

**VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD**  
**B.TECH. I YEAR**  
**(MECHANICAL ENGINEERING)**

**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
A19BS1PH01	Applied Physics	3	0	0	3	3
A19ES1CS01	Programming through C	3	0	0	3	3
A19ES1EE02	Basic Electrical and Electronics Engineering	3	0	0	3	3
A19BS2PH01	Applied Physics Laboratory	0	0	2	2	1
A19ES2CS01	Programming through C Laboratory	0	0	2	2	1
A19ES2EE02	Basic Electrical and Electronics Engineering Laboratory	0	0	2	2	1
A19ES3ME01	Engineering Graphics	0	0	6	6	3
A19PW4ME01	Design Sensitization	0	0	2	2	1
<b>Total</b>		<b>12</b>	<b>1</b>	<b>14</b>	<b>27</b>	<b>20</b>
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
A19BS1CH01	Engineering Chemistry	3	0	0	3	3
A19HS1EN01	English	3	0	0	3	3
A19ES1CS02	Data Structures through C	3	0	0	3	3
A19ES1ME01	Engineering Mechanics	3	0	0	3	3
A19BS2CH01	Engineering Chemistry Laboratory	0	0	2	2	1
A19HS2EN01	English Language Communication Skills Laboratory	0	0	2	2	1
A19ES2CS02	Data Structures through C Laboratory	0	0	2	2	1
A19ES2ME01	Workshop Practices	1	0	2	3	2
<b>Total</b>		<b>16</b>	<b>0</b>	<b>8</b>	<b>24</b>	<b>20</b>

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) and its applications, Solving linear differential equations using Laplace transform.

**TEXT BOOKS:**

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

**REFERENCES:**

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

B.Tech. I Semester

L	T/P/D	C
3	0	3

**(A19BS1PH01) APPLIED PHYSICS**

**COURSE PRE-REQUISITES:** 10+2 Physics

**COURSE OBJECTIVES:**

- To apply various phenomena of light- Interference and Diffraction
- To apply the basic principles of lasers for various laser systems and optical fibers
- To interpret basic structures
- To analyze polarization mechanisms in dielectrics
- To discuss the magnetic and superconducting properties of materials

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

**CO-1:** Extend the importance of Interference in thin films and Fraunhofer diffraction

**CO-2:** Explain the lasing action of various laser sources and describe propagation of light through optical fiber

**CO-3:** Identify different types of crystals and importance of X-ray studies in crystals

**CO-4:** Analyze the frequency dependence of different polarizabilities

**CO-5:** Illustrate applications of magnetic materials and superconductors

**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, Fraunhofer 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.

**UNIT-III:**

**Optical Fibers:** Principle of optical fiber (Total Internal Reflection) – Acceptance angle and acceptance cone – Numerical aperture –Types of fibers and refractive index profiles – Qualitative analysis of attenuation in optical fibers –Application of optical fibers: Optical fiber communication system.

**UNIT-IV:**

**Crystal Structures and XRD:** Space lattice, Unit cell, Lattice parameters, Crystal systems, Bravais lattice, Atomic radius, Co-ordination number, Structures and Packing fractions of Simple Cubic, Body Centered Cubic, Face Centered Cubic, Miller Indices for Crystal planes and directions, Inter planar spacing of orthogonal crystal systems, Diffraction of X-rays by crystal planes and Bragg's law, Powder method, Applications of XRD.

**UNIT-V:**

**Dielectric Properties:** Electric dipole, Dipole moment, Dielectric constant, Electronic, Ionic polarizations and calculation of their polarizabilities, Orientation Polarization (qualitative), Frequency dependence of Polarization- Internal fields, Claussius – Mossotti equation, Piezo and Ferro electricity.

**UNIT-VI:**

**Magnetic Materials and Superconductors:** Permeability, Field intensity, magnetic field induction, Magnetization and Magnetic susceptibility – Origin of magnetic moment, Bohr magneton – Classification of magnetic materials (Dia, Para and Ferro)- Domain theory of ferromagnetism, Hysteresis curve – Soft and Hard magnetic materials – Ferrites and their applications, Superconductivity phenomenon, Meissner effect, Critical fields and Persistent currents, Type I and Type II superconductors, Applications of Superconductors.

**TEXT BOOKS:**

1. Physics, Resnick, Halliday and Krane, 5<sup>th</sup> Edition, Wiley, 2014
2. Engineering Physics, R. K. Gaur and S. L. Gupta, Dhanpat Rai Publications, 2012
3. Engineering Physics, B. K. Pandey and S. Chaturvedi, Cengage Learning, 2014

**REFERENCES:**

1. A Textbook of Engineering Physics, M. N. Avadhanulu and P. G. Kshirsagar, S. Chand Publishers, 2010
2. Optics, A. Ghatak, 6<sup>th</sup> Edition, McGraw Hill Education, 2017
3. Applied Physics, P. K. Mittal, 2<sup>nd</sup> Edition, IK International Publishing House Pvt. Ltd, 2008
4. Introduction to Solid State Physics, Charles Kittel, 8<sup>th</sup> Edition, Wiley, 2012
5. Engineering Physics, P. K. Palanisamy, 3<sup>rd</sup> Edition, Scitech, 2013

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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, 4<sup>th</sup> Edition, McGraw-Hill
2. Let Us C, Yashvant Kanetkar, BPB Publications
3. Programming in ANSI C, E. Balaguruswamy, Tata McGraw-Hill

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

L	T/P/D	C
3	0	3

### (A19ES1EE02) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

**COURSE PRE-REQUISITES:** None

**COURSE OBJECTIVES:**

- To get awareness of using mechanical energy for electrical energy generation
- To understand the basic operation of circuits used for automobile control
- To know about working of different electrical machines used for propulsion of vehicles
- To know the basic operation of diode and transistor

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

**CO-1:** Analyze the electro-mechanical energy conversion using electrical machines

**CO-2:** Analyze the different electrical machines used for propulsion of vehicles

**CO-3:** Analyze different control circuits which involve different circuits' parameters

**CO-4:** Analyze the operation of transistor and CRT

**UNIT-I:**

**Electrical Circuits:** Circuit Concept R-L-C Parameters-Ohm's Law - Kirchhoff's Laws - Series - Parallel resistive networks - Star/delta transformations. AC Circuits: Average value, rms value, form factor of sinusoidal function, R-L, R-C and R-L-C circuits- Concept of Power factor, Real and reactive powers simple problems.

**UNIT-II:**

**DC Machines:** Principle of operation of DC Generator – emf equation - types – Principle of operation of DC Motor - DC motor types –torque equation – Three point starter -Swinburne's test, applications.

**UNIT-III:**

**AC Machines-I:** Transformers: Principle of operation of single phase transformer–emf equation–losses– OC and SC tests - efficiency and regulation (simple Problems)

**UNIT-IV:**

**AC Machines-II & Instruments:** Principle of operation of alternator – regulation by synchronous impedance method –Principle of operation of induction motor – slip – torque characteristics – applications Instruments: Principle and construction of permanent magnet moving coil and moving iron instruments.

**UNIT-V:**

**Diode and it's Characteristics:** P-N junction diode, symbol, V-I Characteristics, Diode Applications: Rectifiers – Half wave Full wave and Bridge rectifiers (simple Problems)

**UNIT-VI:**

**Transistors:** PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications. Cathode Ray Oscilloscope: Principles of CRT



(Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements

**TEXT BOOKS:**

1. Electronic Devices and Circuits, David A. Bell, 5<sup>th</sup> Edition, Oxford University Press, 2008
2. Introduction to Electrical Engineering, M. S. Naidu and S. Kamakshaiah, TMH Publications, 2017

**REFERENCES:**

1. Principles of Electrical and Electronics Engineering, V. K. Mehta, S. Chand & Co, 2010
2. Basic Electrical Engineering, Kothari and Nagarath, 4<sup>th</sup> Edition, TMH Publications, 2019
3. Basic Electrical Engineering, T. K. Nagasarkar and M. S. Sukhija, 3<sup>rd</sup> Edition, Oxford University Press, 2017
4. Electrical & Electronics Technology, E. Hughes, 10<sup>th</sup> Edition, Pearson, 2010

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

L	T/P/D	C
0	2	1

### (A19BS2PH01) APPLIED 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 experience the mechanical oscillations and resonance phenomena
- To verify Biot –Savart law
- To compare the experimental results with the class room 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 periodic motion by measuring rigidity modulus of a material and also discharging of a capacitor

**CO-3:** Differentiate resonance phenomenon in Melde's experiment and Sonometer experiment

**CO-4:** Realize tangent law of magnetism

**CO-5:** Correlate the experimental results with the class room 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. **Optical fiber:** Numerical aperture and acceptance angle of an optical fiber.
6. **Torsional pendulum:** To determine the rigidity modulus of a given wire
7. **Melde's experiment:** To determine the frequency of electrical vibrator using resonance phenomenon
8. **AC frequency by Sonometer:** To measure frequency of A.C mains
9. **RC Circuit:** To determine the time constant of RC circuit
10. **Stewart Gee's experiment:** To verify Biot - Savart's law
11. **Solar Cell:** To study the V-I characteristics of Solar cell
12. **Light Emitting Diode:** To study the V-I characteristics of LED

#### REFERENCES:

1. Engineering Physics, Laboratory Manual/Observation, Faculty of Physics, VNRVJIET
2. Laboratory Manual of Engineering Physics by 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

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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.]**

**WEEK1:**

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.

**VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**B.Tech. I Semester**

<b>L</b>	<b>T/P/D</b>	<b>C</b>
<b>0</b>	<b>2</b>	<b>1</b>

**(A19ES2EE02) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY**

**COURSE OBJECTIVES:**

- To understand the performance of DC shunt machine
- To understand the performance of AC machines
- To understand the performance and efficiency / regulation of electrical machines are determined experimentally
- To understand the operation of solid state devices like diode, transistor and SCR

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

**CO-1:** Find the application of electrical machines with the experimental determination of the performance of the machines

**CO-2:** Find the application of Induction motor with the experimental determination of the performance of the machines

**CO-3:** Find the application of single phase transformer

**CO-4:** Identify the characteristics of all solid state devices

**SECTION A: ELECTRICAL ENGINEERING:**

The following experiments are required to be conducted as compulsory experiments:

1. Swinburne's test on DC shunt machine. (Predetermination of efficiency of a given DC shunt machine working as motor and generator)
2. Brake test on DC shunt motor
3. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors)
4. Brake test on 3-phase induction motor (Determination of performance characteristics)
5. Regulation of alternator by synchronous impedance method

**SECTION B: ELECTRONICS ENGINEERING:**

The following experiments are required to be conducted as compulsory experiments:

1. P-n Diode characteristics
2. Transistor CE characteristics (Input and Output)
3. Full wave rectifier with and without filters
4. CE amplifiers
5. SCR characteristics

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

L	T/P/D	C
0	6	3

(A19ES3ME01) ENGINEERING GRAPHICS

**COURSE PRE-REQUISITES:** None

**COURSE OBJECTIVES:**

- To know the conventions used in Engineering Graphics 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 scales and 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:** Obtain the development and sections of regular solids using AutoCAD

**CO-4:** Demonstrate construction of simple solid models of domain applications 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.

**Customization & CAD Drawing:**

Setting of drawing page and the printer, including scale settings, Setting of units and drawing limits; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles

**Annotations, Layering & Other Functions:**

Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, Layers to create drawings; Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print commands

**Introduction to Computer Graphics:**

Introduction to Computer Graphics; Modeling – Wireframe, Surface and Solid Modelling; Spatial Transformations - Move, Rotate, Zoom; Co-ordinate Systems; Model Viewing

**UNIT-I:**

**Introduction to Engineering Graphics:** Principles of Engineering Graphics and their Significance, Conventions, Drawing instruments

**Engineering Curves:** Conic sections: Ellipse, Parabola and Hyperbola including the Rectangular Hyperbola (General method only)  
Cycloidal Curves & Involutives: Cycloid, Epicycloid, Hypocycloid and Involutives  
**Scales:** Plain, Diagonal and Vernier Scales

**UNIT-II:**

**Orthographic Projections:** Principles of Orthographic Projections – Conventions; Projections of Points in all positions; Projections of lines and planes inclined to both the planes - Auxiliary Views

**UNIT-III:**

**Projections of Regular Solids:** Projections of Solids inclined to both the Planes - Auxiliary Views

**UNIT-IV:**

**Sections and Development of Surfaces of Right Angular Solids:** Section and sectional views of right angular solids of Prism, Cylinder, Pyramid, Cone – Auxiliary Views  
Development of surfaces of Right Regular Solids of Prism, Pyramid, 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; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions

**UNIT-VI:**

**Solid Modeling:** Introduction to solid modeling; Creation of simple solid models; Part editing and two-dimensional documentation of models.

**Demonstration of a simple team design project:** Creation of engineering models of practical applications relevant to the domain and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids using Solid Modeling software  
Applications could include but are not limited to: Table, Chair, Sink, Hinge, Remote Casing, CPU, Electrical Pole, Windows, Door Frames etc.

**TEXT BOOKS:**

1. Engineering Drawing, N. D. Bhatt, 53<sup>rd</sup> Edition, Charotar Publishing House, 2016
2. Textbook on Engineering Drawing, K. L. Narayana & P. Kanniah, 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), 1<sup>st</sup> Edition, John Wiley & Sons, Indianapolis, Indiana
2. AutoCAD Software Theory and User Manuals



VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

L	T/P/D	C
0	2	1

**(A19PW4ME01) 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 the 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, 5<sup>th</sup> Edition, Narosa Publishing House, 2016
2. Higher Engineering Mathematics, B. V. Ramana, 33<sup>rd</sup> Reprint, McGraw Hill Education (India) private Limited, 2018
3. Engineering Mathematics, N. P. Bali, 4<sup>th</sup> Edition, Laxmi Publications (P) Ltd., 2001

**REFERENCES:**

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

B.Tech. II 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, 16<sup>th</sup> Edition, Dhanpat Rai Publications, New Delhi, 2016
2. Engineering Chemistry, Prasanta Rath, B. Rama Devi, Ch. Venkata Ramana Reddy, Subhendu Chakroborty, 1<sup>st</sup> Edition, Cengage Publications, Delhi, 2019
3. A Textbook of Engineering Chemistry, Shashi Chawla, 3<sup>rd</sup> Edition, Dhanpat Rai Publications, New Delhi, 2010

#### **REFERENCES:**

1. Engineering Chemistry, S. S. Dara, 12<sup>th</sup> 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

B.Tech. II 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

**UNIT-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, 3<sup>rd</sup> 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



B.Tech. II Semester

L	T/P/D	C
3	0	3

**(A19ES1CS02) DATA STRUCTURES THROUGH C**

**COURSE OBJECTIVES:**

- To summarize efficient storage mechanisms of data for an easy access
- To familiarize concepts of various linear data structures
- To introduce concept of non-linear data structures
- To develop applications using data structures

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

**CO-1:** Find time complexity notations for various sorting techniques

**CO-2:** Implement the operations of creation, insertion, deletion on linear data structures

**CO-3:** Apply the operations of creation, insertion, deletion on non-linear data structures

**CO-4:** Develop the applications using data structure concepts

**UNIT-I:**

**Data Structures:** Introduction to data structures, abstract data types. Asymptotic notations, Merge sort, Quick Sort, Radix sort.

**UNIT-II:**

**Linked List:** Singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation  
Double linked list implementation, insertion, deletion and searching operations.  
Applications of Linked Lists – Polynomial addition and subtraction.

**UNIT-III:**

**Stacks:** Operations, array and linked representations of stacks, stack applications- infix to postfix conversion, postfix expression evaluation, Towers of Hanoi recursive implementation.

**UNIT-IV:**

**Queues:** operations, array and linked representations of queues. Circular queue operations, dequeue operations.

**UNIT-V:**

**Trees:** Definitions, binary tree representation, binary search tree, binary tree traversals- Preorder, Inorder, Post order.

**UNIT-VI:**

**Graphs:** Definitions, graph representations, spanning tree, graph traversals- BFS and DFS.

**TEXT BOOKS:**

1. C Programming & Data Structures, B. A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning

2. Data Structures Using C (Paperback), Aaron M. Tenenbaum

**REFERENCES:**

1. C & Data Structures, P. Padmanabham, Third Edition, B. S. Publications
2. Data Structures using C, A. M. Tanenbaum, Y. Langsam, and M. J. Augenstein, Pearson Education
3. C Programming & Data Structures, E. Balagurusamy, TMH
4. C Programming & Data Structures, P. Dey, M. Ghosh, R. Thereja, Oxford University Press
5. C & Data Structures, E. V. Prasad and N. B. Venkateswarlu, S. Chand & Co.

B.Tech. II Semester

L	T/P/D	C
3	0	3

**(A19ES1ME01) ENGINEERING MECHANICS**

**COURSE PRE-REQUISITES:** Mathematics, Physics

**COURSE OBJECTIVES:**

- To understand, analyze the forces and moment systems for equilibrium
- To know the concept of centroid and area moment of inertia about any axes
- To distinguish between statics and dynamics & kinematics and kinetics
- To understand the work-energy principle and impulse-momentum principles

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

**CO-1:** Analyze the systems using equilibrium conditions and apply the concepts of mechanics to engineering applications

**CO-2:** Determine the centroid of composite areas and moment of inertia of areas

**CO-3:** Solve the kinematics and kinetics problems

**CO-4:** Apply work-energy principle, impulse-momentum principle to solve engineering problems

**UNIT-I:**

**Forces:** Introduction to Engineering Mechanics – Basic concepts - Classification of a force system - Parallelogram law of forces - Triangle law of forces - Polygon law of forces – Law of transmissibility of forces – Principle of superposition - Lami's theorem - Free Body Diagram – Resultant – Equilibrant - Resultant of coplanar concurrent forces.

**Moments:** Moment of a force - Varignon's principle - Parallel forces - Resultant of parallel forces – Couple - Moment of a couple about any point lying in the plane - Resolution of a force into a force-couple and vice-versa - Resultant of coplanar non-concurrent forces.

**UNIT-II:**

**Friction:** Types of Friction - Limiting friction - Laws of friction - Equilibrium of bodies on rough horizontal and inclined planes - Equilibrium of connected bodies on rough horizontal and inclined planes, Wedge Friction, Screw jack & differential screw jack.

**UNIT-III:**

**Centroid & Centre of Gravity:** Introduction - Centroid - Centroids of lines, Standard areas and volumes – Centroids of composite sections - Centre of gravity of bodies - Pappu's theorems.

**UNIT-IV:**

**Area Moment of Inertia:** Introduction - Inertia - Inertia of areas - Rotation of areas - Radius of gyration - Polar moment of inertia - Parallel axis theorem - Perpendicular axis theorem - Moments of inertia of standard sections and composite sections.

**Mass Moment of Inertia:** Moment of Inertia of Masses – Transfer Formula for Mass moments of inertia – Mass moment of Inertia of composite bodies.

**UNIT-V:**

**Kinematics of Particles:** Kinematics of particles – Rectilinear motion – Curvilinear motion – Projectiles.

**Kinetics of Particles:** Kinetics of particles – Newton's Second Law – Differential equations of rectilinear and curvilinear motion – Dynamic equilibrium – Inertia force – D'Alembert's Principle applied for rectilinear and curvilinear motion.

**UNIT-VI:**

**Work–Energy, Impulse–Momentum:** Work of a force - Principle of Work and Energy - Application of principle of Work-Energy - Impulse-Momentum Principle, Application of Impulse-Momentum principle.

**TEXT BOOKS:**

1. Engineering Mechanics, S. Timoshenko, D. H. Young & J. V. Rao, 5<sup>th</sup> Edition, TMH Publishers, 2016
2. Singer's Engineering Mechanics, K. Vijaya Kumar Reddy & J. Suresh Kumar, 3<sup>rd</sup> Edition, B. S. Publishers, 2011

**REFERENCES:**

1. Engineering Mechanics, J. L. Meriam & L. G. Kraige, 7<sup>th</sup> Edition, Wiley Publishers, 2012
2. Engineering Mechanics, R. C. Hibbeler, 12<sup>th</sup> Edition, Pearson Education, 2018
3. Engineering Mechanics, A. K. Tayal, 14<sup>th</sup> Edition, Umesh Publications, 2012
4. Engineering Mechanics, R. K. Rajput, 2<sup>nd</sup> Edition, Laxmi Publications, 2013
5. A Text Book of Engineering Mechanics, R. K. Bansal, 5<sup>th</sup> Edition, Laxmi Publications, 2007

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

L	T/P/D	C
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### (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

B.Tech. II 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

**UNIT-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. 4<sup>th</sup> 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



**(A19ES2CS02) DATA STRUCTURES THROUGH C LABORATORY**

**COURSE OBJECTIVES:**

- To impart the implementation of data structures such as linked lists, stacks and queue
- To introduce the various advanced data structures such as tree traversals
- To analyze the sorting algorithms
- To teach the various graph traversal algorithms

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

**CO-1:** Analyze the algorithms to determine the time and space complexities

**CO-2:** Implement the linear data structures like stacks, queues and linked lists

**CO-3:** Evaluate the non-linear data structures like Trees and graphs

**CO-4:** Predict the tree and graph traversing techniques

**WEEK 1:**

1. Merge Sort

**WEEK 2:**

2. Quick Sort
3. Radix Sort

**WEEK 3:**

4. SLL creation, insertion, deletion, searching, display operations.

**WEEK 4:**

5. CLL creation, insertion, deletion, searching, display operations.

**WEEK 5:**

6. DLL creation, insertion, deletion, searching, display operations.

**WEEK 6:**

7. STACK operations using arrays and Linked List.

**WEEK 7:**

8. Infix to postfix conversion.

**WEEK 8:**

9. Postfix evaluation.
10. Towers of Hanoi problem

**WEEK 9:**

11. QUEUE operations using arrays and LL.

**WEEK 10:**

12. CIRCULAR QUEUE operations using arrays.

**WEEK 11:**

13. DEQUEUE operations using arrays.

**WEEK 12:**

14. Binary tree traversals using recursion.

**WEEK 13:**

15. Graph traversals (BFS and DFS).

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II 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 & Stair case 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, 3<sup>rd</sup> Edition, Scitech, 2015
2. Elements of Workshop Technology Vol.1 & 2, S. K. Hajra Choudhury, A. K. Hajra Choudhury and Nirjhar Roy, 13<sup>th</sup> 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, 4<sup>th</sup> 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, 4<sup>th</sup> Edition, Prentice Hall India, 1998
4. Manufacturing Technology Vol-1 & 2, P. N. Rao, Tata McGraw-Hill House, 2017