VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD
B.TECH. I YEAR
COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

I SEMESTER **A19**

Course Code	Title of the Course	L	T	P/D	Contact Hours/ Week	Credits
A19BS1MT01	Calculus for Engineers	3	1	0	4	4
A19BS1CH01	Engineering Chemistry	3	0	0	3	3
A19ES1CS01	Programming through C	3	0	0	3	3
A19HS1EN01	English	3	0	0	3	3
A19BS2CH01	Engineering Chemistry Laboratory	0	0	2	2	1
A19ES2CS01	Programming through C Laboratory	0	0	2	2	1
A19HS2EN01	English Language Communication Skills Laboratory	0	0	2	2	1
A19ES2ME01	Workshop Practices	1	0	2	3	2
A19PW4CS01	Design Sensitization	0	0	2	2	1
Total		**13**	**1**	**10**	**24**	**19**
A19MN6HS01	Induction Programme	**-**	**-**	**-**	**-**	**-**

II SEMESTER **A19**

Course Code	Title of the Course	L	T	P/D	Contact Hours/ Week	Credits
A19BS1MT04	Linear Algebra and Advanced Calculus	3	0	0	3	3
A19BS1MT05	Statistical Methods for Data Analysis	3	1	0	4	4
A19BS1PH02	Engineering Physics	3	0	0	3	3
A19ES1EE01	Basics of Electrical Energy for Engineers	3	0	0	3	3
A19ES1IT01	Data Structures	3	0	0	3	3
A19BS2PH02	Engineering Physics Laboratory	0	0	2	2	1
A19ES2EE01	Basic Electrical Engineering Laboratory	0	0	2	2	1
A19ES2IT01	Data Structures Laboratory	0	0	2	2	1
A19ES3ME02	Engineering Drawing	0	0	4	4	2
Total		**15**	**1**	**10**	**26**	**21**

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

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester	**L**	**T/P/D**	**C**
	3	**1**	**4**

(A19BS1MT01) CALCULUS FOR ENGINEERS

COURSE PRE-REQUISITES: Differentiation, Integration

COURSE OBJECTIVES:

- To learn maximum and minimum value of a given function
- To learn Improper integrals using Beta and Gamma functions
- To learn methods of solving first order differential equations and learn about its applications to basic engineering problems
- To learn methods of solving higher order differential equations and learn about its applications to basic engineering problems
- To learn Laplace transforms of standard functions

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Solve problems involving Maxima and Minima
CO-2: Evaluate integrals using special functions
CO-3: Formulate and solve the problems of first and higher order differential equations
CO-4: Apply knowledge of differential equations to real world problems
CO-5: Use Laplace and Inverse Laplace transform as a tool to solve the problems.

UNIT-I:
Functions of Finite Variables: Limits, Continuity, Partial differentiation, partial derivatives of first and second order, Jacobian, Taylor's theorem of two variables (without proof). Maxima and Minima of two variables, Lagrange's method of undetermined Multipliers.

UNIT-II:
Improper Integrals: Definition of Improper Integrals, Beta functions: Properties and other forms of beta functions (statements only) and problems.
Gamma functions: Properties of Gamma functions (statements only), Relation between the Beta and Gamma functions (without proofs) and Evaluation of improper integrals using Beta and Gamma functions.

UNIT-III:
First Order, First Degree ODE and its Applications: Differential equations of first order and first degree - Exact differential equation , Linear and Bernoulli differential equation , Applications of differential equations of first order and first degree - Newton's law of cooling, Law of natural growth and decay, Orthogonal trajectories.

UNIT-IV:
Second and Higher Order ODE with Constant Coefficients: Second order linear differential equations with constant coefficients: Solution of Homogenous, non homogeneous differential equations, Non-Homogeneous terms of the type e^{ax}, sin (ax), cos (ax), polynomials in x, e^{ax} V(x), x V(x).

UNIT-V:

Ordinary Differential Equations with Variable Coefficients: Method of variation of parameters; Equations reducible to linear ODE with constant Coefficients: Euler-Cauchy equation, Legendre's equation.

UNIT-VI:

Laplace Transforms: Laplace transforms, Existence condition, Laplace transform of Elementary functions, Properties of Laplace transforms (Without Proofs), Laplace transform of special functions (Unit step function, Dirac delta function and Periodic function). Inverse Laplace transform and its properties, Convolution theorem (without proof) ant its applications, Solving linear differential equations using Laplace transform.

TEXT BOOKS:

1. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, 5th Edition, Narosa Publishing House, 2016
2. Higher Engineering Mathematics, B. V. Ramana, 33rd Reprint, McGraw Hill Education (India) private Limited, 2018
3. Engineering Mathematics, N. P. Bali, 4th Edition, Laxmi Publications (P) Ltd., 2001

REFERENCES:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley, 2011
2. Advanced Engineering Mathematics, Peter 'O' Neil, 8th Edition, Cengage Learning, 2011

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B.Tech. I Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(A19BS1CH01) ENGINEERING CHEMISTRY

COURSE PRE-REQUISITES: Basic knowledge of Mathematics and Chemistry

COURSE OBJECTIVES:

- To list out the importance of polymers, surfactants and lubricants in real world scenario
- To outline the features of conventional and non-conventional sources of energy
- To discuss the problems of corrosion on structures to interpret the need of alloys
- To emphasize the importance of nanomaterials, analytical techniques, environmental and green chemistry

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Identify & recognize the role of polymers, surfactants and lubricants in various fields

CO-2: Rationalize ideas about alternate sources of energy so as to reduce load on fossil fuels

CO-3: Summarise the effects of corrosion to indicate the use of alloys in various metallic structures

CO-4: Familiarize with the role of nanomaterials, environmental & green chemistry and assess the use of analytical techniques

UNIT-I:

Polymers: Polymers-Definition, types of polymerization-addition, condensation and copolymerization, Properties of polymers- crystallinity, melting point and glass transition, viscoelasticity, solubility of polymers. Fabrication of polymers (compression, extrusion, blowing and thermoforming). Synthesis, properties and uses of PET, PTFE, PMMA, polycarbonate, Bakelite and urea formaldehyde. Conducting polymers-definition, classification and applications. FRPs and their applications.

UNIT-II:

Surfactants: Definition, cleaning mechanism, types of surfactants, micelles, reverse micelles and critical micelle concentration.

Lubricants: Definition, types, mechanism of lubrication-thick film lubrication, thin film lubrication and extreme pressure lubrication. Additives and selection of lubricants. Properties-viscosity, cloud and pour point, flash and fire point, saponification number-definition and significance.

UNIT-III:

Energy Science:

Fuels: Definition, classification, characteristics of a good fuel. Coal-proximate & ultimate analysis-significance. Petroleum- refining, Cracking-definition, types of cracking, fluid-bed cracking, knocking, octane number, cetane number. Alternative and non-conventional sources of energy – solar, wind, geothermal, nuclear and biomass (advantages and disadvantages).

Battery technology: Features of batteries, Rechargeable batteries- lithium ion and Zn-air batteries. Fuel cells-methanol-oxygen fuel cell.

UNIT-IV:

Corrosion: Introduction, causes and effects of corrosion, chemical and electrochemical corrosion and mechanism of corrosion. Types-differential aeration corrosion (Pitting and waterline corrosion), differential metal corrosion (Galvanic corrosion). Factors affecting corrosion-nature of metal (position, passivity, purity, areas of anode and cathode) & nature of environment (temperature, pH, humidity). Corrosion control methods-proper designing, cathodic protection, differences between galvanizing and tinning, paints-constituents and functions.

Alloys: Purpose of making alloys, classification of alloys, ferrous alloys ex: Steel, non-ferrous alloys ex: Cu, Al, Pb (features and applications).

UNIT-V:

Nanomaterials and Analytical Techniques: Nanomaterials: Definition, synthesis-top down and bottom up approaches. Properties and application of fullerenes and carbon nanotubes. Applications of nanomaterials in electronics, catalysis, telecommunication and medicine.

Analytical Techniques: Working principle and applications of pH-metry, conductometry, colorimetry, chromatography (TLC), Scanning tunneling microscope and atomic force microscope. Sensors: Lab-on-a-chip- features and applications.

UNIT-VI:

Environmental and Green Chemistry: Air, water and noise pollution: sources and effects, optimum levels of pollution. Solid waste management and e-waste: effects and management.

Green Chemistry- definition, principles and applications of green chemistry. Self healing materials-principle and applications.

TEXT BOOKS:

1. Engineering Chemistry, P. C Jain and M. Jain, 16th Edition, Dhanpat Rai Publications, New Delhi, 2016
2. Engineering Chemistry, Prasanta Rath, B. Rama Devi, Ch. Venkata Ramana Reddy, Subhendu Chakroborty, 1st Edition, Cengage Publications, Delhi, 2019
3. A Textbook of Engineering Chemistry, Shashi Chawla, 3rd Edition, Dhanpat Rai Publications, New Delhi, 2010

REFERENCES:

1. Engineering Chemistry, S. S. Dara, 12th Edition, S. Chand & Company Ltd., New Delhi, 2010
2. Engineering Chemistry, O. G. Palanna, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009
3. Engineering Chemistry, B. Sivasankar, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009
4. Introduction to Nanoscience, S. M. Lindsay, 2010
5. Introduction to Environmental Science, Y. Anjaneyulu, BS Publications, Hyderabad,2004

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B.Tech. I Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(A19ES1CS01) PROGRAMMING THROUGH C

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:

- To relate basics of programming language constructs and problem-solving techniques
- To classify and implement control structures and derived data types
- To analyze and develop effective modular programming
- To construct mathematical problems and real time applications using C language

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Understand fundamentals of computers and illustrate the flowchart, algorithm, pseudo code for a given problem, develop programs using various datatypes and operators

CO-2: Develop conditional and iterative statements for a given problem

CO-3: Exercise on programs using arrays, pointers, dynamic memory management, structures and unions

CO-4: Develop solution for a given problem using modular approach and perform file handling

UNIT-I:

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flow chart / Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, syntax and logical errors in compilation, object and executable code .Arithmetic expressions and precedence.

UNIT-II:

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching Iteration and loops

Arrays (1-D, 2-D), Character arrays and Strings.

UNIT-III:

Basic Algorithms: Searching (Linear and Binary), basic sorting algorithms (bubble, insertion and selection), Pre-Processor directives.

UNIT-IV:

Functions: (Including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference.

Recursion: Recursion, as a different way of solving programs. Example programs, such as finding factorial, GCD, Fibonacci series, Ackerman function.

UNIT-V:

Structures & Unions: Defining structures and array of structures, Unions, Typedef, Bit-fields

Pointers: idea of pointers, defining pointers, use of pointers in self-referential structures, notation of linked list (no implementation), dynamic memory allocation.

UNIT-VI:

File Handling: Basic concepts, text files and binary files, file input/output operations, Error Handling in Files, random access of files, command line arguments.

TEXT BOOKS:

1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall of India
2. Schaum's Outline of Programming with C, Byron Gottfried, McGraw-Hill

REFERENCES:

1. C: The Complete Reference, Herbert Schildt, IV Edition, McGraw-Hill
2. Let Us C, Yashvant Kanetkar, BPB Publications
3. Programming in ANSI C, E. Balaguruswamy, Tata McGraw-Hill

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B.Tech. I Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(A19HS1EN01) ENGLISH

COURSE OBJECTIVES:

- To enhance their vocabulary through the use of affixes/stem and learn technical vocabulary in specialist fields
- To read and comprehend different kinds of texts (tone, tenor, sound, sense, diction, etc. - sub-skills)
- To write clear, concise, and correct sentences and paragraphs to produce appropriate technical prose
- To recognize and practice use the rhetorical elements necessary for the successful practice of scientific and technical communication

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Use vocabulary contextually and effectively

CO-2: Employ reading skills to comprehend different kinds of texts.(tone, tenor, sound, sense, diction, etc. - sub-skills)

CO-3: Apply principles of critical thinking, problem solving, for clarity, conciseness and accuracy of expression in academic and professional communication

CO-4: Demonstrate improved competence in Standard Written English, including grammar, sentence and paragraph structure, coherence, and use this knowledge to accurately communicate technical information

CO-5: Employ the appropriate rhetorical patterns of discourse in technical and business contexts for scientific and technical communication

UNIT-I:

1.	Reading:	On the Conduct of Life by William Hazlitt
2.	Grammar:	Prepositions
3.	Vocabulary:	Word Formation (Affixation, Compounding, Conversion, Blending, Borrowing)
4.	Writing:	Punctuation, Clauses and Sentences
5.	Life Skills:	Values and Ethics; 'If' by Rudyard Kipling

UNIT-II:

1.	Reading:	The Brook by Alfred Tennyson
2.	Grammar:	Articles
3.	Vocabulary:	Word Formation- (Prefixes, Suffixes, Root Words)
4.	Writing:	Principles of Good Writing-Coherence, Cohesion
5.	Life Skills:	Self Improvement; How I Became a Public Speaker by G.B. Shaw

UNIT-III:

1.	Reading:	The Death Trap by Saki
2.	Grammar:	Noun-Pronoun Agreement; Subject-Verb Agreement
3.	Vocabulary:	Collocation
4.	Writing:	Transitional Devices & Paragraph Writing; Writing Process
5.	Life Skills:	Time Management; On Saving Time by Seneca

UNIT – IV:

1. Reading: Chindu Yellamma
2. Grammar: Misplaced Modifiers
3. Vocabulary: Synonyms and Antonyms
4. Writing: Writing a Summary
5. Life Skills: Innovation; Muhammad Yunus

UNTI-V:

1. Reading: Politics and the English Language by George Orwell
2. Grammar: Cliches, Redundancies
3. Vocabulary: Common Abbreviations
4. Writing: Cause and Effect Paragraphs
5. Life Skills: Motivation; The Dancer with a White Parasol by Ranjana Dave

UNIT-VI:

Organizational Patterns for writing

1. Patterns of Writing: Comparison and Contrast
2. Patterns of Writing: Classification Paragraph
3. Patterns of Writing: Problem-Solution Pattern of writing

TEXT BOOKS:

1. Language and Life: A Skills Approach, Orient Black Swan, 2018 ed

REFERENCES:

1. Technical Communication, Raman, Meenakshi and Sharma, Sangeeta, 3rd Edition, O U P, 2015
2. Communication Skills, Pushplata and Kumar Sanjay. O U P, 2015
3. Longman Dictionary of Common Errors, Turton N.D., and Heaton J.B, 1991
4. Practical English Usage, Swan, Michael. OUP, 1995
5. Remedial English Grammar, Wood, F.T. Macmillan Publications, 2007

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B.Tech. I Semester	**L**	**T/P/D**	**C**
	0	**2**	**1**

(A19BS2CH01) ENGINEERING CHEMISTRY LABORATORY

COURSE PRE-REQUISITES: Basic knowledge of Volumetric Analysis and Mathematics

COURSE OBJECTIVES:

- To practically learn the preparation of standard solutions and estimate hardness & chloride content so as to check its suitability for various purposes
- To determine the rate constant of a reaction and check the variation of concentrations with respect to time
- To measure properties like adsorption, absorption of light, conductance, viscosity, pH and surface tension
- To synthesize a polymer and to separate a mixture of organic compounds by Thin Layer Chromatographic (TLC) technique

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Record the amount of hardness and chloride content in water and interpret the significance of its presence in water

CO-2: Analyze the influence of variation of concentration with time on rate constant

CO-3: Report and predict the significance of properties like absorption of light, adsorption, conductance, viscosity, pH and surface tension

CO-4: Demonstrate the technique of Thin Layer Chromatographic (TLC) and preparation of a polymer

LIST OF EXPERIMENTS:

1. Estimation of hardness of water by complexometric method using EDTA.
2. Determination of chloride content in the given sample water using Argentometric method.
3. Determination of the rate constant of hydrolysis of ester.
4. Estimation of copper present in the given solution by colorimetric method.
5. Conductometric titration of Acid vs Base.
6. Determination of viscosity of sample oil by Redwood Viscometer-I.
7. Determination of pH of various sample solutions by pH meter.
8. Titration of Acid vs Base using pH metric method.
9. Determination of surface tension of a liquid by drop method using Stalagmometer.
10. Determination of R_f value of organic compounds in a mixture by Thin Layer Chromatography.
11. Synthesis of a Polymer-Bakelite/Nylon.
12. Verification of Freundlich/Langmuir isotherm for adsorption of acetic acid on charcoal.

TEXT BOOKS:

1. Laboratory Manual on Engineering Chemistry, S. K. Bhasin and Sudha Rani, Dhanpat Rai Publications

2. College Practical Chemistry, V. K. Ahluwalia, Sunitha Dhingra, Adargh Gulati, University Press Pvt. Ltd
3. Practical Chemistry, O. P. Pandey, D. N. Bajpai, and Dr. S. Giri, S. Chand Publications

REFERENCES:

1. Vogel's Text Book of Quantitative Chemical Analysis, G. N. Jeffery, J. Bassett, J. Mendham and R. C. Denny, Longmann, ELBS
2. Advanced Practical Physical Chemistry, J. D. Yadav, Goel Publishing House
3. Practical Physical Chemistry, B. D. Khosla, R. Chand and Sons

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B.Tech. I Semester	**L**	**T/P/D**	**C**
	0	**2**	**1**

(A19ES2CS01) PROGRAMMING THROUGH C LABORATORY

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:

- To gain a working knowledge of C programming to write modular, efficient and readable C programs by Identifying the structural elements and layout of C source code
- To declare and manipulate single and multi-dimensional arrays of the C data types and derived data types like structures, unions
- To use functions from the portable C library and to describe the techniques for creating program modules using functions and recursive functions
- To manipulate character strings in C programs. Utilize pointers to efficiently solve problems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Use various data types for a specified problem
CO-2: Design, implement, debug a given problem using appropriate language constructs
CO-3: Implement programs using modular approach, file I/O
CO-4: Solve a given problem using C language

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

WEEK 1:
Familiarization with programming environment.

WEEK 2:
Simple computational problems using arithmetic expressions.

WEEK 3:
Problems involving if-then-else structures.

WEEK 4:
Iterative problems, sum of series.

WEEK 5:
1D Array manipulation.

WEEK 6:
Matrix problems, string operations.

WEEK 7:
Simple functions.

WEEK 8 AND WEEK 9:
Programming for solving searching and sorting techniques.

WEEK 10:
Recursive functions.

WEEK 11:
Pointers and structures.

WEEK 12:
File operations.

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B.Tech. I Semester	**L**	**T/P/D**	**C**
	0	**2**	**1**

(A19HS2EN01) ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY

COURSE OBJECTIVES:

- To provide ample practice in LSRW skills and train the students in oral presentations, public speaking, role play and situational dialogue
- To provide practice in vocabulary usage, grammatical construction, structural patterns, and improve comprehension abilities in the students
- To train students to use neutral accent through phonetic sounds, symbols, stress and intonation
- To enable students to transfer information from verbal to graphic representation and vice versa
- To equip the learners to learn basic vocabulary of 3000 words (as identified in Oxford or Cambridge dictionary)

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Comprehend spoken and written discourse
CO-2: Speak fluently with neutral accent and exhibit interpersonal skills
CO-3: Write accurately, coherently and lucidly making appropriate use of words depending on context
CO-4: Introduce oneself to people and be able to speak extempore
CO-5: Learnt the basic vocabulary of 3000 words (as identified by oxford/Cambridge advanced learners dictionary)

UNIT-I:

1. Introduction of Self and others
2. Study & Referencing Skills

UNIT-II:

1. Role play-
   i) Expressing likes and dislikes;
   ii) Agreeing and disagreeing
   iii) Making requests (Using modals for polite requests)
   iv) Accepting and declining requests
2. Listening and note taking, Listening for details
3. Reading Skills – Skimming, Scanning, Intensive Reading and Extensive Reading

UNIT-III:

1. Extempore Speech: JAM
2. Accuracy in listening - Listening to discussion on specific issues
3. Pronunciation, Intonation, Stress and Rhythm

UNIT-IV:

1. Speaking Activity: Oral Presentation
2. Accuracy in listening- listening to discussion on specific issues
3. Reading Comprehension-Contextual Vocabulary

UNTI-V:

1. Speaking Activity: Book/Film Review
2. Reading Comprehension
3. Passive Voice-Constructing the impersonal passive

UNIT-VI:

1. Writing Skills: Information Transfer
2. Definition of a Technical Term
3. Description of a Mechanism/Process

REFERENCES:

1. Practical English Usage, Swan, Michael. 4th Edition OUP, 2017
2. Remedial English Grammar, F.T. Wood. BSC Publishers, 2014
3. Exercises in Spoken English, Parts. I-III. CIEFL, Hyderabad. Oxford University Press, 1997
4. Fowler's Modern English Usage, R.W. Burchfield OUP, Oxford, 2004

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B.Tech. I Semester	**L**	**T/P/D**	**C**
	1	**2**	**2**

(A19ES2ME01) WORKSHOP PRACTICES

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:

- To know the different popular manufacturing process
- To gain a good basic working knowledge required for the production of various engineering products
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field
- To identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Exposed to various types of manufacturing Process

CO-2: Fabricate/make components from wood, MS flat, GI Sheet etc. – hands on experience

CO-3: Exposed to manufacturing of machine components like fasteners, holes & threaded holes etc.

CO-4: Produce small devices / products /appliances by assembling different components

LECTURES & VIDEOS:

1. Manufacturing Methods - Casting, Forming, Machining, Joining, Advanced Manufacturing Methods
2. CNC Machining, Additive Manufacturing
3. Fitting Operations & Power Tools
4. Electrical & Electronics
5. Carpentry
6. Plastic Moulding, Glass Cutting
7. Welding (Arc Welding & Gas Welding), Brazing
8. Power Tools
9. Printed Circuit Boards

I. Carpentry

i. Cross lap joint
ii. Mortise & tenon joint

II. Fitting

i. Square fitting
ii. L-Fitting

III. Welding

i. Butt joint by arc welding
ii. Lap joint by arc welding

IV. Smithy

i. Making of Rectangular Tray from sheet metal.
ii. Making of U-shaped component by black smithy

V. Electrical & Electronics

i. Single lamp connection & Staircase connection
ii. Translation of any tested / designed and tested circuits on a PCB.

VI. Machine Shop

i. Step turning on lathe
ii. Drilling & threading

TEXT BOOKS:

1. Workshop Manual, P. Kannaiah and K. L. Narayana, 3rd Edition, Scitech, 2015
2. Elements of Workshop Technology Vol.1 & 2, S. K. Hajra Choudhury, A. K. Hajra Choudhury and Nirjhar Roy, 13th Edition, Media Promoters & Publishers Pvt. Ltd., 2010
3. Printed Circuit Boards - Design, Fabrication, Assembly and Testing, R. S. Khandpur, Tata McGraw-Hill Education, 2005

REFERENCES:

1. Manufacturing Engineering and Technology, Serope Kalpakjian, Steven R. Schmid, 4th Edition, Pearson Education India Edition, 2002
2. Manufacturing Technology-I, S. Gowri, P. Hariharan and A. Suresh Babu, Pearson Education, 2008
3. Processes and Materials of Manufacture, Roy A. Lindberg, 4th Edition, Prentice Hall India, 1998
4. Manufacturing Technology Vol-1 & 2, P. N. Rao, Tata McGraw-Hill House, 2017

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B.Tech. I Semester	**L**	**T/P/D**	**C**
	0	**2**	**1**

(A19PW4CS01) DESIGN SENSITISATION

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:

- To create awareness of design among students of engineering
- To teach a systematic approach to identifying and defining a problem before brainstorming for a solution
- To instill a sense of significance towards applying creativity to product and service design
- To motivate students to apply design thinking while implementing a project focusing on local or global societal problems

COURSE OUTCOMES: After completion of this course, the student should be able to

CO-1: Identify design principles from an engineering perspective
CO-2: Cultivate sensitivity towards design aspects of Activities, Environments, Interactions, Objects, and Users (A-E-I-O-U) in daily life
CO-3: Validate problem statements through user empathisation with societal and environmental consciousness
CO-4: Devise visual design and documentation to communicate more effectively
CO-5: Develop project management skills in a multidisciplinary environment

STUDENTS' RESPONSIBILITIES:

1. Forming diverse teams of 3–5 members each to work collaboratively throughout the semester.
2. Proactively engaging to observe the objects and interactions in their daily life and society from a design perspective.
3. Identifying general societal and social problems that may be effectively addressed using design thinking principles
4. Presenting and reporting the tasks to the concerned faculty members using their creative communication and people skills.

MODULE-1: Design Overview and Motivation

Design is Everywhere – Various perspectives including history; Design Vocabulary; Design in Indian Context; Art and Design; Importance of Design in Career

MODULE-2: Understanding Design

Design Engineering vs. Engineering Design; Good and Bad Design — Case Studies
Introduction to the Design Double Diamond: Discover-Define-Develop-Deliver; Importance of user-centricity for design

MODULE-3: Doing Design: Discover Phase

Looking for problems: SDGs; Identifying Stakeholders and Defining User Personas; User Empathisation and Tools; Data collection from users and for users: Surveys, Questionnaires, Statistics, Interactions

Need Analysis: Types of Users, Types of Needs; Market Size; Value Proposition to the Users; Identifying Addressable Needs and Touchpoints; Data Validation; Structuring Need Statements

MODULE-4: Designing Customer Service Experience

Enhancing Customer Experience in Services through Innovation and Design Thinking; Service Development Process and Case Studies; Service Experience Cycle and Case Studies

MODULE-5: Communication Skills for Design

Communicating using various media to express an idea in print, electronic, mobile, web, and social media: Visuals, Text, Voice and Audio, Infographics
General Guidelines for a Good Presentation: Target Audience, Slideshow Templates, Appropriate Visual Elements and Aesthetics, Typography, Presentation Styles, Guidelines
General Guidelines for a Good Report: Documentation Classification, Standards, Styles, and Templates

MODULE-6: Sustainable Design Approaches

Concern for Environment and Sustainability in Design, Case Studies to understand good Design For Environment (DFE) Decisions; Design Considerations in the five stages of the Product Life Cycle

TEXT BOOKS:

1. Change by Design, Tim Brown, Harper Business, 2012 (ISBN: 978-0062337382)
2. The Design of Everyday Things, Donald A. Norman, MIT Press, 2013 (ISBN: 978-0262525671)
3. Complete Design Thinking Guide for Successful Professionals, Daniel Ling, CreateSpace Independent Publishing, 2015 (ISBN: 978-1514202739)

REFERENCES:

1. Design As Art, Bruno Munari, Penguin UK, 2009 (ISBN: 978-0141035819)
2. The Art of Innovation, HarperCollins Business, Tom Kelly, Jonathan Littman, 2002 (ISBN: 978-0007102938)
3. Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Thomas Lockwood, Allworth Press, 2009 (ISBN: 978-1581156683)
4. Responsible Innovation: Ethics, Safety and Technology,Joost Groot Kromelink, 2nd ed., TU Delft, Faculty of Technology, Policy and Management, 2019 (e-Book ISBN: 978-9463662024)
5. Design Thinking for Startups: A Handbook for Readers and Workbook for Practitioners, Jimmy Jain, Notion Press, 2018 (ISBN: 978-1642495034)

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(A19BS1MT04) LINEAR ALGEBRA AND ADVANCED CALCULUS

COURSE PRE-REQUISITES: Matrices, Differentiation, Integration

COURSE OBJECTIVES:
- To learn rank of the matrix and its application to consistency of system of linear equations
- To learn Eigen Values and Eigen Vectors
- To learn nature of Quadratic forms
- To learn evaluation of multiple integrals and their applications
- To learn basic properties of vector point function and their applications to line, surface and volume integrals

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Compute the rank of a matrix and analyze the solution of a system of linear equations
CO-2: Calculate Eigen values and Eigen vectors
CO-3: Reduce the quadratic form to its canonical form
CO-4: Evaluate areas & volumes using multiple integrals
CO-5: Transform line integral to surface and surface to volume integrals

UNIT-I:
Matrices: Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; Consistency of Homogeneous and Non-Homogeneous equations, LU Decomposition method.

UNIT-II:
Eigen Values and Eigen Vectors: Eigen values and Eigen vectors and their properties, Diagonalization of matrices; Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem.

UNIT-III:
Real & Complex Matrices, Quadratic forms: Types of Matrices, Symmetric; Hermitian; Skew-Symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices and its properties; Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical form using Linear Transformation and Orthogonal Transformations.

UNIT-IV:
Multiple Integrals: Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form), Change of variables (Cartesian to polar); Evaluation of Triple Integrals, Change of variables (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

UNIT-V:

Vector Differential Calculus: Vector point functions and scalar point functions. Gradient and Directional derivatives, Divergence and Solenoidal vectors, Curl and Irrotational vectors, Scalar potential functions, Tangent plane and normal line. Vector Identities (without proofs).

UNIT-VI:

Vector Integral Calculus: Line, Surface and Volume Integrals and their problems. Green's theorem in a plane, Gauss-Divergence theorem and Stokes theorem (without proofs) and their problems.

TEXT BOOKS:

1. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, 5th Edition, Narosa Publishing House, 2016
2. Higher Engineering Mathematics, B. V. Ramana, 33rd Reprint, McGraw Hill Education (India) private Limited, 2018
3. Engineering Mathematics, N. P. Bali, 4th Edition, Laxmi Publications (P) Ltd., 2001

REFERENCES:

1. Linear Algebra and its Applications, Gilbert Strang, 4th Edition, Cengage Learning, 2014
2. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley, 2011
3. Linear Algebra: A Modern Introduction, D. Poole, 4th Edition, Cengage Learning, 2017

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B.Tech. II Semester	**L**	**T/P/D**	**C**
	3	**1**	**4**

(A19BS1MT05) STATISTICAL METHODS FOR DATA ANALYSIS

COURSE OBJECTIVES:

- To provide insights about the basic roles of various statistical methods in building computer applications
- To develop a greater understanding of the importance of Data Visualization techniques
- To develop problem-solving skills
- To make inferences about the population parameters using sample data
- To provide an understanding on the importance and techniques of predicting a relationship between the two sets of data and determine the goodness of fitted model

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Analyze an extremely large data set and perform exploratory data analysis to extract meaningful insights

CO-2: Develop various visualizations of the data in hand and communicate results of analysis effectively (visually and verbally)

CO-3: Examine a real-world problem and solve the same with the knowledge gained from various distributions study

CO-4: Use and fit a linear regression model to data and use it for prediction

CO-5: Fit a polynomial regression model to data and use it for prediction

UNIT-I:

Introduction to Statistics: Definition of Statistics. Basic objectives. Applications in various branches of science with examples. Collection of Data: Internal and external data, Primary and secondary Data. Population and sample, Representative sample**.**

UNIT-II:

Descriptive Statistics: Classification and tabulation of univariate data, graphical representation, Frequency curves. Descriptive measures - central tendency and dispersion. Bivariate data. Summarization, marginal and conditional frequency distribution.

UNIT-III:

Introduction to R: Introduction, Installing R and Data Types in R, Programming using R: Operators, Conditional Statements, Looping, Scripts, Function creation.

UNIT-IV:

Lists and Data Frames: Introduction, Creating list, List operations, Recursive list, creating a data frame, operations on data frame, Import-Export and Data Visualization.

UNIT-V:

Linear Regression: Introduction, the Regression Model, Estimation of parameters of β_0 and β_1, Estimation of σ^2 and the partitioning of sums of squares, inferences for Regression, correlation, Regression Diagnostics.

UNIT-VI:

Polynomial Regression: Non-linear least square method, Estimation of coefficients, Regression of second-degree polynomial, methods of estimation and inference in non-linear models.

TEXT BOOKS:

1. Introduction to Probability and Statistics for Engineers and Scientists, Sheldon M. Ross, 4th Edition, Academic Press, 2009
2. R for Beginners, Sandip Rakshit, 1st Edition, McGraw Hill Education, 2017
3. Statistical Methods, Rudolf J. Freund, Donna Mohr, William J. Wilson, 3rd Edition, 2010

REFERENCES:

1. R-The Statistical Programming Language, Dr. Mark Gardner, Wiley India Pvt. Ltd, 2013
2. Introduction to the Theory of Statistics, A. M. Mood, F. A. Graybill and D. C. Boes, 3rd Edition, McGraw Hill Education, 2017
3. Introduction of Probability Models, S. M. Ross, 11th Edition, Academic Press, N.Y., 2014
4. Statistical Methods, S. P. Gupta, 42nd Revised Edition, Sultan Chand & Sons, 2012

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B.Tech. II Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(A19BS1PH02) ENGINEERING PHYSICS

COURSE PRE-REQUISITES: 10+2 Physics

COURSE OBJECTIVES:
- To analyze various phenomena of light- Interference and diffraction
- To apply the basic principles of LASER to various laser systems and optical fibers
- To explain the basic concepts in quantum physics required to deal with behavior of particle
- To interpret behavior of an electron in a periodic potential in crystal
- To explain various types of semiconductors and semiconductor materials

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Extend the importance of Interference in thin films, Fraunhofer diffraction
CO-2: Explain the lasing action of various laser sources and optical fiber materials
CO-3: Apply quantum mechanics to behavior of a particle
CO-4: Classify solids based on band gap
CO-5: Analyse formation of PN junction and importance of semiconductor materials

UNIT-I:
Wave Optics: Superposition Principle, Coherence, Interference of light by wave front splitting and amplitude splitting; Interference in thin films by reflection, Newton's rings experiment by reflection- Calculation of wavelength, Farunhofer diffraction (qualitative treatment) from a single slit, Double slit diffraction, Diffraction grating and a circular aperture .

UNIT-II:
Lasers: Introduction, Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Meta Stable State, Population Inversion, Lasing Action, Einstein's Coefficients and relation between them, Ruby Laser, Helium-Neon Laser, Semiconductor Laser, Application of Lasers in Science, Engineering and Medicine, Propagation of LASER through Optical Fiber- Total Internal Reflection.

UNIT-III:
Principles of Quantum Mechanics: Introduction to Quantum Mechanics, Waves and particles, de Broglie hypothesis, Matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle, Schrodinger Time independent Wave Equation, Physical significance of wave function, Particle in one dimensional infinite potential box.

UNIT-IV:
Band Theory of Solids: Free electron theory of metals (Drude and Lorentz theory), Electrical conductivity and Ohm's law, Bloch's theorem for particles in a periodic potential, Kronig-Penney model (Qualitative only), E-K diagram and origin of energy bands. Types of electronic materials: metals, semiconductors, and insulators, Effective mass of an electron.

UNIT-V:

Semiconductors: Intrinsic semiconductors- Carrier concentration, dependence of Fermi level on carrier-concentration and temperature, Extrinsic Semiconductors (Qualitative), Continuity equation-Carrier generation and recombination, Carrier transport: diffusion and drift currents, Hall Effect, Hall Experiment, Measurement of Hall mobility, Resistivity, carrier density using Hall effect.

UNIT-VI:

Engineered Semiconductor Materials: Direct and Indirect band gap semiconductors, Formation of p -n junction, Energy diagram of diode, V-I characteristics of p-n junction diode, Working principle of LED, Working principle and V-I characteristics of Solar Cell – Parameters (short circuit current and open circuit voltage) extraction from I-V characteristics.

TEXT BOOKS:

1. Physics, Halliday, Resnick and Krane, 5th Edition, John Wiley & Sons, 2014
2. Engineering Physics, R. K. Gaur and S. L. Gupta, 8th Edition, Dhanpat Rai and Sons, 2011
3. Introduction to Semiconductor Materials and Devices, M. S. Tyagi, 3rd Edition, Wiley India, 2014

REFERENCES:

1. A Textbook of Engineering Physics, M. N. Avadhanulu and P. G. Kshirsagar, 4th Edition, S. Chand, 2014
2. Optics, A. Ghatak, 2nd Edition, McGraw Hill Education, 2014
3. Introduction to Solid State Physics, Charles Kittel, 8th Edition, John Wiley & Sons, 2014
4. Engineering Physics, B. K. Pandey and S. Chaturvedi, 5th Edition, Cengage Learning, 2015
5. Concepts of Modern Physics, Arthur Beiser, 6th Edition, McGraw Hill Inc, 2016

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B.Tech. II Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(A19ES1EE01) BASICS OF ELECTRICAL ENERGY FOR ENGINEERS

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:

- To understand the use of Electrical Energy in different engineering fields
- To analyze electrical circuits using different network reduction techniques
- To know the working & construction of electrical machines, converters, electronic devices and components
- To identify different LT electrical installation components and know the safety measures

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Appreciate the role of Electrical Energy in various engineering branches and to use different electronic components for system modelling

CO-2: Get familiarized with different electrical and electronic components and to find their suitability in the relevant fields of engineering

CO-3: Find the compatibility of Electrical Machines and Power Converters to different systems with required back ground knowledge

CO-4: Know about Low Voltage Electrical Installation components and the safety measures

UNIT-I:

Introduction to Electrical Energy and DC Circuits: The role of Electrical Energy in modern life and various engineering branches-Overview of electrical energy generation, Transmission, Distribution and Utilization.

Circuit Concept – Types of Elements-R-L-C parameters – Voltage and Current sources – Independent and dependent sources-Source transformation- Kirchhoff's laws – network reduction techniques – series, parallel, series parallel, star/delta transformations, Superposition theorem, Time Response of RL and RC circuits.

UNIT-II:

Steady State AC Circuits: Representation of sinusoidal waveforms, average and RMS values, phasor representation, Analysis of single-phase AC circuits consisting of R, L, C, series RL, RC, RLC combinations, real power, reactive power, apparent power, power factor - Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III:

Transformers and DC Machines: Role of Transformers in the fields of engineering, Transformer principle, Ideal and Practical Transformers, Equivalent circuit, Regulation and Efficiency,

Basic Construction of DC machine, DC generator principle, Emf equation, DC motor principle, back Emf, Load characteristics of separately excited DC motor, speed control of separately excited DC motor.

UNIT-IV:

Alternating Current Machines: Three phase induction motor, types, principle, torque-Slip characteristics, Working principle of Synchronous generator, Stepper motor-Applications.

Electrical Installations and Batteries: Basic layout of wiring in domestic installations, types of wiring systems, Switch Fuse Unit (SFU), MCB and MCCB-Need and types of Earthing- Classification of Batteries, working and Electrical Characteristics of Lead-Acid battery - Elementary calculations of energy consumption, electrical safety precautions.

UNIT-V:

Semi-Conductor Devices: P-N junction diode, symbol, V-I Characteristics, Diode Applications: Half wave, Full wave rectifiers. Bipolar Junction Transistor construction (NPN and PNP transistors), Biasing types (over view), types of configuration (CB, CE and CC), Transistor as an amplifier.

Power Converters: Basics of AC to DC, DC to AC and DC to DC power converters - their necessity and applications in engineering (block diagram approach), UPS block diagram.

UNIT-VI:

Op-Amps, Transducers and Data Acquisition: Ideal operational amplifier, commercial IC 741 operational amplifier-Remote control and monitoring: Transducers used for sensing strain, temperature, acceleration and light- A/D and D/A converters, Data Acquisition and Control.

TEXT BOOKS:

1. Basic Electrical Engineering, D. C. Kulshreshtha, 2nd Edition, TMH, Revised 2019
2. Basic Electrical Engineering, P. Ramana, M. Suryakalavathi, G. T. Chandra Sekhar, 1st Edition, S. Chand Technical Publications, 2018
3. Electronic Devices and Circuits, S. Salivahanan and N Suresh Kumar, 3rd Edition TMH, Revised 2019

REFERENCES:

1. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
2. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989
3. Electrical and Electronics Measurements and Instrumentation, A. K. Sawhney, 3rd Edition, Dhanpat Rai & Co 1983
4. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, 3rd Edition, Tata McGraw Hill, 2010
5. Engineering Circuit Analysis, William Hayt and Jack E. Kemmerly, 8th Edition, McGraw Hill, 2013

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B.Tech. II Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(A19ES1IT01) DATA STRUCTURES

COURSE OBJECTIVES:
- To introduce various searching and sorting techniques
- To demonstrate operations of linear and non-linear data structure
- To develop an application using suitable data structure

COURSE OUTCOMES: After completion of course, the student should be able to
CO-1: Understand basic concepts of data structures and analyse computation complexity
CO-2: Apply linear data structures to implement various sorting, searching techniques
CO-3: Apply various operations of linear and non-linear data structures
CO-4: Analyze appropriate and efficient data structure to implement a given problem

UNIT-I:
Introduction to Data Structures: Abstract Data Types (ADT), Asymptotic Notations. Time- Space trade off. Searching: Linear Search and Binary Search Techniques and their time complexities.
Linear Data Structures: Stacks - ADT Stack and its operations: Applications of Stacks: Recursion, Expression Conversion and evaluation.

UNIT-II:
Linear Data Structures: Queues - ADT queue, Types of Queue: Linear Queue, Circular Queue, Double ended queue, operations on each types of Queues

UNIT-III:
Linked Lists: Singly linked lists: Representation in memory, Operations: Traversing, Searching, insertion, Deletion from linked list; Linked representation of Stack and Queue.
Doubly linked List, Circular Linked Lists: All operations

UNIT-IV:
Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Binary Search Tree, AVL Tree; Tree Operations on each of the trees and their algorithms with time complexities. **B-Trees**: Definition, Operations.

UNIT-V:
Priority Queue: Definition, Operations and their time complexities.
Sorting: Objective and properties of different sorting algorithms: Quick Sort, Heap Sort, Merge Sort; Radix sort

UNIT-VI:
Dictionaries: Definition, ADT, Linear List representation, operations- insertion, deletion and searching, Hash Table representation, Hash function-Division Method, Collision

Resolution Techniques-Separate Chaining, open addressing-linear probing, quadratic probing, double hashing, Rehashing.
Graphs: Graph terminology –Representation of graphs –Graph Traversal: BFS (breadth first search) –DFS (depth first search) –Minimum Spanning Tree.

TEXT BOOKS:
1. Fundamental of Data Structure, Horowitz and Sahani, Galgotia Publication
2. Data Structure, Lipschutz, Schaum Series

REFERENCES:
1. Algorithms, Data Structures, and Problem Solving with C++, Illustrated Edition, Mark Allen Weiss, Addison-Wesley Publishing Company
2. How to Solve it by Computer, 2nd Impression, R. G. Dromey, Pearson Education

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B.Tech. II Semester	**L**	**T/P/D**	**C**
	0	**2**	**1**

(A19BS2PH02) ENGINEERING PHYSICS LABORATORY

COURSE OBJECTIVES:

- To practically learn interaction of light with matter through physical phenomena like interference, diffraction and dispersion
- To understand the periodic motion and formation of standing waves and know the characteristics of the capacitors and resistors
- To study semiconductor devices
- To experience resonance phenomena
- To compare the experimental results with the classroom learning

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Demonstrate the optical phenomena with formation of Newton Rings, pure spectrum through prism and to evaluate grating parameters
CO-2: Illustrate charging & discharging of a capacitor
CO-3: Asses the various characteristics of semiconductor devices
CO-4: Realize tangent law of magnetism and resonance phenomenon in Melde's and Sonometer experiment
CO-5: Correlate the experimental results with the classroom learning

LIST OF EXPERIMENTS:

1. **Spectrometer:** To determine the dispersive power of given prism using spectrometer
2. **Diffraction Grating:** To determine the wavelength of given laser and grating parameters
3. **Diffraction at Single Slit:** To determine the width of given wire.
4. **Newton's Rings Experiment:** To determine the radius of curvature of given plano convex lens
5. **RC Circuit:** To determine the time constant of RC circuit
6. **Optical fiber:** To determine Numerical aperture and Acceptance angle of a given optical fiber cable.
7. **Energy band gap of Semiconductor:** To determine Energy band gap of a semiconductor diode
8. **Light Emitting Diode:** To study the V-I characteristics of LED
9. **Solar Cell:** To study the V-I characteristics of Solar cell
10. **AC frequency by Sonometer**: To measure frequency of A.C mains
11. **Stewart Gee's experiment:** To verify Biot - Savart's law
12. **Melde's experiment:** To determine the frequency of electrical vibrator using resonance phenomenon

REFERENCES:

1. Engineering Physics Laboratory Manual/Observation, Faculty of Physics, VNRVJIET
2. Laboratory Manual of Engineering Physics, Y. Aparna & K. Venkateswara Rao, VGS Publications

3. Engineering Physics Practicals, B. Srinivasa Rao, Keshava Vamsi Krishna and K. S. Rudramamba, Second Edition, Laxmi Publications Pvt. Ltd., University Science Press

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B.Tech. II Semester	**L**	**T/P/D**	**C**
	0	**2**	**1**

(A19ES2EE01) BASIC ELECTRICAL ENGINEERING LABORATORY

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:
- To understand the construction of electrical equipment and operation of electronic devices
- To recognize different circuit reduction techniques
- To practice the techniques to control and assess electrical machines
- To know different electric safety measures

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify different parts of electrical equipment and appreciate their purpose
CO-2: Apply different network reduction techniques to solve and analyze electrical circuits
CO-3: Realize the compatibility of electrical machines in different engineering fields
CO-4: Control different electrical machines and evaluate their performance
CO-5: Appreciate the operation of various electronic devices

PART – A
1. Demonstration of safety precautions, measuring instruments, electrical and electronic components.
2. Identification of Ratings of resistors using color codes and Electrical circuit bread board practice
3. Demonstration of cut-out sections of DC motor, Induction Motor and Alternator.
4. Demonstration of LT switchgear components.
5. Demonstration of various converters and UPS.
6. Demonstration and study of step response using Automatic Data Acquisition.

PART – B
1. Verification of KVL & KCL.
2. Verification of superposition theorem.
3. Time response of RC and RL circuits.
4. Analysis of series RL, RC and RLC circuits.
5. Load test on 1- φ transformer.
6. Speed control of DC shunt motor.
7. Torque speed characteristics of separately excited DC motor.
8. Brake test on 3- φ induction motor.
9. Control of synchronous generator voltage through its field excitation.
10. Constant voltage and constant current charging of batteries.
11. P-N diode characteristics and full wave rectifier.
12. Transistor CE characteristics (Input and Output)

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B.Tech. II Semester	**L**	**T/P/D**	**C**
	0	**2**	**1**

(A19ES2IT01) DATA STRUCTURES LABORATORY

COURSE OBJECTIVES:
- To impart the basic concepts of data structures and algorithms
- To learn the concepts about searching and sorting
- To understand the basic concepts about stacks, queues, lists
- To know the concepts of trees and graphs

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Implement all operations on different linear data structures
CO-2: Develop all operations on different non-linear data structures
CO-3: Apply various searching and sorting techniques
CO-4: Use appropriate data structure for any given problem

LIST OF EXPERIMENTS:

WEEK 1:
Implement Stack using Array

WEEK 2:
a) Program to convert infix expression to postfix expression.
b) Program to postfix evaluation.

WEEK 3:
Implement the following
a) Linear Queue using Array b) Circular Queue using Array

WEEK 4:
Implement Dequeue using Array

WEEK 5:
Implement Single Linked List operations

WEEK 6:
Implement following
a) Circular Linked List Operations b) Double Linked List Operations

WEEK 7:
Implement following
a) Stack using Linked List b) Queue using Linked List

WEEK 8:
Implement BST operations

WEEK 9:
Implement B Tree operations -

WEEK 10:
Implement following sorting techniques
a) Merge b) Heap c) Radix d) Quick

WEEK 11:
Implement following Hashing Techniques
a) Separate Chaining b) Linear Probing

WEEK 12:
Implement following Graph traversals
a) BFS b) DFS

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B.Tech. II Semester	**L**	**T/P/D**	**C**
	0	**4**	**2**

(A19ES3ME02) ENGINEERING DRAWING

COURSE PRE-REQUISITES: None

COURSE OBJECTIVES:

- To know the conventions used in Engineering Drawing and comprehend the tools to be used in AutoCAD software
- To understand the importance of engineering scales and curves
- To learn to use the orthographic projections for points, lines, planes and solids in different positions
- To understand the development of sections and isometric projections
- To create simple solid models of various domain applications

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply the concepts of engineering curves in construction using AutoCAD
CO-2: Solve the problem of projections of points, lines, planes and solids in different positions using AutoCAD
CO-3: Solve the problems of Projections of solids and its positions using AutoCAD
CO-4: Solve the problems on Isometric Projections and its conversions using AutoCAD

Introduction to AutoCAD Software:
The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.

UNIT-I:
Introduction to Engineering Drawing: Principles of Engineering drawing and their significance, Conventions, Drawing Instruments
Engineering Curves: Construction of Ellipse, Parabola and Hyperbola – General and Special methods; Cycloidal curves- Epicycloids and Hypocycloids.

UNIT-II:
Orthographic Projections, Projections of Points & Straight Lines: Principles of Orthographic Projections – Conventions; Projections of Points in all positions; Projections of lines inclined to both the planes

UNIT-III:
Projections of Planes: Projections of Planes- Surface Inclined to both the Planes

UNIT-IV:
Projections of Regular Solids: Projections of Regular Solids inclined to both the Planes – Prisms, Pyramids, Cylinder and Cone

UNIT-V:
Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric

Views, Conventions; Isometric Views of lines, Planes, Simple and Compound Solids

UNIT-VI:
Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions
Introduction to Solid Modelling: Creation of simple solid models relevant to the domain.

TEXT BOOKS:

1. Engineering Drawing, N. D. Bhatt, 53rd Edition, Charotar Publishing House, 2016
2. Textbook on Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers, 2010
3. Engineering Drawing and Computer Graphics, M. B. Shah & B. C. Rana, Pearson Education, 2010

REFERENCES:

1. Mastering AutoCAD 2019 and AutoCAD LT 2019, George Omura and Brian C. Benton (Auto CAD 2019), 1st Edition, John Wiley & Sons, Indianapolis, Indiana
2. AutoCAD Software Theory and User Manuals