

K.L.N. COLLEGE OF ENGINEERING

Pottapalayam – 630 612, Sivagangai District

(An Autonomous Institution, Affiliated to Anna University, Chennai)



Estd: 1994

FIRST YEAR CURRICULUM AND SYLLABUS

REGULATIONS 2020

For Under Graduate Program

B.E. – MECHANICAL ENGINEERING

CHOICE BASED CREDIT SYSTEM

(For the students admitted from the academic year 2020-2021 onwards)



K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

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VISION OF THE INSTITUTION

To become a Premier Institute of National Repute by Providing Quality Education, Successful Graduation, Potential Employability and Advanced Research & Development through Academic Excellence.

MISSION OF THE INSTITUTION

To Develop and Make Students Competent Professional in the Dynamic Environment in the field of Engineering, Technology and Management by emphasizing Research, Social Concern and Ethical Values through Quality Education System.

VISION OF THE DEPARTMENT

To become a centre of excellence for Education and Research in Mechanical Engineering.

MISSION OF THE DEPARTMENT

- Attaining academic excellence through effective teaching learning process and state of the art infrastructure.
- Providing research culture through academic and applied research.
- Inculcating social consciousness and ethical values through co-curricular and extra-curricular activities.



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PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- PEO 1** Graduates will have successful career in Mechanical Engineering and service industries.
- PEO 2** Graduates will contribute towards technological development through academic research and industrial practices.
- PEO 3** Graduates will practice their profession with good communication, leadership, ethics and social responsibility.
- PEO 4** Graduates will adapt to evolving technologies through life-long learning.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- PSO 1** Derive technical knowledge and skills in the design, develop, analyze and manufacture of mechanical systems with sustainable energy, by the use of modern tools and techniques and applying research based knowledge.
- PSO 2** Acquire technical competency to face continuous technological changes in the field of mechanical engineering and provide creative, innovative and sustainable solutions to complex engineering problems.
- PSO 3** Attain academic and professional skills for successful career and to serve the society needs in local and global environment.



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PO1: Engineering Knowledge

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

PO2: 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.

PO3: 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.

PO4: 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.

PO5: 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 an understanding of the limitations.

PO6: 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.

PO7: 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.

PO8: Ethics

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: 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.

PO11: 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.

PO12: 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.



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CHOICE BASED CREDIT SYSTEM

CATEGORY OF COURSES

- i. **Humanities and Social Sciences (HS) Courses** include Technical English, Environmental Science and Engineering, Engineering Ethics and human values, Communication Skills and Management courses.
- ii. **Basic Sciences (BS) Courses** include Mathematics, Physics, and Chemistry.
- iii. **Engineering Sciences (ES) Courses** include Engineering Practices, Engineering Graphics, Basics of Electrical / Electronics / Mechanical / Computer Engineering / Instrumentation etc.
- iv. **Professional Core (PC) Courses** include the core courses relevant to the chosen programme of study.
- v. **Professional Elective (PE) Courses** include the elective courses relevant to the chosen programme of study.
- vi. **Open Elective (OE) Courses** include courses from other departments which a student can choose from the list specified in the curriculum of the students B.E. / B.Tech. Programmes.
- vii. **Employability Enhancement Courses (EEC)** include Project Work and/or Internship, Seminar, Professional Practices, Case Study and Industrial/Practical Training.
- viii. **Mandatory Courses (MC)** include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc

KLNCE UG MECH R2020

SEMESTER I

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

S. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1	20HS101	English for Technical Communication	HS	3	3	0	0	3
2	20BS101	Fundamentals of Engineering Mathematics	BS	4	3	1	0	4
3	20BS102	Engineering Physics	BS	3	3	0	0	3
4	20BS103	Engineering Chemistry	BS	3	3	0	0	3
5	20GE101	Problem Solving using Python Programming	ES	3	3	0	0	3
PRACTICAL								
6	20BS1L1	Basic Science Laboratory	BS	3	0	0	3	1.5
7	20GE1L1	Python Programming Laboratory	ES	4	0	0	4	2
8	20GE1L2	Industrial Practices Workshop	ES	3	0	0	3	1.5
TOTAL				26	15	1	10	21

SEMESTER II

B.E - Department of Mechanical Engineering

S. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1	20HS201	Advanced Technical Communication (Common to all B.E./B.Tech programmes)	HS	3	3	0	0	3
2	20BS201	Laplace Transform and Advanced Calculus (Common to all B.E./B.Tech programmes)	BS	4	3	1	0	4
3	20BS202	Applied Physics (Common to B.E Mech & B.E AUE programmes)	BS	3	3	0	0	3
4	20GE201	Engineering Graphics (Common to all programmes)	ES	4	2	0	2	3
5	20GE202	Engineering Mechanics (Common to B.E Mech & B.E AUE programmes)	ES	4	3	1	0	4
6	20GE203	Basic Electrical, Electronics and Instrumentation Engineering (Common to B.E Mech & B.E AUE programmes)	ES	3	3	0	0	3
PRACTICAL								
7	20HS2L1	Communication Skills Laboratory (Common to B.E Mech, B.E AUE, B.E CSE & B.Tech IT programmes)	HS	2	0	0	2	1
8	20GE2L1	Electrical, Electronics and Instrumentation Laboratory (Common to B.E Mech & B.E AUE programmes)	ES	4	0	0	4	2
TOTAL				27	17	2	8	23

Recommendations, Argumentative Essays, Letter to the Editor on Social Issues – Analytical Essays on Social hazards using Cause and Effect.

UNIT - V EXTENDED WRITING

9

Listening: Listening to Technical Seminar speeches – Listening to achievers, eminent personalities – Dialects – Australian – African – Asian. **Speaking:** Welcome address, Compeering, Vote of Thanks, Peer debates. **Reading:** Texts on self-confidence, motivation, success path. **Writing:** Contracted forms, Conditionals, Articles, Preposition, Tense – ‘going to’ - Error Spotting, Sequence Words – Rearranging – Writing a Book Review – Summary writing – Rearranging Sentences using Sequence Words, Note Making

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Listen, Comprehend and Correspond with others at various contexts
- Speak legibly and fluently under various life-time situations by applying proper communication modules.
- Read and understand a variety of writings and technical text by analyzing the meaning and language.
- Apply clear and legible writing skills in error free style in coherent manner
- Remember and use various communicative skills in precise and efficient way on technological contexts
- Form situational conversations and technical writing styles for interpersonal and effective communication

TEXT BOOKS:

1. Board of Editors. “Using English A Course book for Undergraduate Engineers and Technologists”. Orient Black Swan Limited, Hyderabad: 2015
2. Richards, C. Jack. “Interchange Students’ Book-2” New Delhi: CUP, 2015.

REFERENCES:

1. Murphy, Raymond “English Grammar in Use with Answers: Reference and Practice for Intermediate Students”, Cambridge: CUP, 2004
2. Thomson, A.J. and Martinet, A.V. “A Practical English Grammar”, OUP, New Delhi: 1986
Anne Laws, “Writing Skills”, Orient Black Swan, Hyderabad, 2011
3. Board of Editor, “English for Technical Communication”, Great Mind Publication, Chennai : 2018

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Find the Eigen values and Eigen vectors to diagonalize a matrix, reduce quadratic form to canonical form.
- Apply the concept of limits, continuity and rules of differentiation to differentiate some standard functions and apply the techniques of differentiation to differentiate various types of functions.
- Understand the concepts of Concavity and Convexity by finding the Critical points, point of Inflection and to find Maxima and Minima functions of Single variable.
- Find the derivatives of functions of two variables and apply them to calculate the maxima and minima.
- Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.
- Apply various techniques to solve higher order differential equations with constant and variable coefficients.

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.
2. T. Veerarajan., "Engineering Mathematics", The Tata Mc Graw Hill Publication-New Delhi, First Edition, 2018

REFERENCES:

1. James Stewart, "Calculus, Early Transcendental", Cengage Learning, 7th Edition, New Delhi, 2015. [For units II & III].
2. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, New Delhi, 2006.
3. Wiley, "Calculus- International Student version", 10th Edition, Wiley India Pvt. Ltd, New Delhi 2017.
4. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
5. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 9th Edition, 2014.

20BS102

ENGINEERING PHYSICS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To inculcate the fundamental knowledge in properties of matter and crystal physics.
- To enrich the knowledge on Laser, fiber optics and ultrasonics and their applications relevant to various streams of Engineering and Technology.
- To introduce quantum physics and its applications.

PRE-REQUISITE:

Course Code: Nil

Course Name: Nil

UNIT - I PROPERTIES OF MATTER 9

Elasticity – Hooke’s Law – Stress-strain diagram and its uses – Three modulus of elasticity (qualitative) – Poisson’s ratio – factors affecting elastic modulus and tensile strength – twisting couple – torsional pendulum: theory and experiment – bending of beams – bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment – I -shaped girders.

UNIT - II LASER AND FIBER OPTICS 9

Lasers: Interaction of radiation with atomic energy states – Einstein’s A and B coefficients derivation – Population inversion – resonant cavity, optical amplification (qualitative) – solid state lasers – Nd:YAG laser, Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle – types of optical fibers (material, refractive index, mode) – losses associated with optical fibers – fiber optic sensors: pressure and displacement sensor.

UNIT - III ULTRASONICS 9

Ultrasonics – classification (qualitative) – properties – generation – magnetostriction and piezoelectric methods – detection of ultrasound – cavitations – velocity measurement – acoustic grating – Industrial applications (Drilling, Welding, Soldering and Cleaning) – SONAR – NDT – Pulse Echo system through Transmission and Reflection modes – A, B and C scan displays - Medical application – sonogram.

UNIT - IV QUANTUM PHYSICS 9

Black body radiation – Planck’s theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – wave function and its physical significance – Schrödinger’s wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunneling (qualitative) – scanning tunneling microscope.

UNIT - V CRYSTAL PHYSICS**9**

Crystalline and amorphous materials – unit cell, crystal systems, Bravais lattices, lattice planes - Miller indices – Inter planar spacing in cubic lattice – coordination number and packing factor for SC, BCC, FCC, HCP structures – growth of single crystals: solution and melt growth techniques – Mechanisms of plastic deformation, slip and twinning.

TOTAL: 45 PERIODS**OUTCOMES:****AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Demonstrate the properties of elasticity and measure the different moduli of elasticity.
- Examine the characteristics of laser and optical fiber
- Apply the concepts of ultrasonics in engineering
- Explain black body radiation, properties of matter waves and Schrodinger equation
- Classify the Bravais lattices and different types of crystal structures
- Gain information on growth of crystals and deformations

TEXT BOOKS:

1. R. K. Gaur and S. L. Gupta, "Engineering Physics", Dhanpat Rai Publications, 2012.
2. B. K. Pandey and S. Chaturvedi, "Engineering Physics", Cengage Learning India, 2018.
3. V.Rajendran, "Engineering Physics", Tata McGraw Hill Education Private Limited, 2011.

REFERENCES:

1. D.Halliday, R. Resnick and J. Walker, "Principles of Physics", Wiley publisher, 10th Edition, 2015.
2. R.A.Serway and J.W. Jewett, "Physics for Scientists and Engineers", Cengage Learning, 2014.
3. P.A.Tipler and G. Mosca, "Physics for Scientists and Engineers with Modern Physics", W.H.Freeman, 2007.
4. D.K.Bhattacharya and T. Poonam, "Engineering Physics", Oxford University Press, 2017.

20BS103	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To make the students, familiar with boiler feed water requirements, related problems and water treatment techniques.
- To learn the principle of electrochemical cell, types of corrosion and its control.
- To develop an understanding of the basic concepts of phase rule and its applications to one and two component systems and appreciate the purpose and significance of alloys.
- To be familiar with different types of fuel and their characteristics and also functioning of energy storage devices.
- To understand the techniques of spectra and chromatography for analytical purpose.

PRE-REQUISITE:

Course Code: Nil

Course Name: Nil

UNIT - I WATER AND ITS TREATMENT 9

Characteristics of water; Hard water, Soft water, difference; Hardness – types of hardness, expression of hardness, units, removal of hardness (boiling, soda lime process), estimation of hardness of water by EDTA method (problems); Boiler feed water – requirements – disadvantages of using hard water in boilers (scale and sludge, priming and foaming, caustic embrittlement, boiler corrosion); Treatment of boiler feed water – internal treatment (carbonate, phosphate, and calgon conditioning) external treatment – ion exchange process, zeolite process; Purification of water - reverse osmosis, electro dialysis, Application of nanomaterials in water purification.

UNIT - II ELECTROCHEMISTRY AND CORROSION 9

Electrochemical cell - redox reaction, electrode potential- origin of electrode potential-oxidation potential- reduction potential, - electrochemical series and its significance - Nernst equation (derivation and problems).
Corrosion- causes- factors, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method – corrosion inhibitors. Metallic coating – Electroplating – Factors - Electroplating of Copper and Electroless plating of Nickel.

UNIT - III PHASE RULE AND ALLOYS 9

Phase rule - introduction, definition of terms with examples; One component system - water system; Reduced phase rule - two component system, classification, lead-silver system; Alloys – introduction, definition, properties of alloys, significance of alloying; Functions and effects of alloying elements; Heat treatment of steel - annealing, hardening, tempering, carburizing, nitriding; Ferrous alloys- nichrome and stainless steel (18/8); Non-ferrous alloys – brass and bronze.

UNIT - IV FUELS AND BATTERIES**9**

Fuels – classification, characteristics; Petrol – characteristics, knocking, octane number; Diesel – characteristics, cetane number; Natural gas (CNG), LPG, Power alcohol, Biodiesel, Gasohol; Combustion of fuels – calorific value, GCV and NCV (Problems), calculation of theoretical air for combustion (Problems), Ignition temperature, explosive range, flue gas analysis (Orsat apparatus);

Batteries – primary and secondary batteries, lead-acid battery, lithium ion battery, Fuel cell (hydrogen oxygen fuel cell).

UNIT - V ANALYTICAL TECHNIQUES**9**

Spectroscopic techniques – UV-visible (Principle and Instrumentation – Block Diagram only and applications), IR (Principle and Instrumentation – Block Diagram only and applications), ¹H NMR ((Principle and Instrumentation – Block Diagram only) – Chromatography – HPLC - Flame photometry – Estimation of sodium by Flame photometry.

TOTAL: 45 PERIODS**OUTCOMES:****AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Identify the problems of hardness of water in boilers and to treat water by various methods.
- Construct electrochemical cell and apply Nernst equation for an electrochemical cell and identify various methods to control corrosion.
- Analyse the phase diagram of one component and two component system and describe the various methods of heat treatment of steel.
- Categorise the various types of fuels by their characteristics and analyse the flue gas by Orsat's method.
- Illustrate the working of lead acid battery, lithium ion battery and fuel cell.
- Describe the instrumentation and working of UV, IR, ¹H NMR, HPLC, and flame photometry.

TEXT BOOKS:

1. P.C. Jain and Monika Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2017
2. S.S Dara and S.S Umare, "A Text Book of Engineering Chemistry", S.Chand & Company Limited, 20th Edition, 2018.

REFERENCES:

1. Shashi Chawla, "A Textbook of Engineering Chemistry", Dhanpat Rai & CO. (PVT) LTD, New Delhi, 2012.
2. B.R. Puri, L.R. Sharma, M.S. Pathania, Vishal, "Principles of Physical Chemistry", Vishal Publishing Co., Punjab, 47th Edition, 2017.
3. G Palanna, "Engineering Chemistry", McGraw Hill Education (India) PVT, LTD, Chennai, 2017.
4. Dr. Sunita Rattan, "A Textbook of Engineering Chemistry", S.K.Kataria & Sons, New Delhi, 2012.

UNIT – V FILES, MODULES, PACKAGES**9**

Files and exception – text files, reading and writing files, format operator, command line arguments, errors and exceptions, handling exceptions, modules, packages – Math and Rand, Illustrative programs – word count, copy file, merge two files.

TOTAL: 45 PERIODS**OUTCOMES:****AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Explain Components of a Computer System, types of programming languages, types of software with examples and purpose.
- Perform problem analysis, use algorithms and prepare flow charts, pseudo code for solving simple problems.
- Use Conditional, iteration constructs of python programming and apply to solve simple problems.
- Use Functions, recursive function, String functions in python programming and apply to perform linear and binary search.
- Explain the various operations for manipulating Tuples, Dictionaries and Use List to perform simple and sorting operations.
- Explain file handling operations, exception handling, modules and packages and illustrate programs for word count, file copy, merge operations and exception handling.

TEXT BOOKS:

1. E. Balagurusamy, “Problem solving and Python Programming”, First edition, McGraw Hill Education (India) Private Limited, 2017.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016 (<http://greenteapress.com/wp/think-python/>)

REFERENCES:

1. Yashavant Kanetkar, Aditya Kanetkar, “Let Us Python”, 2nd Edition, BPB Publications, 2020.
2. John V Guttag, “Introduction to Computation and Programming Using Python: With Application to Understanding Data”, 2nd Edition, PHI Publisher, 2017.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach”, Pearson India Education Services Pvt. Ltd., 2016.
4. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd., 2015.
5. Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3.6”, 3rd edition, Shroff/O’ Reilly Publishers, 2018.
6. Dr. A. Kannan, Dr. L. Sai Ramesh, “Problem Solving and Python Programming”, Updated Edition, United Global Publishers Pvt. Ltd., April 2018.

20BS1L1 BASIC SCIENCE LABORATORY

L T P C
0 0 3 1.5

PHYSICS LABORATORY

OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in Optics, properties of matter and liquids.

PRE-REQUISITE:

Course Code: Nil

Course Name: Nil

LIST OF EXPERIMENTS

(Any five to be carried out & one demonstration experiment)

- Determination of Rigidity modulus – Torsional Pendulum.
- Determination of Young’s modulus – Non Uniform Bending.
- a. Determination of wavelength and particle size using diode laser.
b. Determination of acceptance angle in an optical fiber.
- Determination of velocity of sound and compressibility of liquid using ultrasonic interferometer.
- Determination of band gap of a semiconductor diode.
- Determination of thickness of a thin wire – Air wedge method.
- Determination of dispersive power of a prism – Spectrometer*
- Determination of wavelength of mercury spectrum – Spectrometer grating

*Demonstration experiment

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Evaluate moment of inertia of a disc and rigidity modulus for thin wire using Torsional pendulum.
- Appraise Young’s modulus of material of the given beam by Non-Uniform bending method.
- Measure the wavelength of laser light , Particle size and basic parameter of optical fiber using Semiconductor diode LASER.
- Estimate velocity of ultrasound and compressibility of liquid.
- Estimate the wavelength of the prominent spectral lines.
- Utilize experiment kits for useful applications.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Torsional pendulum set	6
2	Travelling microscope & accessories	6
3	Laser kit	6
4	Ultrasonic interferometer	6
5	Semiconductor band gap kit	6

6	Air wedge set up	6
7	Spectrometer & prism	6
8	Spectrometer & Grating	6

CHEMISTRY LABORATORY**OBJECTIVES:**

- To make the students to acquire practical skill in the determination of water quality parameters through volumetric analysis.
- To have hands on experience in using instruments like pH meter, conductivity meter, potentiometer.
- To acquaint the students with the determination of molecular weight of polymer by viscometer.

PRE-REQUISITE:

Course Code: Nil

Course Name: Nil

Any Five experiments to be given

1. Determination of total, temporary & permanent hardness of water by EDTA method.
2. Determination of alkalinity in water sample.
3. Determination of dissolved oxygen content of water sample by Winkler's method.
4. Determination of strength of given hydrochloric acid using pH meter.
5. Estimation of iron content of the given solution using potentiometer.
6. Conductometric titration of a strong acid Vs a strong base.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
9. Corrosion Experiment – Weight Loss Method.
10. Estimation of sodium present in water using flame photometer.

TOTAL(Physics & Chemistry): 45 PERIODS

OUTCOMES:**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Estimate the Chemical quality parameter of a water sample.
- Estimate the strength of acid by conductometric and pH metric titration..
- Estimate the strength of oxidisable material present in given sample by potentiometry.
- Determine the molecular weight of polymer by Ostwald viscometer.
- Demonstrate the rate of corrosion by weight loss method.

REFERENCE:

1. Vogel's "Text book of quantitative chemical analysis" (8th edition, 2014).

LIST OF APPARATUS AND EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Burette	30
2	Pipette	30
3	Beaker (100ml)	30
4	Conical Flask (250ml)	30
5	Conductivity meter	10
6	Potentiometer	10
7	pH meter	10
8	Viscometer	10
9	Flame Photometer	1
10	Electronic Balance	1

20GE1L1	PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To write, test, and debug simple Python programs using conditional statements.
- To implement Python programs using loops.
- To use functions for structuring Python programs.
- To implement Python programs using lists.
- To write Python programs for implementing file operations.

PRE-REQUISITE:

Course Code: Nil
 Course Name: Nil

LIST OF PROGRAMS

1. Biggest of three numbers, odd or even number, Leap year.
2. GCD, Armstrong Number, Palindrome, Fibonacci Series, Prime number
3. Find the square root and exponentiation of a number with and without built-in functions
4. Linear search and Binary search using Recursion.
5. Find the maximum of a list of numbers
6. Selection sort, Insertion sort
7. First n prime numbers
8. Transpose of a Matrix
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Merge two files

PLATFORM NEEDED: Python 3 interpreter for Windows/Linux

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Develop simple Python programs using conditional and iterative constructs.
- Develop simple Python programs using built-in functions and user-defined functions.
- Develop a Python program using recursion to implement linear and binary search.
- Develop a Python program using list to implement selection and insertion sort.
- Develop Python programs to implement matrix operations.
- Develop a Python program to implement file handling.

20GE1L2	INDUSTRIAL PRACTICES WORKSHOP	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To provide exposure to the students with Hands on Experience on various Basic Industrial Practices in Civil, Mechanical, Electrical and Electronics Engineering.

PRE-REQUISITE:

Course Code: Nil

Course Name: Nil

**GROUP A (CIVIL & MECHANICAL)
LIST OF EXPERIMENTS**

I CIVIL ENGINEERING PRACTICE**UNIT - I CARPENTRY PRACTICE**

1. Study of carpentry tools.
2. Preparation of Cross lap joint
3. Preparation of Dovetail joint
4. Preparation of T joint

UNIT - II PLUMBING PRACTICE

1. Study of plumbing tools, pipeline joints, its location and functions: valves, taps, couplings, unions, reducers and elbows in household fittings.
2. Exercise on Preparation of plumbing line sketches for water supply and sewage works.
3. Exercise on providing of basic water line connection for a residential house using plumbing components.
4. Exercise on providing Water line pipe connections for household utilities like water heater, wash basin etc.,

II MECHANICAL ENGINEERING PRACTICE**UNIT - III SHEET METAL PRACTICE**

1. Study of sheet metal forming tools.
2. Preparation of a Model of rectangular tray.
3. Preparation of a Model of Conical Funnel.

UNIT - IV MACHINING PRACTICE

1. Study of machining tools.
2. Exercise on Simple turning, Facing, Chamfering
3. Exercise on Taper turning.
4. Exercise on Drilling and Tapping.

UNIT – V METAL JOINING PROCESS

1. Study of welding tools.
2. Exercise to join two metal plates by single butt joint using arc welding.
3. Exercise to join two metal plates by T Fillet joint using arc welding.
4. Exercise to join two metal plates by lap joint using arc welding.

DEMONSTRATION

1. Gas welding process.
2. Refrigeration and Air conditioning process.

**GROUP B (ELECTRICAL & ELECTRONICS)
LIST OF EXPERIMENTS**

I ELECTRICAL ENGINEERING PRACTICE

1. Residential house wiring using switches, fuse, indicator, Fluorescent lamp and Energy Meter.
2. Measurement of Power consumption for CFL, Fluorescent Lamp, LED Lamp and Incandescent lamp.
3. Stair case wiring
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of an electrical equipment.

II ELECTRONICS ENGINEERING PRACTICE

1. Study of Electronic components – Resistor colour coding, Capacitor, Inductor- Measurement using LCR meter, Transistor & Diode – Terminal identification using Multimeter.
2. Study of logic gates AND, OR, EX-OR and NOT.
3. Measurement of AC signal parameter (peak-peak, rms value, period & frequency) using CRO and AFO.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS		
CIVIL		
S. No	Component Name	No. of Components
1	Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, coupling, unions, elbows, plugs and other fittings	15 sets
2	Carpentry Vice (fitted to work bench)	15 nos
3	Standard wood working tools	15 sets
4	Models of industrial trusses, door joints, furniture joints	5 each
5	Power Tools a. Rotary Hammer b. Demolition Hammer c. Circular Saw	2 nos 2 nos 2 nos

	d. Planer e. Hand Drilling Machine f. Jigsaw	2 nos 2 nos 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	Power Tool: Angle Grinder	2 nos
7	Study purpose items: Refrigerator and Air Conditioner	One each
ELECTRICAL		
1	Assorted electrical components for house wiring	10 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 b. Digital Live-wire detector	2 nos 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	Regulated of power supply, CRO	1 no. each

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Prepare different carpentry joints.
- Prepare pipe connections with different joints for domestic applications.
- Make the models using sheet metal works.
- Carry out the basic machining operations.
- Prepare joints using welding equipment's.
- Demonstrate on gas welding, refrigeration and air conditioning processes.
- Carry out basic home electrical works and appliances.
- Measure the electrical quantities.
- Elaborate on the components, gates, soldering practices.

20HS201	ADVANCED TECHNICAL COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- This course is designed for Engineering and Technology curriculum enabling the students to learn, acquire and apply updated elements of English communication.
- The course is aimed at providing effective skills for procuring communication skills for business and advanced technology.
- Students will benefit by learning the four skills – Listening, Speaking, Reading and Writing – to meet the global requirements for their career and higher studies.

PRE-REQUISITE:

Course Code: Nil

Course Name: Nil

UNIT - I TECHNICAL WRITING 9

Listening: Listening to audio-visuals on personal Interviews, Speeches from Company CEOs, TV Debates. **Speaking:** Wishing, Greeting, Enquiring Hobbies. **Reading:** Editorials, Letter to the Editor Columns, Technical Papers. **Writing:** Analytical writings, Emphasis Techniques, Letter Writing – Business Correspondence, Abstract Writing, Common Errors, Footnotes, Compound words, Preparation of Agenda

UNIT - II BUSINESS ENGLISH AND LANGUAGE DEVELOPMENT 9

Listening: Listening to Audio-Visual documentary, TV Programs of Celebrities Forum. **Speaking:** Self-Expression, Introducing the fellow students, Talking about celebrities, leaders **Reading:** Company Correspondence, Business Correspondence, Technical Text for Vocabulary **Writing:** Bibliography, Sentence Completion, Cloze exercises, Verbal Analogy, Letter – Business enquiry orders, payments, Minutes Preparation.

UNIT - III VISUAL BASED LANGUAGE DEVELOPMENT 9

Listening: Visuals on Group Discussion-Understanding the nuances of GD – Approach – Content – Methodology. **Speaking:** Discussing main points on burning issues, Social issues – Expressing ideas and suggestions. **Reading:** Etiquettes of Non-Verbal Communication. **Writing:** List of common expressions for specified situations – Sentence linkers – Formal Expressions – Suggestions – Reported Speech - Letter to the Editor on Common Issues – Writing the Points in Indirect Form – Check Lists – Numerical Expression.

UNIT - IV EMPLOYABILITY CORRESPONDENCE 9

Listening: Listening to Visuals of Technical Paper presentation – Technical and HR interviews **Speaking:** Peer-to-Peer Interview – Mock Interview – Telephone Conversations. **Reading:** Comparative Analyses – Instructions on Public Spots – Time Management concepts – Email Correspondence. **Writing:** Compare and Contrast – Cause and Effect – Purpose and Function – Job Application Letter – Drafting Resume / CV, – Inferring the graphical / Pictorial representations – Bar chart – Pie chart, Instruction – common and technical instructions for a process or a component.

UNIT - V TECHNICAL REPORT WRITING

9

Listening: Key note speeches – Annual Reports of institutions / companies. **Speaking:** Answering to the Mock Panel Interview – Sharing of interview experiences – presenting a Technical Paper. **Reading:** Annual Reports – Company Reports – Newspaper reports – Comprehension passages. **Writing:** Homophones – Abbreviations and Acronyms – SI Units – Report Writing with recommendations – Inferring the Graph – Flow Chart – Tables – Technical Papers.

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Listen, Understand and create technical correspondence at advanced level
- Respond or answer to the contextual questions, interview questions, form instructions, draft reports
- Speak and analyze social issues, come out with effective ideas for discussion, understand the passages for meaning and vocabulary
- Assess error free technical writings, create legible and coherent technical papers, derive ideas of the given texts in a precise form
- Remember the updated elements of communication skills, nuances of non-verbal communication, business communication
- Create technical instructions, process instructions, self-appraisals, Resumes, reports on various situations

TEXT BOOKS:

1. Board of editors. "Fluency in English A Course book for Engineering and Technology". Orient Blackswan, Hyderabad: 2016
2. Raman, Meenakshi and Sharma, Sangeetha "Technical Communication Principles and Practice". Oxford University Press: New Delhi, 2014.

REFERENCES:

1. Booth-L. Diana, "Project Work", Oxford University Press, Oxford: 2014
2. Grussendorf, Marion, "English for Presentations", Oxford University Press, Oxford: 2007
3. Means, L. Thomas and Elaine Langlois, "English & Communication For Colleges. Cengage Learning", USA: 2007
4. Board of Editor, "Advanced Technical Communication", Great Mind Publication, Chennai : 2019

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Understand the properties of Laplace transforms and to find the Laplace transform of some standard functions.
- Apply Laplace transform and inverse transform to solve the initial value problems.
- Solve the multiple integrals and apply the concept to find areas, volumes.
- Evaluation of line, surface and volume integrals using Green's, Gauss and Stokes theorems.
- Determine Analytic functions, Bilinear Transformations and apply the concept of conformal mapping to find the images of given curves.
- Evaluation of Contour Integrals using Cauchy's Integral and Residue theorems.

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.
2. T. Veerarajan., "Engineering Mathematics I", The Tata Mc Graw Hill Publication-New Delhi, First Edition 2018.

REFERENCES:

1. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 9thEdition, New Delhi, 2006.
2. James Stewart, "Calculus, Early Transcendental", Cengage Learning, 7th Edition, New Delhi, 2015.
3. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics II", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 9th Edition, 2014.
4. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics II", Narosa Publications, New Delhi, 5th Edition, 2016.
5. Sastry, S.S. "Engineering Mathematics", Vol.I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.

20BS202

APPLIED PHYSICS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the phase diagrams and their usage.
- To establish testing methodologies of materials science.
- To inculcate the knowledge on new Engineering materials for Mechanical and Automobile Engineering applications.

PRE-REQUISITE:

Course Code: Nil

Course Name: Nil

UNIT - I PHASE DIAGRAMS

9

Solid solutions - Hume Rothery's rules – the phase rule - single component system - one-component system of iron - binary phase diagrams - isomorphous systems - the tie-line rule - the lever rule - application to isomorphous system - eutectic phase diagram - peritectic phase diagram - other invariant reactions – free energy composition curves for binary systems - microstructural change during cooling.

UNIT - II FERROUS ALLOYS

9

The iron-carbon equilibrium diagram – phases, invariant reactions – microstructure of slowly cooled steels – eutectoid steel, hypo and hypereutectoid steels – effect of alloying elements on the Fe-C system – diffusion in solids – Fick's law – phase transformations – T-T-T diagram for eutectoid steel – pearlitic and martensitic transformations – tempering of martensite steels – stainless steels – cast irons.

UNIT - III NON DESTRUCTIVE TESTING METHODS

9

Non-destructive testing – objectives of NDT – types of defects – cracking, spalling, staining, honeycombing, dusting and blistering – methods of NDT – Liquid penetration method – radiographic testing –magnetic particle inspection-thermography testing– Eddy current testing.

UNIT - IV MAGNETIC AND DIELECTRIC MATERIALS

9

Magnetic materials: Origin of magnetic moment – Bohr magneton- comparison of Dia, para and ferro magnetism- domain theory – types of energy- hysteresis- soft and hard magnetic materials- antiferromagnetic materials-ferrites and its applications. Dielectric materials: Electrical susceptibility – dielectric constant- electronic, ionic, orientational and space charge polarization- Langevin-Debye equation - internal field - clausius- mosotti relation (derivation)- dielectric loss – dielectric breakdown- ferroelectricity and application.

UNIT - V ADVANCED ENGINEERING MATERIALS**9**

Composites: Classifications, role of matrix and reinforcement processing of fiber – reinforced plastics – Polymers: types of polymers- properties and engineering applications-metallic glasses: production and types –melt spinning process – applications – shape memory alloys: phases, shape memory effect, pseudo elastic effect, NiTi alloy, applications – Nanomaterials: preparation (bottom up and top down approaches), properties and applications – Biomaterials and its applications.

TOTAL: 45 PERIODS**OUTCOMES:****AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Explain various phase diagrams.
- Demonstrate the microstructure and phase transformations of ferrous alloys.
- Identify the defects by Non destructive testing.
- Describe magnetic properties of materials.
- Explain dielectric properties of materials and their applications.
- Acquire knowledge on composites, metallic glasses, SMA and nanomaterials.

TEXT BOOKS:

1. V.Raghavan, "Materials science and Engineering (a first course)", PHI learning private limited, Delhi, 6th Edition, 2017
2. S. O. Pillai, "Solid State Physics", New Age International publisher, 8th Edition, 2018.
3. Charles Kittel, "Introduction to Solid State Physics", John Wiley & sons, 8th Edition, 2015

REFERENCES:

1. B. K. Pandey and S.Chaturvedi, "Engineering Physics", Cengage learning India Pvt Ltd, 2013.
2. D. K. Bhattacharya and Poonam tendon, "Engineering Physics", Oxford University Press, New Delhi, First Edition, 2017.
3. Dr. V. Jeyakumar, "Engineering Metallurgy", Lakshmi Publications, 2017.

20GE201	ENGINEERING GRAPHICS	L	T	P	C
		2	0	2	3

OBJECTIVES:

- To develop graphic skills for communication of concepts, ideas and design of Engineering products.
- To expose national standards related to technical drawings.

PRE-REQUISITE:

Course Code: Nil

Course Name: Nil

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.

UNIT - I PROJECTION OF POINTS AND LINES 6+6

Orthographic projection – Principles - Principal planes - Projection of points in all quadrants - 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.

UNIT - II PROJECTION OF PLANE SURFACES 6+6

Projection of planes (Polygonal and Circular surfaces) inclined to both the principal planes by rotating object method.

UNIT - III PROJECTION OF SOLIDS 6+6

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

UNIT - IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6+6

Sectioning of simple solids in vertical position when the cutting plane is inclined to 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, cylinder and cone.

UNIT - V ISOMETRIC PROJECTION AND FREEHAND SKETCHING 6+6

Principles of Isometric Projection – Isometric scale – Isometric projections of simple solids - truncated Prisms and Pyramids. Visualization concepts and Free Hand sketching : Principles – Representation of Three Dimensional objects – Layout of views - Freehand sketching of multiple views from pictorial views of objects

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Familiarize with the fundamentals and standards of Engineering graphics.
- Draw the orthographic projections of points, lines and planes.
- Draw the projections of simple solids like prisms, pyramids, cylinder and cone.
- Draw the projections of sectional views of solids and develop its lateral surfaces.
- Draw the isometric projection of simple objects, truncated prism and pyramids.
- Draw the free hand sketching of simple objects.

TEXT BOOKS:

1. Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 30th Edition, 2017.
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 15th Edition, 2018.

REFERENCES:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education, 3rd Edition, 2012.

PUBLICATION OF BUREAU OF INDIAN STANDARDS:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001: Technical drawings - General principles of presentation.
4. IS 11669 – 1986: General principles of dimensioning on technical drawings.
5. SP 46 (2003): Engineering Drawing Practice for Colleges.
6. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

SPECIAL POINTS APPLICABLE TO EXAMINATIONS ON ENGINEERING GRAPHICS:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

20GE202

ENGINEERING MECHANICS

L	T	P	C
3	1	0	4

OBJECTIVES:

- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of Engineering.
- To apply the techniques to find out centroid and mass moment of inertia of plane surfaces.
- To enhance skills to carry out kinematic and kinetic analyses for system of particles.

PRE-REQUISITE:

Course Code: Nil

Course Name: Nil

UNIT - I BASICS AND STATICS OF PARTICLES 12

Introduction - Units and Dimensions - Laws of Mechanics - Vectorial representation of forces – Resolution and Composition of forces -Equilibrium of a particle –Forces in space – Equilibrium of a particle in space –Equivalent systems of forces –Principle of transmissibility –Single equivalent force.

UNIT - II EQUILIBRIUM OF RIGID BODIES 12

Free body diagram –Types of supports and their reactions –Moments and Couples –Moment of a force about a point and about an axis, Vectorial representation of moments and couples –Scalar components of a moment-Varignon’s theorem –Equilibrium of Rigid bodies in two dimensions.

UNIT - III PROPERTIES OF SURFACES AND SOLIDS 12

First moment of area and the Centroid of sections- Rectangle, circle, triangle from integration- T section , I section, Angle section, Hollow section by using standard formula- Pappus and Guldinus theorems - moment of inertia of plane areas -Parallel and perpendicular axis theorem -radius of gyration.

UNIT - IV DYNAMICS OF PARTICLES 12

Displacements -Velocity and acceleration, their relationship –Rectilinear and Curvilinear motion –Newton’s law –Work Energy Equation of particles –Impulse and Momentum.

UNIT - V FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS 12

Frictional force -Laws of friction -Simple contact friction –Rolling resistance –Belt friction – Translation and Rotation of Rigid Bodies –Velocity and acceleration –General Plane motion.

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Illustrate the vectorial and scalar representation of forces and moments.
- Solve problems in engineering systems using the concept of static equilibrium
- Draw free body diagram and apply equilibrium principles for two dimensional rigid bodies.
- Determine the centroid and moment of inertia of plane lamina.
- Apply fundamental principles to solve problems in dynamics of particles.
- Summarize the basic principles of friction and general plane motion.

TEXT BOOKS:

1. Vela Murali, "Engineering Mechanics", Oxford University Press, 2010
2. Beer FP, Mazurek DF, Sanghi S, Eisenberg ER, Johnson ER and Cornwell PJ, "Vector Mechanics for Engineers: Statics and Dynamics", Tata McGraw Hill Education Private Limited, 10th Edition, 2012.

REFERENCES:

1. Hibbeler RC, "Engineering Mechanics: Statics & Dynamics", Pearson India Education Services Private Limited, 13th Edition, 2012.
2. Palanichamy M.S and Nagan S, "Engineering Mechanics – Statics and Dynamics", Tata McGraw Hill, 3rd Edition, 2004
3. Meriam J.L and Kraig L.G, 'Engineering Mechanics-Statics and Dynamics', John Wiley & sons, Newyork, 2008
4. Irving H Shames, "Engineering Mechanics – Statics and Dynamics", Pearson Education Asia Private Limited, 4thEdition, 2003.
5. Murugaperumal P, "Engineering Mechanics – Sri Krishna Hitech Publishing Company Private Limited., 2013.

20GE203	BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the concept of electric circuit laws and theorems.
- To analyze the single phase and three phase circuits.
- To study about the working principles of Electrical Machines, electronic devices, circuits and various measuring instruments.

PRE-REQUISITE:

Course Code: Nil
Course Name: Nil

UNIT - I DC NETWORKS 9

Basic Concepts-Atomic structure-Electric charge-Electric Current-Circuit components - Resistance-Capacitance -Inductance-potential and potential difference-Ohm's Law-work-power and Energy-DC Network Terminologies-Series and parallel circuits-Voltage and current divider rules-Kirchhoff's Laws-Maxwell's mesh current method-Nodal Analysis.

UNIT - II AC FUNDAMENTALS 9

Introduction to AC circuits –Generation of AC power-advantages– waveforms and RMS value –average value-form factor and peak factor-power and power factor, single phase and three-phase balanced circuits.

UNIT - III ELECTRICAL MACHINES 9

Construction , principles of operation, characteristics and applications of ; DC machines-Transformers (single and three phase) -Synchronous machines -three phase and single phase induction motors.(Qualitative Treatment Only)

UNIT - IV ELECTRONIC DEVICES & CIRCUITS 9

Types of Materials – conductor, semiconductor and insulators-comparison-Silicon & Germanium- N type and P type materials – PN Junction –Forward and Reverse Bias – Semiconductor Diodes –Bipolar Junction Transistor – Characteristics - Introduction to operational Amplifier –Inverting Amplifier –Non Inverting Amplifier.

UNIT - V MEASUREMENTS & INSTRUMENTATION 9

Classification of instruments - Types of indicating Instruments –moving coil and moving iron instruments-dynamometer type wattmeter and induction type energy meter- three-phase power measurements -Introduction to transducers - Classification of Transducers-selection of transducers- Resistive, Inductive, Capacitive.

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Solve the simple and complex electric circuits using various methodologies.
- Discuss about the concepts of single and three phase circuits.
- Explain the Construction and working principles of electrical machines.
- Summarize the characteristics of electrical machines and choose drives for precise applications.

- Describe the various electronic materials, devices and circuits.
- Select appropriate instruments for electrical measurement for a specific application.

TEXT BOOKS:

1. S.K Bhattacharya, “Basic Electrical and Electronics Engineering”, Pearson, second Edition 2017.
2. D P Kothari and I.J Nagrath, “Basic Electrical and Electronics Engineering”, McGraw Hill Education(India) Private Limited, Third Reprint, 2017

REFERENCES:

1. Thereja .B.L., “Fundamentals of Electrical Engineering and Electronics”, S. Chand & Co. Ltd., 2017
2. N K De, Dipu Sarkar, “Basic Electrical Engineering”, Universities Press (India)Private Limited 2016
3. Del Toro, “Electrical Engineering Fundamentals”, Pearson Education, New Delhi, 2015
4. Rajendra Prasad, “Fundamentals of Electrical Engineering”, Prentice Hall of India, 2014
5. John Bird, “Electrical Circuit Theory and Technology”, Elsevier, First Indian Edition, 2013
6. Allan S Moris, “Measurement and Instrumentation Principles”, Elseveir, First Indian Edition, 2011
7. A.E.Fitzgerald, David E Higginbotham and Arvin Gabel, “Basic Electrical Engineering”, McGraw Hill Education (India) Private Limited, 2009

20HS2L1	COMMUNICATION SKILLS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- This course is framed for imparting practical approach in learning and enhancing communication skill to develop in students.
- Students will be able to identify appropriate expressions in speaking and writing.
- They will also be able to understand the style and perfection of language in reading and listening various contexts of engineering and technology.
- The course will benefit to the students to gain confidence for every day communication, aptitude test and interviews.

PRE-REQUISITE:

Course Code: Nil
 Course Name: Nil

UNIT - I LISTENING 6

Listen and takes notes of Lecture, Listen and Write appropriate word, Talks on Engineering and Technology, Developing effective listening skills, barriers to effective listening

UNIT - II SPEAKING 6

Self-Introduction, Role play of Celebrities, Sharing memorable incidents

UNIT - III READING 6

Reading Online Blogs, Reading Advertisement in Online, Newspaper archives reading

UNIT - IV WRITING 6

Process Description, Narrating experiences, Creating Email blogs, Review Writing – Books, Movies, and Journals

UNIT - V SUMMARIZED ACTIVITIES 6

Reading – cloze exercises, Identifying redundant words, Jargon words, Foreign words, Technical terms. **Writing** – Error free sentences, Sequential paragraphs, Essay writing on various levels – basic, middle, and advanced. **Speaking** – Face to face conversation on specific topics, interviewing celebrities, getting acquaintance with new people, sharing information with persons from abroad.

TOTAL: 30 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Express ideas and concepts on par global communication
- Involve inter-personal communication with flair and error-free verbatim
- Face interviews confidently and respond in proper language ability
- Participate in group discussion and share innovative ideas in technical environments
- Adapt multi-national exposure on employment
- Master all-round competency in delivering apt communication for employability

TEXT BOOKS:

1. E. Suresh Kumar et al. "Communication for Professional Success". Orient Blackswan: Hyderabad, 2015

REFERENCES:

1. Butterfield, Jeff "Soft Skills of Everyone". Cengage Learning: New Delhi, 2015
2. "Interact English Lab Manual for Undergraduate Students", Orient BlackSwan: Hyderabad, 2016.
3. Raman, Meenakshi and Sangeetha Sharma. "Professional Communication". Oxford University Press: Oxford, 2014.
4. S. Hariharanetal. "Soft Skills". MJP Publishers: Chennai, 2010

20GE2L1	ELECTRICAL, ELECTRONICS AND INSTRUMENTATION LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To train the students in performing various tests on electrical drives, electronic devices, measuring instruments sensors and circuits.

PRE-REQUISITE:

Course Code: Nil

Course Name: Nil

LIST OF EXPERIMENTS:

1. Load test on separately excited DC shunt generator
2. Load test on Single phase Transformer
3. Load test on single phase Induction motor
4. Load test on DC shunt motor.
5. Measurement of three phase power
6. Verification of Circuit Laws
7. Transistor based application circuits
8. Study of CRO.
9. Characteristics of LVDT
10. Calibration of Rotameter
11. Measurement of temperature by using RTD
12. Measurement of temperature by using Thermistor

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Practiced to solve the electrical circuits.
- Ability to determine the speed characteristic of different electrical machines.
- Select the electrical drives for particular application.
- Capability to design simple circuits involving transistors.
- Explain the working principles of display devices.
- Skillful to use measuring Instruments.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	D. C. Motor Generator Set	2
2	D.C. Shunt Motor	2
3	Single Phase Transformer	2
4	Single Phase Induction Motor	2
5	Ammeter A.C and D.C	20

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6	Voltmeters A.C and D.C	20
7.	Watt meters LPF and UPF	4
8.	Resistors & Breadboards	-
9.	Cathode Ray Oscilloscopes	4
10.	Dual Regulated power supplies	6
11.	A.C. Signal Generators	4
12.	Transistors (BJT, JFET)	-