle, construction, working, CE configuration as an amplifier.

Unit-III: Optoelectronics

Introduction to compound semiconductors, direct and indirect band gap semiconductors, radiative and non-radiative mechanisms, light emitting device: LED - principle, construction and working.

Introduction to photodetectors, light detecting devices - PiN and Avalanche photo diodes: principle, construction and working and their applications, solar cell: principle, construction and working, V-I and P-I characteristics and efficiency of solar cell, applications.

Unit-IV: Lasers and Fiber Optics

Lasers: absorption, spontaneous emission, stimulated emission, population inversion, Einstein coefficients, characteristics of lasers, principle, construction and working of laser: ruby laser, carbon dioxide (CO_2) laser, He-Ne laser and semiconductor lasers, applications of lasers.

Fiber Optics: introduction, optical fiber and its principle, acceptance angle, numerical aperture, step and graded index fibers, attenuation mechanism in optical fibers, applications of optical fibers.

Unit-V: Dielectric and Magnetic Properties of Materials

Introduction to dielectrics: polarization, permittivity, dielectric susceptibility and dielectric constant, polarizability – types of polarization and calculation of electronic and ionic polarizabilities, internal fields in a solid, Clausius - Mossotti equation, piezo electricity and ferroelectricity.

Magnetic materials: origin of magnetic moment, classification of magnetic materials based on magnetic moment, magnetic domains and Weiss theory of ferromagnetism, hysteresis, soft and hard magnetic materials, applications of magnetic materials.

Suggested Readings:

1. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand.
2. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learing.
3. Semiconductor Optoelectronics: Physics and Technology, J. Singh, Mc Graw-Hill inc. (1995).

Reference Books:

1. Physics Halliday and Resnick, – Wiley.
2. “Principles of Lasers”, O. Svelto.
3. Physics of Semiconductor Devices S.M. Sze, John Wiley and Sons (WIE) (1981).

L	T	P	C
3	1	0	4

B.Tech. I Semester
CS101ES: Programming for Problem Solving
(Common to CE, EEE, ME, ECE, MCT & MME)

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.
- To learn how to write modular and readable C Programs.
- To learn structured programming approach in solving problems.

Course Outcomes

- Formulate algorithms and design flowcharts for simple problems and to know the usage of various operators and control statements in program development.
- Understand and analyze the concepts of arrays and pointers for real world problems.
- Understand and analyze the concepts of strings and structures for real world problems.
- Applying concept reusability and handling dynamic memory allocation
- Apply various file handling techniques for better data management.

Unit – I

Introduction to Computing - Components of a computer, Art of programming through Algorithms and Flowcharts, Number System-Decimal, Binary, Octal, Hexadecimal.

Introduction to C Language – History of C, Importance of C, Sample Programs, Basic structure of C programs, executing a C program. Character set, C tokens-keywords, identifiers, constants, variables, data types, managing input and output operations, operators-arithmetic, relational, logical, assignment, increment/decrement, conditional operator, bitwise, special operators, type conversions in expressions, operator precedence and associativity, decision making and branching-if, switch, goto, decision making and looping-while, do, for, jumps in loops-break, continue.

Unit – II

Arrays: Introduction, One-Dimensional Arrays-declaration of one-dimensional array, initializing of one-dimensional array, Two Dimensional Arrays- declaration of two-dimensional array, initializing of two-dimensional array, Multidimensional Arrays.

Pointers: Introduction-declaring a pointer variable, initialization of pointer variables, accessing a variable through its pointer, chain of pointers, pointer expressions, pointer increment and scale factor, pointer and arrays, pointer and character strings.

Unit –III

Strings: Introduction to strings, declaring and initializing string variables, reading strings from terminal and writing strings to screen, putting strings together, comparison of two strings, string handling functions.

Structures: Introduction-defining a structure, declaring a structure variable, accessing structure members, structure initialization, copying and comparing structure variables, arrays of structures, arrays within structures. structures within structures, structures and functions, Unions, Enumerated data types.

Unit –IV

User-Defined Functions: Introduction, elements of user defined functions, categories of functions, nesting of functions, recursion, passing arrays to functions, passing strings to functions, scope, visibility and lifetime of variables, pointers as function arguments (call by reference).

Dynamic Memory Allocation-Introduction, malloc, calloc, free, realloc.

Unit-V

Preprocessor: Introduction, macro substitution, file inclusion, compiler control directives.
Files: Introduction, defining and opening a file, closing a file, input/output operations on files, random access to files, command line arguments**.**

Suggested Readings:

1. E. Balaguruswamy, Programming in ANSI C, Eighth Edition 2020, McGraw Hill Education.
2. B.W. Kernighan and Dennis M. Ritchie, The C Programming Language, Second Edition, Pearson education.

Reference Books:

1. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, Third Edition, Cengage Learning 2016.
2. Pradip Dey and Manas Ghosh, Programming in C , Oxford University Press, Second Edition, 2011.
3. B. Gottfried, Programming with C, 3rd edition, Schaum's outlines, McGraw Hill Education (India) Pvt Ltd.

L	T	P	C
1	0	4	3

B.Tech. I Semester
ME101ES: Engineering Graphics
(Common to CE, EEE, ME, ECE, MCT & MME)

Course Objectives

At the end of this course students are expected to

- Recognize the standards of Engineering Graphics, learn to generate Geometric Constructions, Conic Sections and construct Engineering Scales.
- Understand the procedure to develop orthographic projections of points, lines and planes.
- Learn the procedure to develop projection of solids and objects.
- Understand the procedure to generate the sections and developments of solids.
- Learn the procedure to develop Isometric projections, convert orthographic views to isometric views and vice versa using graphics instruments and AUTOCAD.

Course Outcomes

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

- Apply the fundamental principles of Engineering Graphics to create engineering drawings of various geometric constructions, conic sections and engineering scales adhering to BIS Standards.
- Generate orthographic projections; front view, top view and side views of points and lines.
- Generate the orthographic projections of planes and solids
- Generate the sections of solids and developments of surfaces.
- Develop isometric projection convert orthographic views to isometric views and vice versa for practical engineering problems.

Unit-I: Introduction to Engineering Graphics

Principles of Engineering Graphics and their significance drawing instruments and their use conventions in Drawing, Lines, Lettering, Dimensioning and Geometrical construction. Conic sections including the Rectangular Hyperbola – General method only. Engineering curves: Cycloid, Epicycloid and Hypocycloid, Involutes, Scales–Plain and Diagonal.

Unit-II: Orthographic Projections

Principles of Orthographic Projections–Conventions–Projections of points and lines –Inclined to one and both the planes.

Unit-III: Projections of Planes and Regular Solids

Projections of planes, regular geometric figures, Projections of regular solids - Simple position and inclined to one plane, Sections or Sectional views and true shapes of right regular Solids–Prism, Cylinder, Pyramid and Cone.

Unit-IV: Development of Surfaces & Intersections of Solids

Development of surfaces for right regular Solids–Prism, Cylinder, Pyramid and Cone. Intersection of Solids - Cylinder Vs Cylinder.

Unit-V: Isometric Projections

Principles of Isometric Projection – Isometric scale – Isometric views - Conventions – Isometric views of Lines, Plane figures, Simple compound solids - Isometric projection of Spherical parts. Conversion of Isometric views to Orthographic views and vice-versa – conventions

Introduction to AUTOCAD software package commands:

Introduction to CAD software package commands – free hand sketches of 2D – creation of 2D sketches of CAD package.

Suggested Readings:

1. Engineering Drawing, N.D. Bhatt/Charotar
2. Text book on Engineering Drawing, Narayana, K.L. & P Kannaiah, Second edition, Scitech Publishers.
3. Engineering Drawing/Basant Agrawal/Mc Graw Hill

Reference Books:

1. Engineering Drawing, K Venugopal and G. Sreekanjana, second edition, New Age International.
2. Engineering Drawing/N.S. Parthasarathy and Vela Murali/Oxford
3. Shah, M.B. & Rana B.C., Engineering Drawing and Computer Graphics, Pearson
4. Computer Aided Engineering Drawing – K Balaveera Reddy etal – CBS Publishers

L	T	P	C
3	0	0	0

B.Tech. I Semester
MC101ESC: Environmental Science
(Common to CE, EEE, ME, ECE, MCT & MME)

Course Objectives

- To understand the natural resources and their conservation.
- To understand the importance of ecosystem, biodiversity and ecological balance for sustainable development.
- To gain knowledge about environmental pollution, effects and controlling measures.
- To study about global environmental problems and global issues.
- To understand the environmental policies, regulations and sustainable development.

Course Outcomes

After completing the course, the student will be able to:

- Learn about different types of natural resources and take up the measures to protect the resources.
- Get the information about ecosystem, biodiversity and their usage and conservation.
- Get the information about the types of pollution, understand their effects and controlling measures.
- Gain the knowledge about current global environmental issues and initiations to be taken to protect the environment.
- Gain the knowledge about environmental acts, EIA, sustainable development and follow the rules and regulations.

Unit-I : Natural Resources

Classification - Renewable and Non-renewable resources.
Forest resources - Uses, deforestation- causes, effects and preventive measures.
Water Resources - Uses and over utilization of ground water, rain water harvesting, dams - benefits and problems. Causes, effects and management of floods and drought.
Mineral resources - Uses and Impacts of mining.
Energy resources - Growing energy needs, renewable and non-renewable energy resources, use of alternate energy resources.

Unit-II: Ecosystem and Biodiversity

Ecosystem: Concept of ecosystem - Structure and functions of ecosystem. Food chain, food web and ecological pyramids - significance. Primary and Secondary production - Energy flow models: universal and single channel. Biogeochemical Cycles: Carbon cycle and Nitrogen cycle.
Biodiversity: Definition, Levels of Biodiversity, Values of biodiversity, Hotspots of biodiversity, Threats to biodiversity, Conservation of biodiversity: In-Situ and Ex-situ conservation methods.

Unit-III: Environmental Pollution

Pollution - Definition and classification.
Air pollution: Definition, sources, causes, effects and control measures. Ambient air quality parameters, case Study.
Water pollution: Definition, sources, causes, effects and control measures. Waste water treatment. Case study (Namami Ganga Project)
Soil pollution: Sources, Land degradation - Soil erosion – effects and control measures. Impacts of modern agriculture on soil. Biomagnification and Bioaccumulation (Minamata disease).
Noise pollution: Sources, effects and control measures.
Solid Waste: E-Waste and Municipal solid waste management.

Unit-IV: Global Environmental Issues and Global Efforts

Global warming: Greenhouse effect - definition, sources and effects of greenhouse gases. Ozone layer depletion - Importance of ozone layer, Ozone depleting substances - sources and effects. Acid rain - causes and effects. Climate

change - National Action Plan on Climate Change (NAPCC) – Government of India Initiatives. International conventions/protocols: The Earth summit, Kyoto Protocol and Montreal Protocol. Carbon credits - Emission trading, Green Chemistry Principles. Biodiesel-concept - transesterification and advantages.

Unit-V: Environmental Acts, EIA & Sustainable Development

Environmental Protection Act - **Legal aspects**: Air (Prevention and Control of pollution) Act 1981, Water (Prevention and control of pollution) Act -1974, Wildlife (Protection) Act – 1972, Biodiversity Act - 2002. Environmental Impact Assessment – Concept, structure and flow chart of EIA. Concept of sustainable development - Environmental education, Concept of green building, Ecological foot print, Low carbon life style, Life cycle assessment (LCA) and Clean development mechanisms.

Project Work: Related to Current environmental issues.

Suggested Readings:

1. Erach Bharucha, Textbook of Environmental Studies for Undergraduate Courses, University Grants Commission, Universities Press, 3rd Edition.
2. Kaushik A., Kaushik C.P., Text Book of Environmental Studies, New age International Publishers, 4th Edition.

Reference Books:

1. Anji Reddy M ., Textbook of Environmental Sciences and Technology, BS Publication.
2. Rajagopalan R., Environmental Studies, Oxford University Press, 3rd Edition.
3. Raghavan Nambiar K., Text Book of Environmental Studies, SciTech Publications 2nd Edition.

L	T	P	C
0	0	3	1.5

B.Tech. I Semester
PH152BS: Applied Physics Lab
(Common to EEE & ECE)

Course Objectives

The objectives of the course is to make the student

- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of electrical and optical systems for various physical parameters.
- Apply the analytical techniques and graphical analysis to the experimental data.
- To understand the basic principles of scientific concepts through practicals.

Course Outcomes

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

- Understand different principles of quantum mechanics, semiconductor physics, opto electronic devices, principles of lasers and fiber optics, dielectric and magnetic materials.
- Apply the various procedures and techniques for the experiments.
- Use the different measuring devices and meters to record the data with precision
- Apply the mathematical concepts/equations to obtain quantitative results

List of Experiments:

1. Photoelectric effect: To determine work function, threshold frequency of a given material.
2. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
3. Hall Effect: To determine Hall co-efficient of a given semiconductor.
4. Light emitting diode: Determination of Planck's constant by plotting V-I and P-I characteristics of light emitting diode.
5. LASER: To study the V-I and P-I characteristics of LASER sources.
6. Solar Cell: To study the V-I Characteristics of solar cell.
7. Optical fiber: To determine the bending losses of optical fibers.
8. LCR Circuit: To determine the quality factor of LCR Circuit.
9. R-C Circuit: To determine the time constant of R-C circuit.
10. Stewart – Gee's experiment: Determination of magnetic field along the axis of a current carrying circular coil.

Note: Any 8 experiments are to be performed

Suggested Reading:

1. Engineering Physics Lab manual, 4th edition C.V. Madhusudhana Rao, V. Vasanth Kumar, SCI Tech Publications (India), Pvt. Ltd.

L	T	P	C
0	0	3	1.5

B.Tech. I Semester
CS151ES: Programming for Problem Solving Lab
(Common to CE, EEE, ME, ECE, MCT & MME)

Course Objectives

- To work with an IDE to create, edit, compile, run and debug programs.
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files.

Course Outcomes

- To be able to formulate problems and write programs to implement usage of various operators and control statements in program development.
- Applying the concepts of arrays and pointers to solve the problems.
- Applying the concepts of strings and structures to solve the problems.
- Applying concept reusability and handling dynamic memory allocation.
- Apply various file handling techniques for better data management.

Expression Evaluation & Control Structures:

a. Write the program for the simple, compound interest.
b. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
c. Write a program for find the max and min from the three numbers.
d. Write program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >=70% = Distinction. Read percentage from standard input.
e. 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)
f. Write a C program to find the roots of a Quadratic equation.
g. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

```
5 x 1 = 5
5 x 2 = 10
5 x 3 = 15
```

h. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
i. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
j. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
k. Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1
1 2        * *        2 3        2 2
1 2 3      * * *      4 5 6      3 3 3
```

Arrays and its Applications:

a. Write a C program to find the minimum, maximum and average in an array of integers.

b. Write a C program that uses functions to perform the following:
   i. Addition of Two Matrices
   ii. Multiplication of Two Matrices

Pointers:

a. Write a C program for reading elements using pointer into array and display the values using array.
b. Write a C program for display values reverse order from array using pointer.
c. Write a C program through pointer variable to sum of n elements from array.

Strings:

a. Write a C program using functions to insert a sub-string into a given main string from a given position.
b. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
c. Write a C program to count the lines, words and characters in a given text.

Structures:

a. Write a C program to add two complex numbers by Passing Structure to Function.
b. Write a C program to Store Information of a Student Using Structure.
c. Write a C program to demonstrate e-num

Functions and Dynamic Memory allocation functions:

a. Write a C programs that use both recursive and non-recursive functions.
   i. To find the factorial of a given integer.
   ii. To find the GCD (greatest common divisor) of two given integers.

b. Write a C program to implement dynamic memory allocation for an array using malloc (), calloc (), realloc() and free().

Files:

a. Write a C program to display the contents of a file to standard output device.
b. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
c. 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).

Suggested Reference Books for solving the problems:

1. E Balagurusamy, Programming in ANSI C , Mc Graw Hill, Eighth Edition, 2019.
2. B.A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, Third Edition, Cengage Learning 2016.
3. B.W. Kernighan and Dennis M. Ritchie, The C Programming Language, Second Edition, Pearson education, 1988.
4. B. Gottfried, Programming with C, Fourth edition, Schaum's outlines, McGraw Hill Education (India) Pvt Ltd, 2018.

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B.Tech. II Semester
EN201HS: English
(Common to CE, EEE, ME, ECE, MCT & MME)

Course Objectives

The course aims
- To develop an understanding of the nuances of vocabulary, grammar, reading and writing skills in English and allow them to practice in formal and informal contexts.
- To improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- To facilitate students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- To practice study skills and communication skills in formal and informal situations

Course Outcomes

Students should be able to
- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Introduction

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.

Unit-I

'Toasted English' a short essay by R.K. Narayan

Vocabulary: The Concept of Word Formation –The Use of Prefixes and Suffixes.

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

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

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

Unit-II

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

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

Reading: Improving Comprehension Skills – Techniques for Good Comprehension
Writing: Nature and Style of Sensible Writing- Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence

Unit-III

'Blue Jeans' from the prescribed textbook 'English for Engineers'
Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives- 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- Skimming and Scanning
Writing: Information Transfer, Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Job Application with Resume.

Unit-IV

'The Road Not Taken' by Robert Frost
Vocabulary: Standard Abbreviations and Acronyms in English
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Comprehension- Intensive Reading and Extensive Reading
Writing: Writing Practices–Writing Introduction and Conclusion – Essay Writing-Précis Writing.

Unit-V

'What should you be Eating' from the prescribed textbook 'English for Engineers'
Vocabulary: Technical Vocabulary and its usage
Grammar: Common Errors in English
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.

Suggested Readings:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.
2. Toasted English by R.K. Narayan
3. The Road Not Taken by Robert Frost

Reference Books:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Murali, K and Mishra, S. (2011) Communication Skills for Engineers Pearson Publishers
3. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
4. Wood, F.T. (2007) Remedial English Grammar. Macmillan.
5. Zinsser, William. (2001) On Writing Well. Harper Resource Book.
6. Hamp-Lyons, L. (2006) Study Writing. Cambridge University Press.

L	T	P	C
3	1	0	4

B.Tech. II Semester
MA202BS: Mathematics-II
(Common to all Branches)

Course Objectives

To learn
- Various methods of solving the differential equations of first order.
- Methods of solving higher order differential equations.
- Evaluation of multiple integrals and their applications.
- The study of physical quantities involved in engineering fields related to vector valued functions.
- The basic properties of vector valued functions and their applications to line, surface and volume integrals and converting one into another.

Course Outcomes

After learning the contents of this paper, the student must be able to
- Solve the first order differential equation with real world application.
- Use various methods to solve higher order differential equations with constant and variable coefficients.
- Evaluate multiple integrals to obtain area and volume.
- To analyze the physical quantities involved in engineering field related to vector valued functions.
- Evaluate line, surface and volume integrals and understand the relation between them.

Unit-I: First Order Ordinary Differential Equations

Overview of first order and first degree differential equations; Exact differential equations, Differential equations reducible to Exact, Linear and Bernoulli's differential equations; Applications: Newton's law of cooling, Law of natural growth and decay.

Equations not of first degree: equations solvable for p, equations solvable for x, equations solvable for y and Clairaut's type.

Unit-II: Ordinary Differential Equations of Higher Order

Higher order linear differential equations with constant coefficients: Solutions of Homogeneous differential equations and Solutions of Non-Homogeneous equations with terms of the type sinax, cosax, x^m, e^{ax}, xv(x) and v(x) e^{ax} ; Method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

Unit-III: Multivariable Calculus (Integration)

Introduction to curve tracing (regular curves); 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. Applications: Evaluation of Area (by double integrals) and volume (by double integrals and triple integrals).

Unit-IV: Vector Differentiation

Vector point functions and scalar point functions. Gradient, Divergence, Curl, Scalar potential functions, Solenoidal and Irrotational vectors. Directional derivatives, Tangent plane and Normal plane and Lapalcian Operator. Vector Identities.

Unit-V: Vector Integration

Line, Surface and Volume Integrals. Green's Theorem, Gauss divergence Theorem and Stoke's Theorem(without proofs) and their applications.

Suggested Readings:

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

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
2. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes.
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

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3	1	0	4

B.Tech. II semester
CH201BS: Chemistry
(Common to CE, EEE, ME, ECE, MCT & MME)

Course Objectives

To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer:

- To understand water quality, industrial usage, softening methods and related problems.
- To acquire the knowledge of electrochemistry and corrosion which are essential for the Engineers and applications in industries.
- To get exposed to qualitative and quantitative parameters of fuels and to develop understanding of the combustion process. To understand the basic principles and applications of lubricants.
- To understand the preparation, properties and applications of polymeric materials, refractories and nanomaterials in the real world scenario.
- To acquire the skills pertaining to spectroscopic techniques and to apply them for medical and other fields.

Course Outcomes

After completing the course , the student will be able to acquire:

- Knowledge on the disadvantages of hard water for domestic and industrial purposes. The techniques of softening of hard water and treatment of potable water.
- Knowledge about the principles of electrochemistry. Storage of electrical energy in batteries, construction of batteries and fuel cells. Mechanism of corrosion of metals and alloys and corrosion control methods.
- Knowledge about the techniques of analysis for quality parameters of fuels and their combustion process and also applications of lubricants.
- Skills on the application of engineering materials like polymers, nanomaterials and refractories.
- The required skills on basic concepts of spectroscopy and its application to medical and other fields.

Unit-I: Water and its Treatment

Introduction – Hardness of water – Causes and effects. Types of hardness - temporary and permanent hardness – units of hardness – Estimation of hardness of water by complexometric method - Numerical problems.

Boiler feed water - Boiler troubles: Priming and Foaming, Scale and Sludge, Caustic embrtillement and Boiler corrosion. Internal treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment – Ion exchange process. Desalination of brackish water by Reverse Osmosis. Potable water and its specifications. Steps involved in the treatment of Municipal water – Disinfection of water by Ozonization and Chlorination including Breakpoint Chlorination.

Unit-II: Electrochemistry and Corrosion

Electrochemistry: Electrochemical cells – Electrode, Electrode potential, Standard Electrode Potential, Nernst Equation and its applications. Electrochemical Series and its applications. Cell EMF - Numerical problems. Construction and functioning of Calomel, Quinhydrone and Glass electrodes. Determination of pH of a solution using Quinhydrone and Glass electrodes.

Batteries : Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery). Fuel cells (H_2-O_2 and Methanol - Oxygen fuel cells).

Corrosion and its Control: Corrosion- Causes and effects - Theories of chemical and electrochemical corrosion. Types of corrosion: Galvanic, Concentration cell corrosion (waterline and pitting corrosion). Factors influencing the rate of corrosion. Corrosion control methods - Cathodic protection (Sacrificial anodic and impressed current cathodic protection), Protective Coatings - Metallic coatings: methods of applications – Hot Dipping (Tinning and Galvanizing), Electroplating of Copper, Electroless plating of Nickel.

Unit-III: Fuels and Lubricants

Chemical fuels : Classification of Fuels - Primary and Secondary fuels. Characteristics of a good fuel.

Solid Fuels: Coal and its ranking. Analysis of coal – proximate and ultimate analysis and their significance – Numerical problems.
Liquid Fuels: Fractional distillation of petroleum. Knocking - Fuel rating – Octane and Cetane numbers.
Gaseous Fuels: Composition, Characteristics and uses of LPG, CNG and Biogas. Introduction to propellants.
Combustion: Definition, Calorific value of fuel – Higher Calorific Value (HCV), Lower Calorific Value (LCV) - Dulong's formula – Numerical problems. Calculation of air quantity required for combustion of a fuel.
Lubricants: Definition, Classification of lubricants with examples. Properties of lubricants - Viscosity, Cloud point, Pour point, Flash point and Fire point. Characteristics of a good lubricant.

Unit-IV: Engineering Materials

Polymers: Introduction and Terminology
Plastics - Preparation, properties and engineering applications of Bakelite and Acrylonitrile Butadiene Styrene (ABS).
Conducting Polymers: Classification with examples. Mechanism of conduction in polyacetylene and polyaniline. Effect of doping on conductance. Applications of conducting polymers.
Biodegradable Polymers: Concept and advantages - **P**reparation, properties and applications of Polylacticacid and polyvinyl alcohol.
Fibers: Preparation, properties and applications of Nylon 6, 6 and Dacron.
Elastomers: Preparation, properties and applications of Butyl rubber and Neoprene.
Refractories: Definition, Classification, Characteristics of a good refractory. Properties - Refractoriness, Refractoriness Under Load, Porosity and chemical inertness . Applications of refractories.
Nanomaterials: Introduction - Preparation by Sol - Gel method, General applications of Nanomaterials.

Unit -V: Spectroscopic Techniques and Applications:

Spectroscopy: Introduction
Electronic (UV - Visible) Spectroscopy: Principles - laws of absorption (Beer-Lamberts Law), types of electronic transitions, the chromophore concept, auxochrome, absorption and intensity shifts. Applications of UV - Visible spectroscopy.
Infrared Spectroscopy: Principle, Selection rules, Molecular vibrations - number of fundamental vibrations for linear and nonlinear molecules. Functional Group and Fingerprint regions of IR spectroscopy. Applications.
Nuclear Magnetic Resonance Spectroscopy: Basic concepts of nuclear magnetic resonance spectroscopy, chemical shift - shielding and deshielding, number of signals and splitting pattern of the signals - examples. Applications of NMR spectroscopy. Introduction to Magnetic Resonance Imaging.

Suggested Readings:

1. Jain P.C. & Jain M., Engineering Chemistry, Dhanpat Rai Publishing Company Ltd., New Delhi, 17th edition (2018).
2. Prashanth Rath, Rama Devi B., Venkata Ramana Reddy Ch. and Chakroborty Subhendu, Engineering Chemistry, Cengage Learning India Pvt. Ltd., 2nd edition.

Reference Books:

1. Shikha Agarwal, Engineering Chemistry, Cambridge Univ. Press.
2. Shashi Chawla, Text Book of Engineering Chemistry, Dhanpat Rai Publications.
3. Sharma Y.R., Elementary Organic Spectroscopy, S. Chand & Company Pvt. Ltd.

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B.Tech. II Semester
EE201ES: Basic Electrical Engineering
(Common to EEE & ECE)

Course Objectives

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC / AC machines and Transformers
- To impart the knowledge of various electrical installations
- To introduce the concept of power, power factor and its improvement

Course Outcomes

- To analyze and solve electrical circuits using network laws and theorems
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations

Unit-I : D.C. Circuits

The SI System of Units, Electrical circuit elements (R, L and C), Colour Coding of Resistors, Ohm's Law, Voltage and Current sources, Power, Energy, Current Sources in Parallel and Series, Voltage Sources in Parallel and Series, Series Circuits, Parallel Circuits, Kirchhoff's Voltage Law & Kirchhoff's Current Law, The Voltage Divider Rule, Current Divider Rule, Analysis of Series-Parallel Circuits, analysis of simple circuits with DC excitation - Mesh (Loop) Analysis, Nodal Analysis, Delta-Wye (Pi-Tee) Conversion, Superposition, Thevenin and Norton Theorems. Time-domain analysis of first order RL and RC circuits.

Unit-II : A.C. Circuits

Generation of AC Voltages, Frequency, Period, Amplitude, and Peak Value, Representation of sinusoidal waveforms, peak and rms values, Complex Number Review, phasor representation, R, L, and C Circuits with Sinusoidal Excitation, The Impedance Concept, Analysis of single-phase ac circuits consisting of R, L, C, R-L, R-C, R-L-C combinations (series and parallel), real power, reactive power, apparent power, power factor, The Relationship between P, Q, and S, resonance in series R-L-C circuit. Three-phase connections, voltage and current relations in star and delta connections, Power in a Balanced System

Unit-III: Transformers

Principle of operation, construction of transformers, EMF equation of transformer, voltage and turns ratio, ideal transformer on no load and on load, practical transformer on load including winding resistance and reactance, referring of parameters – to primary and secondary, equivalent circuit of transformer, approximate equivalent circuit of transformer, losses in transformers, Open circuit and short circuit tests, regulation and efficiency calculations.

Unit-IV: Electrical Machines

Generation of rotating magnetic fields, construction and working of a three-phase induction motor, slip of induction motor, torque in three phase induction motor, significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Working principle and construction of DC machine, EMF equation of DC generator, types of DC generators, torque in DC motor, types of DC motors, torque-speed characteristics and speed control of separately excited DC motor. Construction and working of synchronous generators.

Unit-V : Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), Miniature Circuit Breaker (MCB), Earth Leakage Circuit Breaker (ELCB), Modular Case Circuit Breaker (MCCB), Types of Wires and Cables, Earthing – types of earthing.

Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement, methods to improve power factor and battery backup.

Suggested Readings:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

Reference Books:

1. L.S. Bobrow, Fundamentals of Electrical Engineering", Oxford University Press, 2011
2. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
3. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989

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B.Tech. II Semester
EN251HS: The English Language and Communication Skills Lab
(Common to CE, EEE, ME, ECE, MCT & MME)

Course Objectives

- To develop an understanding of the nuances of listening and speaking skills in English and allow them to practice in formal and informal contexts.
- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- To sensitize 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 their mother tongue interference
- To train students to use language appropriately for oral presentation and interview skills
- To improve language proficiency of the students through practice sessions in English Language Labs

Course Outcomes

Students will be able to attain:

- Better understanding of nuances of English language through audio- visual experience and group activities
- Neutralization of accent for intelligibility
- Speaking skills with clarity and confidence which in turn enhances their employability skills
- Enhancement of fluency in verbal and non-verbal communication
- Ability to use English both in written and spoken modes through JAM sessions, GDs, Interview skills etc.
- Proficiency in Listening for specific and general purposes.

The 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 its role in the LSRW skills approach to language and improve their pronunciation.
2. To facilitate students to practice listening for general content, listening for specific information and for intensive listening.
3. 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 understand and practise word accent, recognize and use the right intonation in sentences.

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 professional contexts
   - Oral practice: Just A Minute (JAM)Sessions/Introduction to structured talk
   - Describing objects/situations/people
   - Role play – Individual/Group activities
   - Interview skills

Exercise – I
CALL Lab:
Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers to Listening.
Practice: Introduction to Phonetics – Speech Sounds - Vowels – Monophthongs and Diphthongs –Consonants – Voiced and Voiceless- Past tense markers (-ed & -es) and Plural Markers.
ICS Lab:
Understand: Communication at Work Place- Spoken vs. Written language.
Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II
CALL Lab:
Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.
Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.
ICS Lab:
Understand: Features of Good Conversation – Starting a Conversation – Joining a Conversation – Ending a Conversation - Non-verbal Communication – Eye contact and Facial gestures.
Practice: Situational Dialogues – Role-Play-Individual & Group - Expressions in Various Situations –Making Requests and Seeking Permissions – Telephone Etiquette – Dos and Don'ts of Mobile phone Etiquette.

Exercise - III
CALL Lab:
Understand: Intonation-Errors in Pronunciation-the Interference of Mother Tongue (MTI).
Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.
ICS Lab:
Understand: How to make Formal Presentations.
Practice: Formal Presentations.

Exercise – IV
CALL Lab:
Understand: Listening for General Details.
Practice: Listening Comprehension Tests.
ICS Lab:
Understand: Public Speaking – Exposure to Structured Talks – Power Point Presentations – Poster Presentations.
Practice: Making a Short Speech – Extempore and Prepared – Aspects of Presentation.

Exercise – V
CALL Lab:
Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests.
ICS Lab:
Understand: Interview Skills – *Resume Preparation – Salient features of Interview Skills – Before the Interview – During the Interview – After the Interview.*
Practice: Mock Interviews.

Suggested Readings:

1. Exercises in Spoken English. Parts 1, 2 & 3. CIEFL, Hyderabad: OUP
2. ELCS Lab Manual, A Workbook for CALL and ICS Lab Activities, published by Orient Blackswan Private Limited, Hyderabad.

Reference Books:

1. Cambridge English, Business Benchmark, South Asian Edition, Student's Book, Norman Whitby – B2 Level.
2. Communication Skills for Engineers Pearson Publishers
3. Skills Annexe, Functional English for Success, published by Orient BlackSwan, Hyderabad.

4. Technical Communication, published by Oxford University Press, New Delhi.
5. English for Engineering Course Workbook published by Hitech Publishing Company Pvt. Ltd., Hyderabad.
6. Selected TED Talks

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 with Internet connectivity.

System Requirement (Hardware component):

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

i) Computers with Suitable Configuration for Multi-Media
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 LCD and a projector with Internet Connectivity, Handycam Camcorder with 4K recording facility with tripod.

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B.Tech. II Semester
CH251BS: Engineering Chemistry Lab
(Common to CE, EEE, ME, ECE, MCT & MME)

Course Objectives

The course consists of experiments related to the principles of chemistry required for an Engineering student. The student will learn :

- Quantitative analytical techniques like Estimation of hardness of water by Complexometry. Estimation of ferrous iron by Dichrometry and Permanganometry.
- The measurement of physical properties like Viscosity and Surface Tension.
- Quantitative estimations by Instrumental techniques – Conductometry, Potentiometry and Colorimetry.
- Synthetic procedures of drugs like Aspirin and fibers like Nylon.
- Determination of Acid Value of Coconut oil.

Course Outcomes

After completing the course, the student will gain practical knowledge on:

- Quantitative Analytical Techniques with Volumetric procedures.
- Quantitative Analytical Techniques with Instrumental methods.
- Measurement of Physical Properties like Viscosity and Surface Tension.
- Synthetic procedures of Drugs and Polymers.
- The concept of Acid Value of oils and its determination.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA.
2. Estimation of the amount of Fe^{2+} in a given solution by Dichrometry.
3. Estimation of the amount of Fe^{2+} in a given solution by Permanganometry.
4. Estimation of the amount of HCl in a given solution by Conductometry.
5. Estimation of the amount of Acetic acid in a given solution by Conductometry.
6. Estimation of the amount of HCl in a given solution by Potentiometry.
7. Estimation of the amount of Fe^{2+} in a given solution by Potentiometry using $KMnO_4$
8. Estimation of the amount of Mn^{+2} in a given solution by Colorimetry.
9. Determination of Viscosity of a given lubricating oil using Redwood viscometer.
10. Determination of Surface Tension of a given liquid using Stalagmometer.
11. Synthesis of Polymers (Nylon /Bakelite).
12. Synthesis of Aspirin.
13. Determination of Acid Value of Coconut oil.

Reference Books:

1. Khosla B.D., Gulati A., and Garg V.C., Senior practical physical chemistry, R. Chand & Co., Delhi.
2. Sharma K.K., and Sharma D. S., An introduction to practical chemistry, Vikas publishing, New Delhi, 1st edition, 1982.
3. Mendhan J., Denney R.C., Barnes J.D., Thomas M., Siva Sankar B., A Text Book of Quantitative Chemical Analysis, Pearson, 6th edition.
4. Dara S.S., Text book on Experiments and calculations in Engineering chemistry, S. Chand publishers, 1st edition, 2018.

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B.Tech. II Semester
ME251ES: Engineering Workshop
(Common to CE, EEE, ME, ECE, MCT & MME)

Course Objectives

At the end of this course students are expected to

- Study of different hand operated power tools, uses and their demonstration.
- Gain a good basic working knowledge required for the production of various engineering products.
- Provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field.
- Study commonly used Engineering trades like Carpentry, Fitting, Tin smithy, Foundry, House wiring, Plumbing & Black smithy and practical exposure to these trades.
- Study of various machining operations.

Course Outcomes

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

- Practice on various workshop trades including plumbing, Fitting, Carpentry, Foundry, House wiring, Tin smithy, Black smithy and Welding by using different tools.
- Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring and chiseling.
- Apply basic electrical engineering knowledge for House wiring practice.
- Implement the knowledge of basic workshop processes under safety norms.
- Understand different metal joining techniques using arc welding process.

1. Trades for Exercises (At least two exercises from each trade)

I. Carpentry –Bridle Joint, Half - Lap Joint, Mortise & Tenon Joint
II. Fitting – L- fit, V-Fit & Dovetail Fit
III. Tin-Smithy – Square Tin, Rectangular scoop & Rectangular tray
IV. Foundry – Preparation of Green Sand Mould using Single Piece and Split Pattern
V. Welding Practice – Arc Welding- Lap Joint, Butt Joint & T Joint
VI. House-wiring – Parallel & Series, Two-way Switch and Tube Light
VII. Black Smithy – Oval shape, S – Hook & Fan Hook

2. Trades for Demonstration & Exposure

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools used in construction and Wood working operations.

Suggested Readings:

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

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B.Tech. II Semester
EE251ES: Basic Electrical Engineering Lab
(Common to EEE & ECE)

Course Objectives

- To analyze a given network by applying various electrical laws and network theorems
- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters
- To analyze the performance characteristics of DC and AC electrical machines

Course Outcomes

On completion of this course the student shall

- Get an exposure to basic electrical laws
- Understand the response of different types of electrical circuits to different excitations
- Understand the measurement, calculation and relation between the basic electrical parameters
- Understand the basic characteristics of transformers and electrical machines

List of experiments/demonstrations:

1. Verification of Ohm's Law
2. Verification of KVL and KCL
3. Transient Response of Series R-L and R-C circuits using DC excitation
4. Transient Response of R-L-C Series circuit using DC excitation
5. Resonance in series R-L-C circuit
6. Calculations and Verification of Impedance and Current of R-L, R-C and R-L-C series circuits
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Performance Characteristics of a Three-phase Induction Motor
13. No-Load Characteristics of a Three-phase Alternator

Any 10 of the above experiments to be conducted