KAMARAJ
COLLEGE OF ENGINEERING & TECHNOLOGY ®

(**An Autonomous Institution** - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)
S.P.G.Chidambara Nadar - C.Nagammal Campus
S.P.G.C.Nagar, K.Vellakulam - 625 701, (Near Virudhunagar), Madurai District.

B.E. ELECTRONICS AND INSTRUMENTATION ENGINEERING
REGULATION 2020
FIRST YEAR (I & II Semester) – CURRICULUM & SYLLABI

SEMESTER I

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	HS1171	Communicative English	HS	3	0	0	3	3
2	MA1171	Engineering Mathematics-I	BS	3	1	0	4	4
3	PH1171	Engineering Physics	BS	3	0	0	3	3
4	CY1171	Engineering Chemistry	BS	3	0	0	3	3
5	GE1171	Fundamentals of Computing and Programming	ES	3	0	0	3	3
PRACTICALS								
6	BS1181	Basic Sciences Laboratory	BS	0	0	2	2	1
7	GE1181	Fundamentals of Computing and Programming Laboratory	ES	0	0	4	4	2
			TOTAL	15	1	6	22	19

SEMESTER II

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	HS1271	Technical English	HS	3	0	0	3	3
2	MA1271	Engineering Mathematics-II	BS	3	1	0	4	4
3	PH1272	Physics for Electronics Engineering	BS	3	0	0	3	3
4	BS1271	Environmental Science and Engineering	BS	3	0	0	3	3
5	GE1271	Engineering Graphics	ES	1	0	4	5	3
6	EE1271	Circuit Theory	PC	3	0	0	3	3
PRACTICALS								
7	GE1281	Engineering Practices Laboratory	ES	0	0	4	4	2
8	EE1281	Electric Circuits Laboratory	PC	0	0	4	4	2
			TOTAL	16	1	12	29	23

HS1171   **COMMUNICATIVE ENGLISH**
              (Common to all branches of B.E. / B.Tech Programmes)

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- Develop the basic reading and writing skills of first year engineering and technology students
- Help learners develop their listening skills, which will enable them listen to lectures and comprehend them by asking questions; seeking clarifications
- Help learners develop their speaking skills and speak fluently in real contexts
- Help learners develop vocabulary of a general kind by developing their reading skills

UNIT I   SHARING PERSONAL INFORMATION   9

Listening- short texts- Short formal and informal conversations about current affairs. **Speaking**- introducing oneself - exchanging personal information **Reading**- Reading- short comprehension passages and fill-in the gap, Practice in skimming, scanning and predicting content and end up effectively -**Writing**- Completing sentences using connectors - Developing hints based on the true facts -**Language development**- Parts of speech- Tenses-modal verbs Language Ladders: Wh- Questions/ Yes or no questions - **Vocabulary development** -Prefixes-suffixes- Changes in meaning.

UNIT II   GENERAL READING AND FREE WRITING   9

Listening -telephonic conversations. **Speaking** – sharing information of personal kind - redundancies – taking leave- **Reading** - comprehension-pre-reading-post reading-comprehension questions (multiple choice questions and /or short questions/ open-ended questions)-inductive reading- short narratives and descriptions from newspapers including dialogues and conversations (also used as short Listening texts)- register- **Writing** – paragraph writing- topic sentence- main ideas- Free writing-Summary writing –**Language development** – prepositions, conjunctions, articles, count/uncount nouns- **Vocabulary development**-guessing meanings of words in context.

UNIT III   GRAMMAR AND LANGUAGE DEVELOPMENT   9

Listening – listening to longer texts and filling up the table- product description- narratives from different sources. **Speaking**- asking about routine actions and expressing opinions

Reading- short texts and longer passages (close reading) **Writing**– constructing a paragraph of their own choice- use of reference words and discourse markers-coherence- jumbled sentences . **Language development**- degrees of comparison- pronouns- direct vs indirect questions- **Vocabulary development** – single word substitutes- meanings of root words.

UNIT IV   READING AND LANGUAGE DEVELOPMENT   9
Listening- listening to dialogues or conversations and completing exercises based on them. **Speaking**- speaking about oneself- speaking about one's friend. **Reading**- comprehension reading longer texts- reading different types of texts- magazines Writing- letter writing, informal or personal letters-e-mails-conventions of personal email-**Language development**- Phrasal Verbs- **Vocabulary Development**- synonyms-antonyms.

UNIT V   EXTENDED WRITING   9
Listening –listening to talks- conversations- **Speaking** – participating in conversations- short group conversations-**Reading**- longer texts- close reading –**Writing**- brainstorming - writing short essays – developing an outline- identifying main and subordinate ideas- dialogue writing- **Language development**- Collocations used in everyday life - **Vocabulary Development** - Fixed and Semi-Fixed Expressions used in informal situations

TOTAL: 45 PERIODS

COURSE OUTCOMES:
Upon completion of the course, the student will be able to

C01   Comprehend articles of a general kind in magazines and newspapers.

CO2   Apply acquired knowledge of conventions in diverse contexts by participating effectively in informal conversations

CO3   Make use of standard English to express views coherently and explicitly in formal communication.

CO4   Demonstrate proper grammar usage in the writing of personal letters and emails in English

CO5   Illustrate their ability to write short essays of a general kind

TEXTBOOKS:
1. Richards, C. Jack, 2015, *Interchange Students' Book-2* , CUP, New Delhi.
2. Sanjay Kumar & Pushp Lata, 2018, *Communication Skills*: Oxford University Press, Chennai.

REFERENCES:

1. Shoba, KN 2019, *Communicative English – A Workbook,* Cambridge, New Delhi.
2. Bailey & Stephen 2011, *Academic Writing: A practical guide for students*. Rutledge, New York.
3. Comfort , Jeremy, Pamela Rogerson Revell , Trish Stott & Derek Utley 2011, *Speaking Effectively: Developing Speaking Skills for Business English.* Cambridge University Press, Cambridge.
4. Dutt P. Kiranmai & Rajeevan Geeta 2013, *Basic Communication Skills*, Foundation Books.
5. Means,L. Thomas & Elaine Langlois 2007, *English & Communication for Colleges*, Cengage Learning ,USA.
6. Redston, Chris & Gillies Cunningham 2005, *Face2Face (Pre-intermediate Student's Book& Workbook)*, Cambridge University Press, New Delhi.

WEB SOURCES:

1. http://learnenglish.britishcouncil.org/grammar/intermediate-to-upper-intermediate
2. https://www.bbc.co.uk/learningenglish/basic-grammar

	MA1171	**ENGINEERING MATHEMATICS – I**	**L**	**T**	**P**	**C**
	(Common to all branches of B.E. / B.Tech Programmes)		**3**	**1**	**0**	**4**

PREREQUISITE: Basics of Matrices – Limit of a function – Continuity – Differentiation – Integration – Elementary calculus. (Not for Examination)

OBJECTIVES:

To enable the students to

- Gain knowledge in using matrix theory techniques to solve problems.
- Understand the various techniques in differential calculus to obtain the maxima and minima of a function.
- Understand the concept of evolutes and envelopes.
- Understand the concept of integration for finding Length of curves, Volumes of solid of revolution, Surface areas of revolution.
- Acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I   MATRICES   12

Characteristic equation – Eigen values and Eigen vectors – Properties – Cayley-Hamilton Theorem (without proof) – Applications: Inverse and powers of a matrix – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II   APPLICATIONS OF DIFFERENTIAL CALCULUS   12

Curvature in Cartesian coordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes – Increasing and Decreasing functions – Maxima and Minima of functions of single variable using first derivative test.

UNIT III   APPLICATIONS OF INTEGRAL CALCULUS   12

Beta and Gamma Function– Properties– Evaluation of integrals using Beta and Gamma function–Length of curves – Surface areas of revolution.

UNIT IV   PARTIAL DIFFERENTIATION AND ITS APPLICATIONS   12

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Partial differentiation of implicit functions – Jacobians – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT V   MULTIPLE INTEGRALS AND ITS APPLICATIONS   12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids.

                                                               TOTAL: 60 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

   CO1   Apply the concept of Eigen values and eigenvectors, diagonalization of a
              matrix for solving Engineering problems.

   CO2   Apply differentiation to solve maxima and minima problems.

   CO3   Apply integration to compute Length of curves and Surface areas of
              revolution.

   CO4   Apply Partial differentiation to compute Maxima and minima of functions
              of two variables.

CO5   Apply multiple integrals technique to calculate area and volume.

TEXT BOOKS:
1. Grewal, B S 2014, *Higher Engineering Mathematics*, Khanna Publishers, 43rd Edition, New Delhi.
2. Kreyszig Erwin 2016, *Advanced Engineering Mathematics*, John Wiley and Sons, 10th Edition, New Delhi.

REFERENCES:
1. Anton, H, Bivens, I & Davis, S 2016, *Calculus*, Wiley, 10th ed.
2. Jain, RK, & Iyengar, SRK 2007, *Advanced Engineering Mathematics*, Naros Publications, 3rd Edition, New Delhi.
3. Narayanan, S & Manicavachagom Pillai, T K 2007, *Calculus Volume I and II*, S. Viswanathan Publishers Pvt. Ltd., Chennai.
4. Peter V.O'Neil 2007, *Advanced Engineering Mathematics*, Cengage learning 7th Edition.
5. Weir, MD, & Joel Hass 2016, *Thomas Calculus*, Pearson Education 12th ed, India.

PH1171   **ENGINEERING PHYSICS**
(Common to all branches of B.E./ B.Tech Programmes)

L	T	P	C
3	0	0	3

OBJECTIVES:
- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I ULTRASONICS   **9**
Generation of ultrasonic waves –Magnetostriction generator – Piezoelectric generator - detection of ultrasonic waves - properties – cavitation - velocity measurement – acoustic grating - Industrial applications: SONAR - Non Destructive Testing - A,B and C –scan displays.

UNIT II   LASER AND FIBER OPTICS   **9**
Lasers: population of energy levels, Einstein's A and B coefficients– Semiconductor lasers: homo junction and heterojunction.

Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibre (material, refractive index profile and number of modes) –sensors: pressure and displacement, optical fiber communication system, endoscope.

UNIT III   THERMAL PHYSICS   9
Thermal conductivity – Forbe's and Lee's disc method- conduction through compound media (series and parallel) - thermal expansion of solids and liquids – thermal insulation- Applications: heat exchangers, refrigerators, ovens and solar water heater.

UNIT IV   QUANTUM PHYSICS   9
Postulates of quantum mechanics - Black body radiation – Planck's theory (derivation) - wave particle duality – electron diffraction – degenerate and non-degenerate states – physical significance of wave function- Schrödinger's wave equation – time independent and time dependent wave equations – particle in a one-dimensional box - scanning tunneling microscope.

UNIT V   CRYSTAL PHYSICS   9
Crystalline and non-crystalline solids - unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – interplanar distances - coordination number and packing factor for SC, BCC, FCC and HCP - crystal defects: point defect and line defect - role of imperfections in plastic deformation - Bridgman and Czochralski crystal growth techniques.

TOTAL: 45 Hours

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

CO1   Understand the properties, generation and applications of ultrasonic waves.

CO2   Realize the properties & principle of laser, and propagation of light in optical fibre.

CO3   Explain the idea of heat conduction in different media and understand the real applications of heat transfer.

CO4   Comprehend the quantum concepts in materials.

CO5   Describe the various types of atomic arrangements and imperfections in crystal.

TEXT BOOKS:

1. Bhattacharya, DK, & Poonam, T 2015, *Engineering Physics* Oxford University Press.
2. John Wilson, Hawkes, JFB 1998, *Optoelectronics: An Introduction*, Prentice Hall of India.
3. Gaur, RK & Gupta, SL 2012, *Engineering Physics*, Dhanpat Rai Publishers.
4. Pandey, BK & Chaturvedi, S 2012, *Engineering Physics,* Cengage Learning India.
5. Charles Kittel 2007, *Introduction to Solid State Physics*, 7th ed, Wiley India.

REFERENCES:

1. Halliday, D, Resnick, R & Walker, J 2015, *Principles of Physics,* Wiley.
2. Serway, RA. & Jewett, JW 2010, *Physics for Scientists and Engineers*, Cengage Learning, 2010.
3. Tipler, PA & Mosca, G 2007, *Physics for Scientists and Engineers, USA*.
4. Mathews, PM & Venkatesan 2010, *A Text book of Quantum Mechanics*, Tata McGraw hill.
5. William T. Silfvast 2004, *Laser Fundamentals*, 2nd ed, Cambridge University press, New York.
6. Shankar, R 2014, *Fundamentals of Physics,* Yale University Press, New Haven and London.

WEB REFERENCES:

1. https://nptel.ac.in/courses/122/106/122106034/ (Quantum Physics)
2. https://nptel.ac.in/courses/115/105/115105099/ (Solid state Physics)
3. https://nptel.ac.in/courses/115/107/115107095/ (Fiber Optics)
4. https://nptel.ac.in/courses/113/106/113106070/ (Ultrasonic testing)

CY1171   **ENGINEERING CHEMISTRY**
(Common to all branches of B.E./ B.Tech Programmes)

OBJECTIVES:

L	T	P	C
3	0	0	3

To enable the students to understand

- Water quality parameters and water treatment techniques.
- Principles and applications of electrochemistry, its processes and storage devices.
- The various energy sources and their applications

- The basic concepts of polymers, their properties and some of the important applications.
- The basic principles and preparatory methods of engineering materials and nanomaterials.

UNIT I WATER AND ITS TREATMENT   **9**

Water – sources and impurities – water quality parameters: colour, odour, pH, hardness, alkalinity, TDS, COD and BOD. Boiler feed water – requirement – troubles (scale & sludge, caustic embrittlement, boiler corrosion and priming & foaming). Internal conditioning – phosphate, calgon and carbonate treatment. External conditioning - zeolite (permutit) and ion exchange demineralization. Municipal water treatment process – primary (screening, sedimentation and coagulation), secondary (activated sludge process and trickling filter process) and tertiary (ozonolysis, UV treatment, chlorination, reverse osmosis).
.

UNIT II   ELECTROCHEMISTRY   **9**

Introduction –Electrochemical cells – Reversible and irreversible cells – Concentration Cells - EMF - Measurement of EMF - Electrode potential – Single Electrode Potential – Nernst Equation (Problems) – Reference electrodes – Calomel electrode – Glass electrode – EMF Series – Significance – Applications of EMF measurements: Potentiometric Titrations. Storage Devices: Batteries and Super capacitors - Types of batteries - alkaline, lead-acid, nickel-cadmium and lithium batteries - construction, working and commercial applications. Fuel Cells – H_2-O_2 fuel cell – Microbial Fuel Cells.

UNIT III   ENERGY SOURCES   **9**

Conventional and Non Conventional Energy Sources – Conventional: Fossil Fuels - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - manufacture of synthetic petrol (Bergius process) - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG). Non Conventional: Solar energy – Solar Energy Conversion – Solar Cells, Wind Energy, Nuclear Energy – Nuclear fission and fusion – Nuclear chain reactions - Nuclear reactor – Nuclear Power Plant – Breeder Reactor.

UNIT IV   POLYMERS   **9**

Introduction: Functionality - degree of polymerization- Classification of polymers- natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and coordination); condensation and copolymerization. Properties of polymers: Tg, tacticity, molecular weight-weight average,

number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension. Synthesis, Properties and uses of: PE, PVC, Nylon 66, Bakelite, Epoxy resins.

UNIT V   ENGINEERING MATERIALS   9

Introduction - Portland cement- manufacture and properties - setting and hardening of cement, special cement- waterproof and white cement–properties and uses - Glass - manufacture, types, properties and uses.

Nanomaterials - Basics-distinction between molecules, nanomaterials and bulk materials; size-dependent properties – Synthesis of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, Precipitation & electrochemical deposition – General Applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon successful completion of course the students will be able to

- CO1   Identify the purity of water samples as per industry requirements.
- CO2   Apply basic concepts of electrochemistry in energy storage devices
- CO3   Recognize different forms of energy resources to apply them for suitable applications in energy sectors
- CO4   Illustrate the structure and properties of polymeric molecules.
- CO5   Identify the properties of various materials used in engineering and technology applications

TEXT BOOKS:

1. Jain, PC & Monica Jain 2015, *Engineering Chemistry*, 16th ed, Dhanpat Rai Publishing Company (P) Ltd, New Delhi.
2. Sivasankar B 2010, *Engineering Chemistry*, Tata McGraw-Hill Publishing Company Ltd, New Delhi.
3. Dara, SS & Umare, SS 2015, *A text book of Engineering Chemistry*, 2nd ed, Chand & Company Ltd, New Delhi.

REFERENCES:

1. Schdeva, MV 2017, *Basics of Nano Chemistry*, Anmol Publications Pvt Ltd.
2. Sivasankar, B 2012, *Instrumental Methods of Analysis*, Oxford University Press.
3. Friedrich Emich 2017, *Engineering Chemistry*, Scientific International Ltd.

4. Gowariker, VR, Viswanathan, NV & Jayadev Sreedhar 2019, *Polymer Science*, 6th ed, New Age International Publishers.

GE1171   FUNDAMENTALS OF COMPUTING AND PROGRAMMING
            (Common to all branches of B.E./ B.Tech Programmes)

OBJECTIVES:

To enable the students to:

L	T	P	C
3	0	0	3

- Provide the basics of computational problem solving
- Develop simple C Programs using basic programming constructs
- Develop simple C programs to work on arrays and strings
- Develop simple applications in C using functions and pointers
- Develop basic applications in C using structure and files

UNIT I INTRODUCTION TO COMPUTING AND PROBLEM SOLVING   7

Fundamentals of Computing – Basic computer organization – Generation of Computers – Evolution of programming languages – Need for logical analysis and thinking – Number System – Algorithms – Pseudocodes – Flowcharts.

SUGGESTED TOOL: Raptor tool
SUGGESTED ACTIVITIES:

Draw a flow chart and write a pseudocode to perform the following operations:

i.   Swap two numbers without temporary variable
ii.   Leap year or not
iii.   Sum of even numbers in range of 1 to N
iv.   Prime or not
v.   Find minimum in a given array of elements
vi.   Solve Towers of Hanoi problem
.

UNIT II   BASICS OF C PROGRAMMING   11

Introduction to C programming – Structure of C program – Cprogramming: Data Types – Storage classes – Constants– Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions – Input/Output statements, Assignment statements – Decision making statements – Switch statement – Looping statements.

SUGGESTED ACTIVITIES:

Write a C Program to perform the following operations:

i.   Simple calculator

ii.   GCD

iii. Fibonacci series

UNIT III   ARRAYS AND STRINGS   10

Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays – String operations.

SUGGESTED ACTIVITIES:

Write a C Program to perform the following operations:

i.   Computing Mean, Median and Mode

ii.   Matrix operations (Addition, Scaling, Multiplication and Transpose)

iii. Bubble Sort

iv.   Linear Search

v.   String operations (length, compare, concatenate, copy, reverse)

.

UNIT IV   FUNCTIONS AND POINTERS   9

Introduction to functions: Function prototype, function definition, function call, Built-in functions – Recursion – Pointers – Pointer operators – Pointer arithmetic – Parameter passing: Pass by value, Pass by reference.

SUGGESTED ACTIVITIES:

Write a C Program to perform the following operations:

i.   String functions, math functions

ii.   Computation of Sine series

iii. Scientific calculator using built-in functions

iv.   Factorial using recursive functions

v.   Swapping of two numbers using pass by value

vi.   Changing the value of a variable using pass by reference

UNIT V   STRUCTURES AND FILE PROCESSING   8

Structure – Nested structures – Array of structures – Files– Types of file processing: Sequential access, Random access – Command line arguments – Pre-processor directives.

SUGGESTED ACTIVITIES:

Write a C Program to perform the following operations:

i.   Student mark sheet preparation using Structure

ii.   Read the content from a text file, convert it to upper case and store it in another text file

iii.   Search a content from the student data file (Sequential access)

iv.   Fetch nth record from the student data file (Random access)

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon successful completion of course the students will be able to

CO1   Develop algorithms for simple computational problems

CO2   Develop simple applications in C using basic constructs

CO3   Design and implement applications using arrays and strings

CO4   Develop and implement applications in C using functions and pointers

CO5   Develop applications in C using structures and files

TEXTBOOKS:

1. ReemaThareja, 2016, *Programming in C*, 2nded, Oxford University Press.

2. Forouzan, BA&Gilberg, RF, 2006, *Computer Science: A structured programming approach using C*,3rd ed, Cengage Learning.

3. Kernighan, B.W & Ritchie, D.M, 2006, *The C Programming language*, 2nd ed, Pearson Education.

REFERENCES:

1. Paul Deitel& Harvey Deitel, *C How to Program*, 7thed, Pearson Publication.

2. Juneja, BL & Anita Seth, 2011, *Programming in C*, CENGAGE Learning India pvt. Ltd.

3. Pradip Dey & Manas Ghosh, 2009, *Fundamentals of Computing and Programming in C*, Oxford University Press.

4. Anita Goe l& Ajay Mittal, 2011,*Computer Fundamentals and Programming in C*, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia.

5. Byron S. Gottfried, 1996,*Schaum's Outline of Theory and Problems of Programming with C*, McGraw-Hill Education.

BS1181   **BASIC SCIENCES LABORATORY**

(Common to all branches of B.E / B.Tech Programmes)

PHYSICS LABORATORY

L	T	P	C
0	0	2	1

OBJECTIVES:

To introduce different experiments to test basic understanding of

physics concepts applied in optics, ultrasonics, thermal and semiconductor physics.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

1. (a) Determination of wavelength, and particle size using Laser.

   (b) Determination of acceptance angle in an optical fiber.

2. Determination of thermal conductivity of a bad conductor – Lee's Disc method.

3. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.

4. Determination of wavelength of mercury spectrum – spectrometer grating.

5. Determination of band gap of a semiconductor.

6. Determination of thickness of a thin wire – Air wedge method.

7. Determination of Young's modulus by Uniform bending method.

Experiments using LabVIEW: (Demonstration only)

1. Calibration of Ammeter/Voltmeter using potentiometer.

2. Sensors - Displacement, Pressure, Strain and Acoustical sensors.

TOTAL: 15 PERIODS

CHEMISTRY LABORATORY

OBJECTIVES:

To enable the students to

- Inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.

- Familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.

LIST OF EXPERIMENTS: (Any 6 Experiments)

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.

2. Determination of total, temporary & permanent hardness of water by EDTA method.

3. Determination of DO content of water sample by Winkler's method.

4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by EDTA method
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.

TOTAL: 15 PERIODS

COURSE OUTCOMES:
Upon successful completion of course the students will be able to

CO1 Interpret the elastic property of the materials using non-uniform bending method and the size of the microscopic particles with the help of a laser.

CO2 Find the bandgap of the semiconductor using Four probe setup and compressibility   of the given liquid and velocity of the ultrasonic waves using an ultrasonic interferometer.

CO3 Illustrate the wavelength of different colours present in the polychromatic light source using grating

CO4 Analyse the water quality parameters like hardness, Alkalinity, Chloride, DO in the   given water sample by volumetric method

CO5 Determine the quantity of the analyte in the given sample by volumetric method with the help of instruments

TEXT BOOKS:
1. Jeffery, GH, Bassett, J, Mendham, J & Denney, RC, 2014, "*Vogel's Textbook of Quantitative Chemical Analysis*", 8th ed.

GE1181	FUNDAMENTALS OF COMPUTING AND ROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

(Common to all branches of B.E / B.Tech Programmes)

OBJECTIVES:
To enable the students to

• Learn the use of office automation tools

• Represent the solution to simple problems using algorithm and flowchart.

• Develop simple programs in C using basic constructs.

- Develop simple programs to solve primitive applications in C using strings, pointers, functions, structures and files

LIST OF EXPERIMENTS:
1. **OFFICE APPLICATION SOFTWARE**
   a. Word Processing
      - I. Document creation, Text manipulation with Scientific notations
      - II. Table creation, Table formatting and Conversion
      - III. Letter preparation and mail merge
      - IV. Drawing - flow Chart
   b. Spread Sheet
      - I. Formula - formula editor, Sorting
      - II. Chart - Line, XY, Bar and Pie
   c. Power point
      - I. Advertisement making
      - II. Presentation preparation
2. **DRAW FLOWCHART USING RAPTOR TOOL TO:**
   - I. Find area of a circle
   - II. Find the biggest of two numbers
   - III. Compute grade for given mark
   - IV. Find the sum and average of 'N' numbers
3. **C PROGRAMS USING I/O STATEMENTS AND EXPRESSIONS TO:**
   - I. Find area and volume of shapes
   - II. Convert centigrade to Fahrenheit
   - III. Swap two numbers with and without using temporary variable
4. **C PROGRAMS USING DECISION-MAKING CONSTRUCTS TO:**
   - I. Find the biggest of two numbers
   - II. Compute grade for given mark
   - III. Check whether the given number is Armstrong number or not
5. **C PROGRAMS USING ONE DIMENSIONAL ARRAY TO:**
   - I. Perform linear search
   - II. Sort the given numbers using bubble sort
   - III. Populate an array with height of persons and find how many persons are above the average height.
6. **C PROGRAMS USING TWO DIMENSIONAL ARRAY TO:**
   - III. Add two matrices
   - IV. Multiply two matrices

V.   Find sum of diagonal elements of a Matrix

7. C PROGRAMS USING FUNCTIONS TO:

VI.   Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.

VII.   Find the factorial of a number using recursion

VIII.   Swap the value of two numbers (Call by value and Call by reference)

IX.   Sort the list of numbers using functions

8. C PROGRAMS USING STRINGS TO:

a. Check whether the given string is palindrome or not (Without using built-in functions)

b. From a given paragraph perform the following using built-in functions:

9. FIND THE TOTAL NUMBER OF WORDS.

I.   Capitalize the first word of each sentence.

II.   Replace a given word with another word.

10. C PROGRAMS USING STRUCTURES TO:

a. Compute internal marks of students for five different subjects using structures and files.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of course the students will be able to

CO1 Understand the use of office automation tools

CO2 Represent pictorially the solution for simple problems.

CO3 Develop C programs for simple applications making use of basic constructs, arrays and strings.

CO4 Develop C programs to solve simple applications using functions, recursion and pointers.

CO5 Build C programs to solve simple applications using structure and files.

HS1271   **TECHNICAL ENGLISH**

(Common to all Branches of B.E / B.Tech Programmes)

OBJECTIVES:

L	T	P	C
3	0	0	3

To enable the students to:

- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Foster their ability to write convincing job applications and effective reports.
- Develop their speaking skills to make technical presentations, participate in group discussions.
- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialization.

UNIT I   **TECHNICAL WRITING-AN INTRODUCTION**   **9**

Listening- Listening to talks of scientists / Indian speakers – Fill- in exercises- **Speaking** Asking for and giving directions for ESL students- **Reading** – reading short technical texts from journals- newspapers - **Writing**- purpose statements – extended definitions - Writing instructions- checklists-recommendations-**Vocabulary Development**- technical vocabulary **Language Development** –subject verb agreement – compound words

UNIT II   **INTERPRETATION OF GRAPHICAL REPRESENTATION**   **9**

Listening- Listening to longer technical talks and completing exercises based on them- **Speaking** – describing a graphical interpretation-**Reading**-Error Correction- Paragraph Completion- Graphical Representation- **Writing**- interpreting charts, graphs, paragraphing- **Vocabulary Development**-vocabulary used in formal letters/emails and reports. **Language Development**- personal passive voice, numerical adjectives.

UNIT III   **JOB APPLICATIONS**   **9**

Listening- Listening to documentaries and making notes. **Speaking** – mechanics of presentations- **Reading** – reading for detailed comprehension- **Writing**- email etiquette- job application – cover letter –Resume preparation(via email and hard copy)- **Vocabulary Development**- Perfect phrases for interviews-. **Language Development**- clauses- if conditionals

UNIT IV   REPORT WRITING   9

Listening- TED/Ink talks; **Speaking** –participating in a group discussion -**Reading**– reading and understanding technical articles **Writing**– Writing reports- minutes of a meeting- accident and survey report-**Vocabulary Development**- prefixes and suffixes/Synonyms- Misspelled words. **Language Development**- embedded sentences.

UNIT V   ESSAY WRITING   9

Listening- Listening to TED Talks that are technical in nature -**Speaking** – introduction to technical presentations- **Reading** – longer texts both general and technical, practice in speed reading; **Writing**-analytical, descriptive and issue based essays- **Vocabulary Development**- verbal analogies **Language Development**- Commonly Used Idioms and Phrases.

TOTAL PERIODS: 45

COURSE OUTCOMES:
Upon completion of the course, the student will be able to

CO1	Utilize basic grammatical skills in writing instructions, checklists and recommendations
CO2	Apply acquired knowledge of Grammar to prepare formal letters and e-mails.
CO3	Develop reading skills by familiarizing with different types of reading strategies.
CO4	Construct documents with respect to career
CO5	Make use of communicative English in report preparation and minutes.

TEXT BOOKS:
1. Sam Praveen.D& K.N. Shoba, 2020, *A Course in Technical English*, CUP, Chennai.
2. Raman & Sharma, 2018,*Technical Communication*, OUP, New Delhi.

REFERENCES:
1. Richard Rossner, 2017 *Language Teaching Competences,* OUP.
2. Booth, L, Diana, 2014 Project *Work*, OUP,Oxford.
3. Shoba and Praveen Sam 2018, *Technical English-Workbook*, Cambridge University Press: New Delhi.
4. Ibbotson & Mark 2009, *Professional English in use*, University Press, New Delhi,
5. Sudharshana, NP & Shavitha, C 2018, *English for Engineers*, Cambridge University Press, Chennai.

WEB SOURCES:

1. https://owl.purdue.edu/owl/subject_specific_writing/professional_technical_writing/index.html
2. https://hbr.org/topic/communication

MA1271   **ENGINEERING MATHEMATICS – II**

(Common to all Branches of B.E / B.Tech Programmes)

OBJECTIVES:

L	T	P	C
3	1	0	4

To enable the students to

- Acquire sound knowledge of techniques in solving ordinary differential equations obtained from engineering problems.
- Acquaint the student with the concepts of vector calculus that is needed for problems in engineering disciplines.
- Know the standard techniques of complex variable theory to obtain solution of integrals.
- Know Laplace transforms for solving differential equations.

UNIT I   **DIFFERENTIAL EQUATIONS**   **12**

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

UNIT II   **VECTOR CALCULUS**   **12**

Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Volume integral - Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III   **ANALYTIC FUNCTIONS**   **12**

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping – Mapping by functions $w = z+c$, cz and $1/z$ - Bilinear transformation.

UNIT IV   COMPLEX INTEGRATION   12

Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals.

UNIT V   LAPLACE TRANSFORMS   12

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1   Apply various techniques in solving differential equations which arises in Engineering problems.

CO2   Solve engineering problems using the concept of vector calculus.

CO3   Make use of the concept of analytic functions, conformal mapping and Bilinear transformations.

CO4:   Evaluate integrals using Cauchy's integral formula and residue theorem.

CO5:   Apply Laplace transforms techniques in solving differential equations.

TEXT BOOKS:

1. Grewal, BS 2014, *Higher Engineering Mathematics*, Khanna Publishers, 43rd Edition, New Delhi.
2. **Kreyszig Erwin 2016, *Advanced Engineering Mathematics*, John Wiley and Sons, 10th Edition, New Delhi.**

REFERENCES :

1. Bali, N, Goyal, M & Watkins, C 2009, *Advanced Engineering Mathematics*, Firewall Media, 7th ed, New Delhi.
2. Jain, RK & Iyengar, SRK 2007, *Advanced Engineering Mathematics*, Narosa Publications, 3rd ed, New Delhi.
3. Wylie, RC & Barrett, LC 2012, *Advanced Engineering Mathematics*, Tata McGraw Hill Education Pvt. Ltd, 6th ed, New Delhi.
4. Peter V. O'Neil 2007, *Advanced Engineering Mathematics*, Cengage learning, 7th ed.

5. Weir, MD & Joel Hass 2016, *Thomas Calculus*, Pearson Education, 12th ed, India.

PH1272   **PHYSICS FOR ELECTRONICS ENGINEERING**
                  (Common to ECE, EEE, EIE)

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to

- To understand the essential principles of Physics of semiconductor devices and Electron transport properties.
- To accomplish the magnetic and optical properties of materials and nanodevices.
- To impart fundamentals of superconducting, magnetic, dielectric materials and nano electronic devices.

UNIT I   CONDUCTING & SUPERCONDUTING MATERIALS   9

Conducting material: Free electron theory (Classical & Quantum) - Fermi-Dirac statistics – density of energy states – concentration of electrons in metals– low resistivity and high resistivity materials - thermostat and thermal relays.

Super conducting material: Meissner effect – Type I & II superconductors – BCS theory- high temperature superconductors – Josephson's effect – Electrical switching element- cryotron – SQUID - CT scan and MRI scan- magnetic levitation in trains.

UNIT II   PHYSICS OF SEMICONDUCTOR DEVICES   9

Direct and indirect semiconductors- Generation and Recombination- Drift current -Diffusion current- Continuity equations- Einstein relation – carrier concentration in intrinsic semiconductor – extrinsic semiconductor: N – type & P-type – Hall effect– Ohmic contacts – tunnel diode – Schottky diode- MOS capacitor.

UNIT III   MAGNETIC AND DIELECTRIC MATERIALS   9

Magnetic material: Domain Theory of ferro magnetism- Hysteresis - Weiss molecular field - exchange interaction- Antiferromagnetism- Application of ferromagnetic materials -ferrites – structures of ferrites – Applications of ferrites: telecommunication, radar and magnetic hard disc.

Dielectric materials: Polarization and its types (Qualitative) – Internal field –Clausius Mosotti relation- dielectric loss– dielectric breakdown – ferroelectricity- Applications of dielectrics: transformer, capacitor and microwave oven.

UNIT IV   OPTICAL PROPERTIES OF MATERIALS   9

Classification of optical materials – Colour centres - carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) - photo current in a P-N diode – solar cell – LED – Organic LED – Laser diodes.

UNIT V   NANO DEVICES   9

Zener Bloch Oscillation – Resonant tunneling – Mesoscopic structures: conductance fluctuation and coherent transport- nano wires - Ballistic transport- Quantum resistance and conductance – coulomb blockade effects - single electron transistor – Quantum dot laser.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon successful completion of course the students will be able to

- CO1   Describe the conducting and superconducting material and its applications
- CO2   Acquire knowledge on basics of semiconductor physics and its applications in various devices
- CO3   Interpret the knowledge on magnetic and dielectric properties of materials
- CO4   Infer the functioning of optical materials for optoelectronics
- CO5   Understand the basics of quantum structures and their application in single electron transistor.

TEXT BOOKS:

1. Kasap, SO 2007, *Principles of Electronic Materials and Devices*, McGraw-Hill Education.
2. Umesh K Mishra & Jasprit Singh, 2008, *Semiconductor Device Physics and Design*, Springer.
3. Wahab, MA 2009, *Solid State Physics: Structure and Properties of Materials,* Narosa Publishing House.
4. Sze, SM 2007, *Physics of Semiconductor Devices*, John Wiley and Sons, USA.

REFERENCES:

1. Garcia, N & Damask, A 2012, *Physics for Computer Science Students*, Springer-Verlag.

2. Hanson, GW 2009, *Fundamentals of Nanoelectronics,* Pearson Education.

3. Rogers, B, Adams, J & Pennathur, S 2014, *Nanotechnology: Understanding Small Systems*, CRC Press.

4. Suprio Dutta 1998, *Electronic transport in Mesoscopic Systems,*Cambridge University Press.

WEB REFERENCES:

1. http://www.youtube.com/watch?v=4MiBBubORsI (Conducting Materials)

2. https://nptel.ac.in/courses/115/101/115101012/(Superconductors)

3. http://www.doitpoms.ac.uk/tlplib/dielectrics/index.php (Dielectric materials)

4. https://www.youtube.com/watch?v=8ETYsUr0I_g (Quantum confinement)

BS1271   **ENVIRONMENTAL SCIENCE AND ENGINEERING**

(Common to all Branches of B.E / B.Tech Programmes)

L	T	P	C
3	0	0	3

OBJECTIVES:

To enable the students to understand

- The interrelationship between living organism and environment.
- The integrated themes and biodiversity, natural resources, pollution control and waste management.
- Scientific, technological, economic and political solutions to environmental problems.
- The dynamic processes and understand the features of the earth's interior and surface
- The importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value

UNIT I   INTRODUCTION TO ENVIRONMENTAL STUDIES, ECOSYSTEM AND BIODIVERSITY   12

Definition, scope and importance, need for public awareness - Environment- Concept of ecosystem – structure and function of an ecosystem – producers, consumers and decomposers- Energy flow in the eco system - Food chain, Food web -Ecological pyramid- Ecological Succession - Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries - Introduction to biodiversity 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 – Hotspots of Biodiversity - endangered and endemic species of India- Threats to Biodiversity (habitat loss, poaching, man-wildlife conflicts) -conservation of biodiversity: In-situ and ex-situ – Field study.

UNIT II   ENVIRONMENTAL POLLUTION   9

Definition – causes, effects and control measures of: (a) Air pollution (climate change, global warming, acid rain, ozone layer depletion) (b) Water pollution (c) Noise pollution (d) Marine pollution (e) Nuclear Pollution (f) Soil Pollution - Solid waste management- causes, effects and control – e- waste - Role of an individual in prevention of pollution - Pollution case studies

UNIT III   NATURAL RESOURCES   9

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Rain water harvesting - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion - Land resources: Land as a resource, land degradation, man induced landslides, soil - role of an individual in conservation of natural resources.

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UNIT IV   DISASTER MANAGEMENT AND ENVIRONMENTAL LEGISLATIONS   9

Definition of disaster – types – Natural disasters – Earthquakes – Landslides – Flood, cyclones, Tsunami and Drought Man made disaster – Nuclear, Chemical and Biological disaster (COVID-19) – Disaster impacts (Environmental, Physical, social, ecological and economical) – Case study – Need and concept of disaster management – Disaster management cycle – Mitigation , relief – recovery –Role and responsibility of the government, community, local institutions and NGO's - Environmental ethics – Acts for prevention of environmental pollution – Wild life protection act – Forest conservation act – Water (Prevention & control) Act – Air (Prevention & control) Act – Environmental protection Act – Public awareness.

UNIT V   HUMAN POPULATION AND THE ENVIRONMENT   6

Population growth, variation among nations – population explosion – family welfare programme – Resettlement and rehabilitation of people – human rights – value education - HIV / AIDS- women and child welfare - Environmental impact analysis (EIA)- -GIS-remote sensing- role of information technology in environment and human health – Case studies

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon successful completion of course the students will be able to

CO1 Explain the natural environment and its relationships with human activities.

CO2 Summarize the causes, effects and control measures of various environmental pollution.

CO3 Illustrate the importance of various resources, its utilization and conservation

CO4 Infer that the technological development and improvement in standard of living lead to serious environmental disasters.

CO5 Outline the importance of population control and its impact on the environment.

TEXT BOOKS:

1. Bharucha, E, 2013, *Textbook of Environmental studies for Undergraduate Courses*, 2nd ed, Universities Press Pvt. Ltd.

2. Benny Joseph, 2017, *Environmental Science and Engineering*, 3rd ed, Tata McGraw-Hill, New Delhi.

3. Miller, TG & Jr, Spoolman, S, 2014, *New Environmental Science*, 14th ed, Wadsworth Publishing Co, New Delhi.

REFERENCES:

1. Kaushik, A & Kaushik, CP 2018, *Environmental Science and Engineering*, 6th ed, New Age International private Ltd, New Delhi.

2. Gilbert Masters & Wendell, P Ela, 2013, *Introduction to Environmental Engineering and Science*, 3rd ed, Pearson Education private Ltd.

3. De, AK 2014, *Environmental Chemistry*, 7th ed, New Age international publishers, New Delhi.

4. Sawyer, CN, Mac Carty, PL, & Parkin, GF 2003, *Chemistry for Environmental Engineering and Science*, 5th ed, Tata McGraw – Hill, New Delhi.

GE1271   **ENGINEERING GRAPHICS**

(Common to all branches of B.E / B.Tech Programmes)

OBJECTIVES:

L	T	P	C
1	0	4	3

To enable the students to

- Develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- Expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning, Isometric projection of combination of solids

UNIT I   PROJECTION OF POINTS, LINES AND PLANE SURFACE   (3+12)

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes – Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object

.**UNIT II   PROJECTIONS OF SOLIDS   (3+12)**

Projection of simple solids like prisms, pyramids, cylinder, cone when the axis is inclined to one of the principal planes by rotating object method.

UNIT III   PROJECTION   OF   SECTIONED   SOLIDS   AND   DEVELOPMENT OFSURFACES   (3+12)

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.
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UNIT IV   ISOMETRIC AND PERSPECTIVE PROJECTIONS   (3+12)

Principles of isometric projection – isometric scale -isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method .

UNIT V   ORTHOGRAPHIC PROJECTION   (3+12)

Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid –– Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles –Representation of ThreeDimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects simple objects. Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – Drawing of tangents and normal to the above curves

TOTAL: 75 PERIODS

COURSE OUTCOMES:

Upon successful completion of course the students will be able to

    CO1   Familiarize with the fundamentals and standards of Engineering graphics
    CO2   Perform freehand sketching of basic geometrical constructions and multiple views
          of objects.
    CO3   Project orthographic projections of lines and plane surfaces
    CO4   Draw projections and solids and development of surfaces
    CO5: Visualize and to project isometric and perspective sections of simple solids.

TEXT BOOKS:

1. Natarajan, KV 2006, *A text book of Engineering Graphics*, Dhanalakshmi Publishers, Chennai.
2. Venugopal K & Prabhu Raja V 2008, *Engineering Graphics*, New Age International (P) Limited.

REFERENCES:

1. Bhatt ND & Panchal VM 2010, *Engineering Drawing*, 50th ed, Charotar Publishing House.
2. Basant Agarwal & Agarwal CM 2008, *Engineering Drawing*, Tata McGraw Hill Publishing Company Limited, NewDelhi.
3. Gopalakrishna KR 2007, *Engineering Drawing (Vol. I&II combined)*, Subhas Stores, Bangalore.

4. Luzzader, Warren.J. & Duff,John M 2005, *Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production*, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi.

5. N S Parthasarathy & Vela Murali 2015, *Engineering Graphics*, Oxford University, Press, New Delhi.

6. Shah MB & Rana BC 2009, *Engineering Drawing*, 2nd ed Pearson.

EE1271 **CIRCUIT THEORY**

(Common to EEE & EIE)

L	T	P	C
3	0	0	3

OBJECTIVES:

- To impart knowledge on solving dc and ac circuits using basic electrical laws and network theorems

- To introduce the concept of resonance in coupled circuits.

- To give exposure on transient response analysis of lumped circuits with different sources.

- To introduce phasor diagrams and analysis of three phase ac circuits.

UNIT I   ANALYSIS OF DC CIRCUITS   9

Ohm's Law- Resistive elements- Resistors in series and parallel circuits- dependent and independent sources- Basics of network graph - KVL, KCL, voltage and current division rule- Mesh current & Node voltage method of analysis - Source transformation- Star-delta conversion- Superposition Theorem - Thevenin's Theorem- Norton's Theorem- Maximum power transfer Theorem- Reciprocity Theorem.

UNIT II ANALYSIS OF AC CIRCUITS   9

Introduction to AC - Sine wave, phase relations in R, L and C circuits-Complex impedance-series and parallel circuits with combination of RLC elements - Mesh current & Node voltage method of analysis - Star-delta conversion - Thevenin's Theorem- Norton's Theorem-Superposition Theorem-Maximum power transfer Theorem.

UNIT III   RESONANCE AND COUPLED CIRCUITS   9

Series Resonance- Parallel Resonance- Frequency Response of series & parallel resonance-Quality factor, Bandwidth and selectivity- Self & Mutual inductance- coupled

circuits-Coefficient of coupling- Dot Conversion – Tuned circuits- Single tuned and double tuned coupled circuits.

UNIT IV   TRANSIENT RESPONSE ANALYSIS & TWO PORT NETWORKS   9
Transient response of RL, RC and RLC circuits using Laplace transform for DC input and A.C. sinusoidal input - Two port Network – Open Circuit Impedance (Z) Parameters – Short Circuit Admittance (Y) Parameters – Hybrid (h) Parameters

UNIT V   THREE PHASE CIRCUITS   9
A.C. circuits – Average and RMS value – Power, Power Factor and Energy - Three phase balanced / unbalanced voltage sources- Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads - Phasor diagram - Power measurement in three phase circuits using two wattmeter method.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
Upon successful completion of course the students will be able to
- CO1   Solve the given DC electric circuit using basic electrical laws /network theorems.
- CO2   Solve the given AC electric circuit using basic electrical laws /network theorems
- CO3   Determine the frequency response characteristics of resonance circuits & explain the operation of coupled circuits.
- CO4   Obtain the transient response of RL, RC & RLC circuits using Laplace Transform for both AC and DC inputs
- CO5   Determine the various electrical parameters in three-phase AC circuits under balanced/unbalanced conditions.

TEXT BOOKS:
1. Sudhakar A & Shyam Mohan SP 2015, *Circuits and Network Analysis and Synthesis*, McGraw Hill.
2. Hayt, WH, Kemmerly, JE & Durbin, SM 1986, *Engineering circuit analysis* (p. 74). New York: McGraw-Hill.
3. Alexander, CK 2009, *Fundamentals of electric circuits*. McGraw-Hill.
4. Robbins, AH & Miller, WC 2012, *Circuit analysis: Theory and practice*. Cengage Learning.

REFERENCES:

1. Chakrabarti A 1999, *Circuits Theory (Analysis and synthesis*, Dhanpath Rai & Sons, NewDelhi.
2. Jegatheesan, R 2015, *Analysis of Electric Circuits*.
3. Joseph A, Edminister & Mahmood Nahri, 2010. *Electric circuits,Schaum's series*, Mc Graw Hill, New Delhi, 2010.
4. Van Valkenburg, ME 2015, *Network Analysis,* Prentice-Hall of India Pvt. Ltd, New Delhi.
5. Mahadevan, K & Chitra, C 2015. *Electric Circuits Analysis*, Prentice-Hall of India Pvt. Ltd, New Delhi
6. Svoboda JA & Dorf, RC 2013, *Introduction to electric circuits*. John Wiley & Sons.

GE1281   **ENGINEERING PRACTICES LABORATORY**

(Common to all branches of B.E. / B.Tech Programmes)

L	T	P	C
0	0	4	2

OBJECTIVES:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL &MECHANICAL)

I   CIVIL ENGINEERING PRACTICE   **12**

Buildings:

(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.
(c) Preparation of plumbing line sketches for water supply and sewage works.
(d) Hands-on-exercise:
   Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

(a) Study of the joints in roofs, doors, windows and furniture.

(b) Hands-on-exercise:

       i. Wood work, joints by sawing, planning and cutting

II   MECHANICAL ENGINEERING PRACTICE   18

Welding:

(a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.

Basic Machining:

(a) Simple Turning and Taper turning

(b) Drilling Practice

Sheet Metal Work:

(a) Forming & Bending:

(b) Model making – Trays and funnels.

Machine assembly practice:

(a) Study of centrifugal pump

(b) Study of air conditioner

(c) Study of 3D Printing

Group –B (Electrical &Electronics)

III   ELECTRICAL ENGINEERING PRACTICE   14

1. Residential wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
4. Measurement of energy using single phase energy meter.
5. Measurement of electrical quantities – voltage, current, impedance, power & power factor in RLC circuit.
6. Measurement of resistance to earth of electrical equipment.
7. Study of UPS
8. Study of Protective Devices- Fuses, Circuit Breakers & Relays

IV   ELECTRONICS ENGINEERING PRACTICE   16

1. Study of Electronic components and equipments, Resistor color coding, measurement of AC signal parameters (peak-peak, rms period, frequency) using CRO.
2. Study of logic gates AND, OR, EX-OR and NOT.
3. Generation of Clock Signal.

4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.

5. Measurement of ripple factor of HWR and FWR.

6. Study of Mixed Storage Oscilloscope

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of course the students will be able to

CO1   Fabricate carpentry components and pipe connections including plumbing works.

CO2   Use welding equipment to join the structures

CO3   Make the models using sheet metal works

CO4   Demonstrate various electrical switches and wiring.

CO5   Measure the various electrical quantities.

CO6   Elaborate on the components, gates, soldering practices

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.   15 Sets.

2. Carpentry vice (fitted to work bench)   15 Nos.

3. Standard woodworking tools   15 Sets.

4. Models of industrial trusses, door joints, furniture joints   5 each

5. Power Tools: (a) Rotary Hammer   2 Nos

(b) Demolition Hammer   2 Nos

(c) Circular Saw   2 Nos

(d) Planer   2 Nos

(e) Hand Drilling Machine   2 Nos

(f) Jigsaw   2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders   5 Nos.

2. Welding booth with exhaust facility   5 Nos.

3. Welding accessories like welding shield, chipping hammer, wire brush, etc.   5 Sets.

4. Oxygen and acetylene gas cylinders, blow pipe and other

welding outfit.	2 Nos.
5. Centre lathe	2 Nos.
6. Hearth furnace, anvil and smithy tools	2 Sets.
7. Moulding table, foundry tools	2 Sets.
8. Power Tool: Angle Grinder	2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner,3D Printer	One each

ELECTRICAL

1.	Assorted electrical components for house wiring	15 Sets
2.	Electrical measuring instruments	10 Sets
3.	Study purpose items: Iron box, fan and regulator, emergency lamp	1 each
4.	Megger (250V/500V)	1 No.
5.	Power Tools: (a) Range Finder	2 Nos
	(b) Digital Live-wire detector	2 Nos

ELECTRONICS

1. Soldering guns	10 Nos.
2. Assorted electronic components for making circuits	50 Nos.
3. Small PCBs	10 Nos.
4. Multimeters	10 Nos.
5. Study purpose items: Telephone, FM radio, low-voltage power supply	

EE1281   **ELECTRIC CIRCUITS LABORATORY**

(Common to EEE & EIE)

L	T	P	C
0	0	4	2

OBJECTIVES:

- To simulate various electric circuits using Pspice / Matlab /Multi-Sim / Scilab
- To gain practical experience on electric circuits and verification of theorems

List of Experiments:

1. Simulation and experimental verification of Kirchhoff's voltage and current laws for the given DC circuit.
2. Simulation and experimental verification of Thevenin and Norton's theorem for the given DC & AC circuits.
3. Simulation and experimental verification of Superposition theorem for the given DC circuit.
4. Simulation and experimental verification of Maximum Power transfer Theorem for the given DC circuit.
5. Study of oscilloscopes and measurement of sinusoidal voltage, frequency and power factor using CRO.
6. Simulation and Experimental validation of frequency response of RLC electric circuit.
7. Measurement of self and mutual inductance of a coil and study of magnetically coupled coils.
8. Simulation and Experimental validation of transient behavior of R-C circuit under DC input.
9. Determination of Z and Y parameters of two-port networks.
10. Analysis of three-phase balanced and unbalanced Star/Delta network.
11. Measurement of 3-Phase Power by two wattmeter method under balanced & unbalanced load conditions.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of course the students will be able to

CO1   Apply basic electrical laws and network theorems for solution of simple DC & AC circuits.

CO2   Determine transient response and frequency response of given AC circuits

CO3   Determine network parameters of the given of two port network.

CO4   Simulate three phase balanced / unbalanced star / delta network

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Regulated Power Supply: 0 – 15 V D.C - 10 Nos / Distributed Power Source.
2. Function Generator (1 MHz) - 10 Nos.
3. Single Phase Energy Meter - 1 No.
4. Oscilloscope (20 MHz) - 10 Nos.
5. Digital Storage Oscilloscope (20 MHz) – 1 No.
6. 10 Nos. of PC with Circuit Simulation Software (min 10 Users) (e-Sim / Scilab/
7. Pspice / MATLAB /other Equivalent software Package) and Printer (1 No.)
8. AC/DC - Voltmeters (10 Nos.), Ammeters (10 Nos.) and Multi-meters (10 Nos.)
9. Single Phase Wattmeter – 3 Nos.
10. Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box - 6 Nos each.
11. Circuit Connection Boards - 10 Nos.

Necessary Quantities of Resistors, Inductors, Capacitors of various capacities (Quarter Watt to 10Watt)