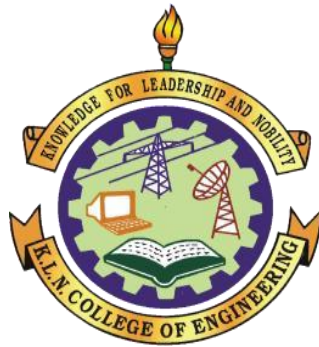


K.L.N. COLLEGE OF ENGINEERING

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.Tech. – ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

CHOICE BASED CREDIT SYSTEM

(For the students admitted from the academic year 2021-2022 onwards)



K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM
(An Autonomous Institution, Affiliated to Anna University, Chennai)



VISION OF THE INSTITUTION

To become a Centre of Excellence in Technical Education and Research in producing Competent and Ethical professionals to the society.

MISSION OF THE INSTITUTION

To impart Value and Need based curriculum to the students with enriched skill development in the field of Engineering, Technology, Management and Entrepreneurship and to nurture their character with social concern and to pursue their career in the areas of Research and Industry.

VISION OF THE DEPARTMENT

To emerge as a center of excellence through innovative technical education and research in Information Technology.

MISSION OF THE DEPARTMENT

To produce competent Information Technology professionals to face the industrial and societal challenges by imparting quality education with ethical values.



K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM
(An Autonomous Institution, Affiliated to Anna University, Chennai)



PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- PEO 1** To excel in industrial or graduate work in Information Technology and multi-disciplinary Environments.
- PEO 2** To adapt to ever changing technologies by applying Engineering Principles.
- PEO 3** To practice professionalism conforming to ethical values, team work and Leadership.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- PSO 1** To create better learning environment in line with technological updation and research progress.
- PSO 2** To give industry exposure through research and consultancy in Information and Communication Technologies.



PROGRAM OUTCOMES (POs)

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.



REGULATIONS 2020

For Under Graduate Program

B.TECH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

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



B.TECH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

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

| 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 | 20AD201 | Foundation for Data Science | PC | 3 | 3 | 0 | 0 | 3 |
| 4 | 20GE201 | Engineering Graphics (Common to all B.E / B. Tech programmes) | ES | 4 | 2 | 0 | 2 | 3 |
| 5 | 20GE205 | Basic Electrical and Electronics Engineering (Common to B.E CSE , B. Tech IT & B.Tech AIDS programmes) | ES | 3 | 3 | 0 | 0 | 3 |
| 6 | 20CS201 | Programming in C (Common to B.E EEE, B.E EIE, B.E. CSE, B.Tech IT & B.Tech AIDS programmes) | PC | 3 | 3 | 0 | 0 | 3 |
| | | | | | | | | |
| PRACTICALS | | | | | | | | |
| 7 | 20HS2L1 | Communication Skills Laboratory (Common to B.E CSE, B.Tech IT , B.E MECH, B.E AUE & B.Tech AIDS programmes) | HS | 2 | 0 | 0 | 2 | 1 |
| 8 | 20CS2L1 | C Programming Laboratory (Common to B.E EEE, B.E EIE, B.E CSE ,B.Tech IT & B.Tech AIDS programmes) | PC | 4 | 0 | 0 | 4 | 2 |
| 9 | 20AD2L1 | Foundation for Data Science Laboratory | PC | 4 | 0 | 0 | 4 | 2 |
| TOTAL | | | | 30 | 17 | 1 | 12 | 24 |

| | | | | | |
|----------------|--|----------|----------|----------|----------|
| 20HS101 | ENGLISH FOR TECHNICAL COMMUNICATION | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

OBJECTIVES:

- This course is designed for entry level Engineering and Technology curriculum enabling the students to learn, acquire and apply for their learning and career.
- The course is aimed at providing effective skills for promoting communication skills through English.
- Students will benefit in conversing with the peers, faculty and fellow professionals.
- The outcome of this course contains refined level of English proficiency by acquiring all four skills, listening, speaking, reading and writing to prepare them for global readiness.

PRE-REQUISITE

Course Code: Nil
 Course Name: Nil

UNIT I FOCUSING LANGUAGE DEVELOPMENT 9

Listening: Listening to TV News, Guest Lecturers, note – taking. **Speaking:** Pronunciation Common Vocabulary – Technical Vocabulary – Answering Peer Questions – Conversation with Teacher. **Reading:** News magazines, Reading for unfamiliar words, Variety of News Items. **Writing:** Word formation – Auxiliary verbs – Modal Verbs – Sentence Types – Affirmative, Negative, Interrogative, Concord – Dialogue Writing, Letter to Principal / Director – Instructions using Auxiliary.

UNIT II GRAMMAR AND TECHNICAL READING 9

Listening: Listening to Peer Conversations – Brief Speeches – Listening for Specific Information – Recap of Speeches. **Speaking:** Wh Questions, Day today conversations, Telephonic enquiries official/formal enquiries. **Reading:** Technical Essays – Identifying Sentence Types – Classifying the verb patterns. **Writing:** Tenses – Simple Present, Present Progressive, Present Perfect, Present Perfect Continuous – Voice – Active & Passive – Précis Writing – Essay Writing

UNIT III GRAMMAR AND LANGUAGE DEVELOPMENT 9

Listening: TV interviews, Commentaries, Digital Videos for World Information. **Speaking:** Telephonic Conversation – Classroom Activities – Conversing Information. **Reading:** Coherence, Development of Thoughts. **Writing:** Tenses – Simple Past, Past Progressive, Past Perfect, Past perfect continuous – Impersonal Passive-Narrating the past events, Letter to friend/father about Industrial Visit/Functions held – Narrating the past experience using Impersonal Passive voice

UNIT IV READING AND LANGUAGE DEVELOPMENT

9

Listening: Listening to Dialects of English – British & American Regional. **Speaking:** Role Plays, Extempore, Responding to specific questions. **Reading:** Comprehensive passages, Reading for specific points. **Writing:** Tenses – Simple Future, Future progressive, Future Perfect, Future Perfect continuous – Definition – Phrases of Reason – Cause & Effect, 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**COURSE OUTCOMES:****On Completion of the course, the students should 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
3. Anne Laws, “Writing Skills”, Orient Black Swan, Hyderabad, 2011
4. Board of Editor, “English for Technical Communication”, Great Mind Publication, Chennai, 2018

| | | | | | |
|----------------|--|---|---|---|---|
| 20BS101 | FUNDAMENTALS OF ENGINEERING MATHEMATICS | L | T | P | C |
| | | 3 | 1 | 0 | 4 |

OBJECTIVES:

- To relate various methods of Matrix Algebra to handle practical problems arising in the field of engineering.
- The main aim of this course is to achieve conceptual understanding and to retain the best traditions of Calculus.
- The syllabus is designed to provide the basic tools of Calculus of Single and Multivariable, mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions.

PRE-REQUISITE

Course Code: Nil

Course Name: Nil

UNIT I MATRICES 12

Introduction to Matrices-Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton Theorem – Diagonalization of matrices – Reduction of a Quadratic form to Canonical form by Orthogonal transformation – Nature of Quadratic forms.

UNIT II DIFFERENTIAL CALCULUS 12

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Differentiation of Polynomials, Exponential, Trigonometric, Hyperbolic, Logarithmic and Implicit functions- Maxima and Minima of functions of single variable

UNIT III FUNCTIONS OF SEVERAL VARIABLES 12

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

UNIT IV INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions, Improper integrals

UNIT V ORDINARY 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.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

On Completion of the course, the students should 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 I", 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 II", 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**COURSE OUTCOMES:****On Completion of the course, the students should 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**COURSE OUTCOMES:****On Completion of the course, the students should 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

| | | | | | |
|----------------|---|----------|----------|----------|----------|
| 20GE101 | PROBLEM SOLVING USING PYTHON PROGRAMMING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

OBJECTIVES:

- To know the basics of Computers and algorithmic problem solving
- To understand Python programs with conditional and looping constructs.
- To define Python functions and strings.
- To use Python data structures – lists, tuples, sets and dictionaries.
- To do input/output with files in Python.

PRE-REQUISITE

Course Code: Nil

Course Name: Nil

UNIT I COMPUTER FUNDAMENTALS AND PROBLEM SOLVING 9

Introduction to Computer System – Block Diagram of Computer, Types of Memory, I/O Devices, Application Programs, System Programs – Loader, linker, assembler, compiler, interpreter, Programming process – source code to executable code, Problem Solving Strategies – Problem analysis, Algorithms, Flow Charts, Pseudo Code. Illustrative problems: odd or even number, Leap year, Biggest of three numbers, square root of a number, Sum of n numbers, Armstrong number, Palindrome, Fibonacci Series, Prime number, Bubble Sort and Linear Search

UNIT II DATA, EXPRESSIONS, CONTROL FLOW STATEMENTS 9

Python interpreter and interactive mode, values and types – int, float, boolean, string, and list, variables, expressions, statements, tuple assignment, operators and precedence of operators, comments, Control Flow Statements – Conditionals – conditional (if), alternative (if-else), chained conditional (if-elif-else), Iteration – state, while, for, break, continue, pass, Illustrative programs – exchange the values with and without using temporary variables, circulate the values of n variables, distance between two points

UNIT III FUNCTIONS, STRINGS 9

Functions – function definition and use, flow of execution, parameters and arguments, function composition, Fruitful functions – return values, parameters, local and global scope, recursion, Strings – string slices, immutability, string functions and methods, string module, Illustrative programs – square root, GCD, exponentiation, Factorial of a number, linear search, binary search

UNIT IV LISTS, TUPLES, SETS, DICTIONARIES 9

Lists – list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters, Lists as arrays, Tuples – tuple assignment, tuple as return value, Sets - Creating a set, Modifying a set, Removing elements from a set, Set operations- Set Union, Set intersection, Set difference, Set membership test, Iterating through a set, Set methods, Built-in functions with set, Frozenset - Dictionaries – operations and methods, Advanced list processing –List comprehension, Illustrative programs – selection sort, insertion sort, Matrix addition and subtraction, sum an array of numbers

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**COURSE OUTCOMES:****On Completion of the course, the students should 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, Sets, 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
3. (<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.
- Determination of wavelength and particle size using diode laser.
 - 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

COURSE OUTCOMES:**On Completion of the course, the students should 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

LIST OF EXPERIMENTS**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

COURSE OUTCOMES:

On Completion of the course, the students should 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

TOTAL: 60 PERIODS

PLATFORM NEEDED : Python 3 interpreter for Windows / Linux

COURSE OUTCOMES:

On Completion of the course, the students should 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 d. Planer e. Hand Drilling Machine f. Jigsaw | 2 nos 2 nos 2 nos 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 | 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 | Regulated of power supply, CRO | 1 no. each |

COURSE OUTCOMES:

On Completion of the course, the students should 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 Expressions

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**COURSE OUTCOMES:****On Completion of the course, the students should 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.

| | | | | | |
|----------------|--|---|---|---|---|
| 20BS201 | LAPLACE TRANSFORM AND ADVANCED CALCULUS | L | T | P | C |
| | | 3 | 1 | 0 | 4 |

OBJECTIVES:

- To make the student familiar with topics such as Multiple Integrals, Vector Calculus, Analytic Functions, Complex Integration and Laplace Transform.
- To learn the concept of basic Vector Calculus which can be widely used for Modeling the various laws of Physics.
- To understand the various methods of Complex Analysis and Laplace Transform can be used for efficiently solving the problems that occur in various branches of Engineering disciplines

PRE-REQUISITE

Course Code: Nil
 Course Name: Nil

UNIT I LAPLACE TRANSFORM 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

UNIT II MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in Polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of Solids – Change of Variables in Double and Triple integrals

UNIT III 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 - Area of a Curved Surface - Volume Integral – Green’s, Gauss divergence and Stoke’s theorems – Verification and Application in evaluating Line, Surface and Volume Integrals.

UNIT IV 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 , $1/z$, z^2 -Bilinear transformation

UNIT V 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 – Use of Circular Contour

TOTAL: 60 PERIODS**COURSE OUTCOMES:****On Completion of the course, the students should 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, 9th Edition, 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

20AD201

FOUNDATIONS FOR DATA SCIENCE

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

OBJECTIVES:

- Learn the data analysis basics with Python
- Study Data Analysis and interpretation with Numpy on statistical parameters
- Understand various methods of Data Preparation and Manipulation with Pandas
- Learn Data Visualization using matplotlib and seaborn
- Learn Machine learning fundamentals concepts such as Feature Engineering and various techniques

PRE-REQUISITE

Course Code: Nil

Course Name: Nil

UNIT I INTRODUCTION TO DATA ANALYSIS

9

Data Analysis - Mathematics and Statistics Basic Concepts - The Data Analysis Process - Data Extraction - Data Pre-processing/Cleaning - Data Preparation/Visualization - Data Modelling / Visualization - Quantitative and Qualitative Analysis - Errors and Debugging - Profiling and Timing Code

UNIT II INTRODUCTION TO NUMPY

9

Python data types - NumPy Arrays with Computations - Aggregations: Min, Max, and Everything In Between-Broadcasting - Comparisons, Masks, and Boolean Logic - Sorting Arrays - Structured Data with NumPy's Arrays

UNIT III DATA MANIPULATION WITH PANDAS

9

Introducing Pandas Objects - Data Indexing and Selection - Operating on Data in Pandas - Handling Missing Data - Hierarchical Indexing - Combining Datasets - Vectorized String Operations - Working with Time Series - High-Performance Pandas: eval() and query()

UNIT IV VISUALIZATION WITH MATPLOTLIB

9

Various Plots - Simple Line - Scatter Plots - Error Visualization - Density and Contour Plots - Histograms, Binnings, and Density - Customizing Plots-Multiple Subplots - Three-Dimensional Plotting in Matplotlib - Geographic Data with Basemap - Visualization with Seaborn

UNIT V MACHINE LEARNING FUNDAMENTALS

9

Machine Learning concepts using Scikit-learn- Hyperparameters and Model Validation - Feature Engineering - Basics of Classification, Clustering - Support Vector Machines - Decision Trees and Random Forests- Principal Component Analysis

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On Completion of the course, the students should be able to:

- Understand the various analysis methods in Numpy and Pandas
- Perform calculations that measure the central tendency and dispersion of data
- Solving the problems based on Time series analysis data
- Visualize various statistical quality control charts
- Apply the concepts of various machine learning techniques to solve problems

TEXT BOOKS:

1. Jake VanderPlas, 2016, Python Data Science Handbook: Essential Tools for Working with Data, 1sted, O'Reilly Media, Inc

REFERENCES

1. Nelli, F 2015, Python Data Analytics, 1sted, Apress, USA.
2. McKinney, W 2017, Python for Data Analysis, 2nd ed, O'Reilly Media, Inc.
3. John V Guttag 2013, Introduction to Computation and Programming Using Python, Revised and Expanded Edition, MIT Press.
4. Timothy A. Budd 2015, Exploring Python, Mc-Graw Hill Education Private Ltd. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016

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

COURSE OUTCOMES:

On Completion of the course, the students should 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

| | | | | | |
|---------|---|---|---|---|---|
| 20GE205 | BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Qualitative Treatment only) | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

OBJECTIVES:

- To learn the fundamental laws, theorems of electrical circuits and also to analyze them.
- To study the basic principles of electrical machines and their performances.
- To study the different energy sources and their utilizations.
- To study the fundamentals of electronic circuits.
- To understand the principles and operations of operational amplifiers

PRE-REQUISITE

Course Code: Nil

Course Name: Nil

UNIT I ELECTRICAL CIRCUITS ANALYSIS 9

Ohms Law, Kirchhoff's Law-Instantaneous power- series and parallel circuit analysis with resistive, capacitive and inductive network - nodal analysis, mesh analysis- network theorems - Thevenins theorem, Norton theorem, maximum power transfer theorem and superposition theorem, -star delta conversion

UNIT II ELECTRICAL MACHINES 9

DC and AC Rotating Machines: Types, Construction, principle, Emf and torque equation, Basics of Stepper Motor- Transformers-Introduction- types and construction, working principle of Ideal transformer-Emf equation- All day efficiency calculation

UNIT III UTILIZATION OF ELECTRICAL POWER 9

Renewable energy sources-wind and solar panels. Illumination by lamps- Sodium Vapour, Mercury vapour, Fluorescent tube. Domestic refrigerator -Electric circuit, construction and working principle. Protection-need for earthing. Energy Tariff calculation for domestic loads

UNIT IV ELECTRONIC CIRCUITS 9

Semi conductors, Types -PN Junction-VI Characteristics of Diode, zener diode, BJT- operations of PNP and NPN transistors- Transistors configurations -Common Base, Common Emitter &Common Collector configurations- Amplifiers

UNIT V OPERATIONAL AMPLIFIERS AND DIGITAL ELECTRONICS 9

Op amps- Amplifiers, oscillator, rectifiers, differentiator, integrator, ADC, DAC, Number Systems, Complements-1's and 2's Complements- Basic Digital Logic gates, Universal gates- NAND and NOR Implementation

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On Completion of the course, the students should be able to:

- Discuss the essentials of electric circuits and analysis
- Solve the various network theorems using different methodologies.
- Discuss the basic operation of electric machines and transformers.
- Understand the renewable sources and common domestic loads.
- Discuss the basics of semiconductor devices and applications.
- Explain about applications of Op-amps and basics of digital circuits

TEXT BOOKS:

1. D.P. Kothari and I.J Nagarath, “Basic Electrical and Electronics Engineering”, Mc Graw Hill, 2019, Fourth Edition.
2. M.S. Sukhija and T.K. Nagsarkar, “Basic Electrical and Electronic Engineering”, Oxford, 2019.

REFERENCES

1. S.B. Lal Seksena and Kaustuv Dasgupta, “Fundamentals of Electrical Engineering”, Cambridge, 2017
2. B.L Theraja, “Fundamentals of Electrical Engineering and Electronics”. Chand & Co, 2018.
3. S.K.Sahdev, “Basic of Electrical Engineering”, Pearson, 2019.
4. John Bird, “Electrical and Electronic Principles and Technology”, Sixth Edition, Elsevier, 2017.
5. Mittle, Mittal, “Basic Electrical Engineering”, 2nd Edition, Tata McGraw-Hill Edition,2017.
6. C.L.Wadhwa, “Generation, Distribution and Utilisation of Electrical Energy”, New Age international pvt.ltd., Revised 4th Edition 2018

20CS201

PROGRAMMING IN C

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

OBJECTIVES:

- To understand the basic C programming constructs.
- To learn about usage of arrays and strings.
- To understand the concepts of functions, pointers, structures and unions.
- To expose to file handling operations in C

PRE-REQUISITE

Course Code: Nil

Course Name: Nil

UNIT I BASICS OF C PROGRAMMING

9

Introduction to programming paradigms– Structure of C program– C programming– 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 –Pre-processor directives – Compilation process

UNIT II ARRAYS AND STRINGS

9

Introduction to Arrays– Declaration, Initialization –One dimensional array –Example Program– Computing Mean, Median and Mode, Two dimensional arrays –Example Program– Matrix Operations (Addition, Scaling, Determinant and Transpose), String operations– length, compare, concatenate, copy –Selection sort, linear and binary search

UNIT III FUNCTIONS AND POINTERS

9

Introduction to functions– Function prototype, function definition, function call, Built-in functions (string functions, math functions), Recursion, Example Program– Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions –Pointers, Pointer operators, Pointer arithmetic, Arrays and pointers – Array of pointers, Example Program– Sorting of names, Parameter passing– Pass by value, Pass by reference, Example Program– Swapping of two numbers and changing the value of a variable using pass by reference

UNIT IV STRUCTURES AND UNIONS

9

Structure – Nested structures, Pointer and Structures, Array of structures, Example Program – using structures and pointers, typedef, Self referential structures, Union, Dynamic memory allocation, Illustrative programs – allocating block of memory, sum of n numbers using malloc, calloc

UNIT V FILE PROCESSING

9

Files – File operations, Types of file processing– Sequential access, Random access
 Sequential access file - Example Program– Finding average of numbers stored in sequential
 access file, Random access file -Example Program– Transaction processing using random
 access files, Command line arguments

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

On Completion of the course, the students should be able to:

- Use basic constructs of C programming to develop simple programs.
- Analyze the one dimensional and two dimensional arrays and develop programs to implement operations such as addition, scaling, Determinant and Transpose.
- Utilize string operations such as length, compare, concatenate and examine sorting and searching algorithm.
- Illustrate simple examples for functions and pointers and develop programs to implement pointer arithmetic, arrays with pointers and advanced concepts of functions.
- Illustrate simple programs for structures and unions and design real time application programs.
- Analyze file operations and develop programs to implement various file access procedures.

TEXT BOOKS:

1. Balagurusamy, E, "Programming in ANSI C", Eighth Edition, Tata Mcgraw-Hill, 2019.
2. Yashavant Kanetkar, "Let Us C", BPB Publications, 17th Edition, 2020.
3. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2015

REFERENCES

1. Paul Deitel and Harvey Deitel, "C How to Program", Seventh edition, Pearson Education India, 2015.
2. Juneja, B. L and Anita Seth, "Programming in C", CENGAGE Learning India pvt. Ltd., 2011.
3. PradipDey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.
4. Byron Gottfried, "Schaum"s outlines- Programming with C", McGraw-Hill Education, Fourth edition, 2018.
5. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016

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|----------------|--|---|---|---|---|
| 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 Journal

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

COURSE OUTCOMES:

On Completion of the course, the students should 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.

20CS2L1

C PROGRAMMING LABORATORY

L T P C
^ ^ ^ ^**OBJECTIVES:**

- To develop programs in C using basic constructs.
- To develop applications in C using strings, pointers, functions, structures.
- To develop applications in C using file processing.

PRE-REQUISITE

Course Code: Nil

Course Name: Nil

LIST OF PROGRAMS

1. Programs using I/O statements, expressions and decision-making constructs.
2. Program for finding given year is leap year or not and finding given number is Armstrong number or not.
3. Design a calculator to perform the operations namely, addition, subtraction, multiplication, division and square of a number.
4. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions
 - 5 if it is a perfect cube.
 - 4 if it is a multiple of 4 and divisible by 6.
 - 3 if it is a prime number
 Sort the numbers based on the weight in the increasing order as shown below
 <10,its weight>,<36,its weight><89,its weight>
5. Matrix addition and subtraction
6. Matrix multiplication and transpose of a matrix
7. Program using string with and without using string functions: string copy and Reverse the String.
8. Convert the given decimal number into binary, octal and hexadecimal numbers using user defined functions.
9. From a given paragraph perform the following using built-in functions
 - a. Find the total number of words.
 - b. Capitalize the first word of each sentence.
 - c. Replace a given word with another word.
10. Program using recursion – factorial and Fibonacci series
11. Sort the list of numbers using pass by reference.
12. Generate salary slip of employees using structures and pointers.
13. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.
14. Count the number of account holders whose balance is less than the minimum balance using sequential access file
15. **Mini project (Any one project : Maximum 4 per Team)**
 - Railway reservation system

- Library Management System
- University Result Publication System
- Hospital Management System
- Student Automation System
- Payroll System
- Banking System
- Inventory System

PLATFORM NEEDED: Turbo C++ Compiler

TOTAL: 60 PERIODS

COURSE OUTCOMES:

On Completion of the course, the students should be able to:

- Develop simple programs using decision making and looping statements.
- Utilize array concepts to perform matrix addition, subtraction and multiplication.
- Utilize string operations and develop programs to show string copy and reverse.
- Develop programs using user defined functions, built-in functions and recursion.
- Design applications using sequential and random access files.
- Design simple real time projects using the concepts of structures and union.

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|----------------|--|---|---|---|---|
| 20AD2L1 | FOUNDATIONS FOR DATA SCIENCE LABORATORY | L | T | P | C |
| | | 0 | 0 | 4 | 2 |

OBJECTIVES:

- Learn the data analysis basics with Python
- Study Data Analysis and interpretation with Numpy on statistical parameters
- Understand various methods of Data Preparation and Manipulation with Pandas
- Learn Data Visualization using matplotlib and seaborn
- Learn Machine learning fundamentals concepts such as Feature Engineering and various techniques

PRE-REQUISITE

Course Code: Nil
 Course Name: Nil

Implementation of the following problems using Statistical Packages

1. NumPy Arrays Computations - Aggregations-Sorting -Arrays-Structured Data
2. Pandas Dataframe- Manipulations from CSV
3. Data Acquisition using python web Scraping
4. Classification and tabulation of data and Graphical and diagrammatic presentation of data.
5. Perform calculations that measure the central tendency and dispersion of data and Implementation of measures of Skewness, moments and kurtosis.
6. Determination of point and interval estimates.
7. Solving linear regression, polynomial regression and non-linear regression based problems and solving multiple regression and correlation analysis based problems.
8. Solving the problems based on Time series analysis and forecasting and implementing statistical quality control charts.
9. Apply Classification, Clustering and SVM techniques for Web Scraped Datasets
10. Decision Trees and Random Forests-PCA for Intrusion Detection
11. Mini Project

TOTAL: 60 PERIODS

COURSE OUTCOMES:

On Completion of the course, the students should be able to:

- Understand the various analysis methods in Numpy and Pandas
- Apply the concept of Classification and tabulation of data
- Perform calculations that measure the central tendency and dispersion of data and Implementation of measures of Skewness, moments and kurtosis
- Solving the problems based on Time series analysis and forecasting and implementing statistical quality control charts.
- Apply the concepts of various machine learning techniques to solve problems.