

**DEPARTMENT OF**

**COMPUTER  
SCIENCE AND  
ENGINEERING  
(DS, CS, AIDS)**

## VISION OF THE DEPARTMENT

- To produce engineers with in-depth technical knowledge and ethical values.
- To incorporate ingeniousness and self-driven capabilities to the students in the fields of mezzanine technologies.
- To nurture the ecosystem of Innovation, Research and Development through an integrated teaching-learning environment for faculty and students.

## MISSION OF THE DEPARTMENT

- Offer diverse curriculum in line with industry, professional and research bodies.
- Provide project-based learning environment for developing diverse practical capabilities.
- Offer advanced trainings to enable process skills and competencies.

**B.TECH.**  
**CSE (DATA SCIENCE)**

# B.TECH. CSE (DS)

## PROGRAM EDUCATIONAL OBJECTIVES

**PEO-I:** Graduates of the Data Science will contribute to the Nation's progress through their talent to solve varied and complex Data Science problems across a broad range of application areas. (Professional accomplishment)

**PEO-II:** Graduates of the Data Science will be successful Professionals, designing and implementing Products & Services of global standards in the field Data Science, becoming entrepreneurs, pursuing higher studies & research. (Continuing Education)

**PEO-III:** Graduates of the Data Science Program will be able to adapt to changing scenario of disruptive technology with an ability to solve critical societal problems using logical and flexible approach in decision making. (Attitudes)

**PEO-IV:** To make the graduates adaptable to changing career opportunities who have the potential to excel in industry or public sector or higher studies exhibiting global competitiveness.

# B.TECH. CSE (DS)

## PROGRAM OUTCOMES

**PO-1: Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO-2: Problem Analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO-3: Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO-4: Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO-5: Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including

prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO-6: The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

**PO-7: Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO-8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities, and norms of the engineering practice

**PO-9: Individual and Teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO-10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO-11: Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO-12: Life-Long Learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning (LLL) in the broadest context of technological change.

## B.TECH. CSE (DS)

### PROGRAM SPECIFIC OUTCOMES

**PSO-1:** Acquire proficiency in developing and implementing efficient solutions using evolving technologies of Data Science, platforms and Free and Open-Source Software.

**PSO-2:** Gain critical understanding of hardware and software tools providing to the contemporary needs of IT industry 4.0 standards.

**PSO-3:** Graduating student will be able to illustrate the use of Data Science for attaining reliable and fault-tolerant IT solutions by using and understanding use cases.



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

**I SEMESTER**

**R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22BS1MT101	Matrices and Calculus	3	1	0	4	4
22BS1CH102	Chemistry For Engineers	3	0	0	3	3
22ES1EE101	Basic Electrical and Electronics Engineering	3	0	0	3	3
22ES1CS101	Programming for Problem Solving	3	0	0	3	3
22ES1DS101	Introduction to Data Science	2	0	0	2	2
22ES3ME102	Engineering Drawing	0	0	4	4	2
22BS2CH101	Engineering Chemistry Laboratory	0	0	2	2	1
22ES2CS101	Programming for Problem Solving Laboratory	0	0	2	2	1
22ES2EE101	Basic Electrical and Electronics Engineering Laboratory	0	0	2	2	1
22MN6HS101	Induction Programme	2	0	0	2	0
<b>Total</b>		<b>16</b>	<b>1</b>	<b>10</b>	<b>27</b>	<b>20</b>

**II SEMESTER**

**R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22BS1MT102	Ordinary Differential Equations and Vector Calculus	2	1	0	3	3
22BS1MT103	Statistical Methods for Data Analysis	3	0	0	3	3
22HS1EN101	English for Skill Enhancement	2	0	0	2	2
22ES1CS102	Data Structures	3	0	0	3	3
22BS1PH102	Applied Physics	3	0	0	3	3
22BS2PH102	Applied Physics Laboratory	0	0	2	2	1
22HS2EN101	English Language and Communication Skills Laboratory	0	0	2	2	1
22ES2CS102	Data Structures Laboratory	0	0	2	2	1
22ES2ME102	Engineering and IT Workshop	1	0	2	3	2
22SD5CS101	Elements of Computer Science and Engineering	0	0	2	2	1
22MN6HS103	Happiness and Wellbeing	2	0	0	2	0
<b>Total</b>		<b>16</b>	<b>1</b>	<b>10</b>	<b>27</b>	<b>20</b>

L – Lecture      T – Tutorial      P – Practical      D – Drawing  
C – Credits      SE – Sessional Examination      CA – Class Assessment  
SEE – Semester End Examination      D-D – Day to Day Evaluation  
CP – Course Project      PE – Practical Examination

CH – Contact Hours/Week  
ELA – Experiential Learning Assessment  
LR – Lab Record

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

**B.Tech. I Semester**

## (22BS1MT101) MATRICES AND CALCULUS

TEACHING SCHEME		
L	T/P	C
3	1	4

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Matrices, Differentiation, Integration

### COURSE OBJECTIVES:

- To know the rank of the matrix and its application to consistency of system of linear equations
- To know Eigen values and Eigen vectors
- To know the nature of Quadratic forms
- To know maximum and minimum of a given function with several variables
- To evaluate multiple integrals and their applications

**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:** Solve problems involving Maxima and Minima

**CO-5:** Evaluate multiple integrals and its applications in areas and volumes

### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2	-	-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-
CO-5	3	2	1	-	-	1	1	1	2	1	-	2	-	-

### UNIT-I:

**Matrices:** Types of real matrices, symmetric, skew symmetric and orthogonal 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 eigenvectors and their properties, Diagonalization of matrices; Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem

**UNIT-III:**

**Complex Matrices and Quadratic Forms:** Types of complex matrices; Hermitian; Skew-Hermitian, 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 Transformation.

**UNIT-IV:**

**Functions of Several Variables:** Definitions of Limits, Continuity. Partial differentiation: partial derivatives of first and second order, Euler's theorem, Total derivative, Jacobian, Functional dependence, Taylor's theorem of two variables (without proof). Maxima and Minima of two variables, Lagrange's method of undetermined Multipliers.

**UNIT-V:**

**Multiple Integrals with Applications:** 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).

**TEXT BOOKS:**

1. Higher Engineering Mathematics, B. V. Ramana, 11<sup>th</sup> Reprint, Tata McGraw-Hill, 2010
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Narosa Publications
3. Advanced Engineering Mathematics, Erwin Kreyszig, 9<sup>th</sup> Edition, John Wiley India Pvt. Ltd.

**REFERENCES:**

1. Linear Algebra and its Applications, Gilbert Strang, Cengage Publication
2. Matrices, A. R. Vasishtha and A. K. Vasishtha, Krishna's Educational Publishers
3. Engineering Mathematics, N. P. Bali, 4<sup>th</sup> Edition, Laxmi Publications (P) Ltd.
4. Calculus and Analytic Geometry, G. B. Thomas and R. L. Finney, 9<sup>th</sup> Edition, Pearson, 2002
5. Linear Algebra and its Applications, David C. Lay, Pearson Education India, 2003

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. I Semester

### (22BS1CH102) CHEMISTRY FOR ENGINEERS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** General Chemistry and Basic Mathematics

#### COURSE OBJECTIVES:

- To analyze the quality of water for sustainable living
- To acquire the knowledge about polymer science and its applications in various fields
- To outline the importance of non-conventional energy sources and portable electric devices
- To imbibe the conceptual knowledge of corrosion science
- To recognize the significance of engineering materials for multidisciplinary environs

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

**CO-1:** Assess the specification of water regarding its usage in domestic & Industrial scenarios

**CO-2:** Analyze the efficacy of polymers in diverse applications

**CO-3:** Recognize the transformations in energy sources & battery technology

**CO-4:** Predict the suitable corrosion control methods in safeguarding the structures

**CO-5:** Interpret the role of engineering materials in various sectors

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2	-	-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-
CO-5	3	2	1	-	-	1	1	1	2	1	-	2	-	-

#### UNIT-I:

**Water and its Treatment:** Introduction- Hardness - causes, expression of hardness, units of hardness, types of hardness, Numerical problems (temporary & permanent hardness of water). Estimation of hardness by EDTA method.

Potable water and its specifications. Steps involved in the treatment of potable water – screening, sedimentation, coagulation, filtration, and disinfection methods- boiling, chlorination (By Chlorine gas, Bleaching powder, Chloramine), Breakpoint of chlorination.

Boiler troubles - boiler corrosion, caustic embrittlement, scale & sludge formation. Internal treatment- Calgon, phosphate, and colloidal conditioning, External

treatment - Softening of water by ion- exchange processes. Desalination of brackish water – Reverse osmosis and its advantages.

#### **UNIT-II:**

**Polymer Science:** Definition – Classification of polymers with examples, Types of polymerizations, addition, and condensation polymerization with examples. Properties of polymers-crystallinity & glass transition temperature.

**Plastics:** Definition and characteristics-thermoplastic and thermosetting plastics, Preparation, Properties, and applications of Teflon, PMMA, PC, PET, Bakelite.

Moulding of Plastics (Compression, Extrusion, Blow moulding and Thermoforming).

Fiber reinforced plastics (FRP)-features & applications.

**Conducting Polymers:** Classification and applications of conducting polymers.

**Shape Memory Polymers (SMPs):** Definition, classification based on their mode of activation (thermo-responsive, light-responsive, electrically, magnetically Induced and water activated -brief note) and applications of SMPs in various fields.

#### **UNIT-III:**

**Energy Sources & Battery Technology:** Definition and characteristics of fuel, Types of fuels, analysis of coal – proximate and ultimate analysis. Petroleum and its Refining Cracking- Definition, types -moving bed catalytic cracking process. Knocking – octane and cetane rating, Gaseous fuels –Types of hydrogen fuel, generation of green hydrogen-mechanism of electrolysis of water.

**Battery Technology:** Definition, Characteristics of a good battery, Classification of batteries- primary, secondary, reserve and fuel cells with examples.

**Primary Batteries:** Zn-air battery-Construction and working.

Rechargeable batteries: Construction and working of lithium-ion battery and its importance in electric vehicles.

**Fuel Cell:** Definition, construction, working, principle, and applications of methanol-oxygen fuel cell.

#### **UNIT-IV:**

**Corrosion and its Control:** Introduction causes and effects of corrosion, mechanism of chemical and electrochemical 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 - cathodic protection-Sacrificial anodic and impressed current cathodic protection, comparison of galvanizing and tinning.

#### **UNIT-V:**

##### **Engineering Materials:**

**Nanomaterials:** Definition, Synthesis of nanomaterials- Top-down and bottom-up approaches. Characterization techniques of Nanomaterials – STM and AFM working principle, advantages, and limitations.

**Self-Healing Materials:** Features, principle, and applications.

**Biosensors:** Definition, characteristics, classification-, construction & working, applications and advantages of biosensors. Biochips -Definition, advantages, and applications.

**Lubricants:** Definition and need for lubricants, types- liquid, semi-solid, solid, mechanisms of lubrication-thick film lubrication, thin film lubrication and extreme pressure lubrication. Properties of lubricants-viscosity, cloud and pour point, flash and fire point, their definition and significance.

**TEXT BOOKS:**

1. Engineering Chemistry, P. C. Jain and M. Jain, Dhanpat Rai Publishing Company, 2010
2. Engineering Chemistry, Rama Devi, Venkata Ramana Reddy and Rath, Cengage Learning, 2016

**REFERENCES:**

1. Engineering Chemistry, Shikha Agarwal, Cambridge University Press, 2015
2. Engineering Chemistry, Shashi Chawla, Dhanpat Rai, 2011
3. A Textbook of Engineering Chemistry, M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021
4. Textbook of Engineering Chemistry, Jaya Shree Anireddy, Wiley Publications

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. I Semester

### (22ES1EE101) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### 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, 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 analyze the DC circuits using various network reduction techniques

**CO-2:** Analyze the various electrical parameters of AC circuits with R-L-C elements

**CO-3:** Understand the operation of various Electrical Machines

**CO-4:** Know about low voltage electrical installation components and the safety measures

**CO-5:** Get familiarized with different electronic components and to find their suitability in the relevant fields of engineering

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	3	3	3	2	1	1	1	1	1	1	1	-	-	-	-
CO-2	2	3	3	3	2	1	1	1	1	1	1	1	-	-	-	-
CO-3	3	2	3	2	1	1	1	1	1	1	1	1	-	-	-	-
CO-4	1	1	1	1	1	3	3	1	1	1	1	1	-	-	-	-
CO-5	3	2	3	2	1	1	1	1	1	1	1	1	-	-	-	-

#### UNIT-I:

**Introduction to Electrical Energy and DC Circuits:** The role of Electrical Energy in modern life and various engineering branches- Circuit Concept – Types of Elements- R-L-C parameters – Voltage and Current sources – Independent and dependent sources- Kirchhoff's laws – network reduction techniques: series, parallel, series parallel, star/delta transformations, Superposition theorem, Thevenin's theorem.

## **UNIT-II:**

**Steady State AC Circuits:** Representation of sinusoidal waveforms, average and RMS values, form factor and peak factor, 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 (Derivation only).

## **UNIT-III:**

**Transformers and DC Machines:** 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 and 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.

**Electrical Installations and Batteries:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, MCCB, Types of Wiring, Earthing: Need of earthing, Types (Pipe and Plate earthing), classification of batteries, working and electrical characteristics of Lead Acid battery.

## **UNIT-V:**

**Semi-Conductor Devices and Data Acquisition:** P-N junction diode, symbol, V-I Characteristics, Diode Applications: Half wave, Full wave rectifiers. Bipolar Junction Transistor construction (NPN and PNP transistors), Common-Emitter configuration, Transistor as an amplifier. A/D and D/A converters, Data Acquisition and Control.

## **TEXT BOOKS:**

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

## **REFERENCES:**

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



**ONLINE RESOURCES:**

1. <https://nptel.ac.in/courses/108108076>

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. I Semester

### (22ES1CS101) PROGRAMMING FOR PROBLEM SOLVING

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### 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:** Illustrate the flowchart, algorithm, pseudo code for a given problem

**CO-2:** Execute programs using various data types and operators

**CO-3:** Implement programs using conditional and iterative statements for a given problem

**CO-4:** Exercise on programs using arrays, pointers, dynamic memory management, structures and unions

**CO-5:** Develop solution for a given problem using modular approach and perform file handling

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	2	3	1	-	-	-	-	2	2	1	-	-	-
CO-2	2	2	3	2	1	-	-	-	2	2	-	2	-	-
CO-3	2	2	3	2	1	1	-	-	2	2	-	2	-	-
CO-4	1	2	3	1	1	1	-	-	2	2	2	2	-	-
CO-5	1	2	3	1	1	1	-	-	2	2	2	2	-	-

#### UNIT-I:

##### Introduction to Programming:

Compilers, compiling and executing a program.

Representation of Algorithm, Flowchart/ Pseudocode with examples, Program design and structure of C programming.

Variables, Data types Operators, expressions and precedence, Expression evaluation, Storage classes, type conversion.

**I/O:** Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

**Conditional Branching:** Branching with if, if-else, nested if-else, else-if ladder, switch-case, goto,

## **UNIT-II:**

### **Loops, Arrays, Strings:**

**Loops:** Iteration with for, while, do- while loops, break and continue statements.

**Arrays:** One and two dimensional arrays, creating, accessing and manipulating elements of arrays

**Strings:** Introduction to strings, handling strings as array of characters, string functions available in C arrays of strings.

## **UNIT-III:**

### **Searching, Sorting, Functions:**

**Searching:** Basic searching in an array of elements (linear and binary search techniques)

**Sorting:** Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

**Functions:** Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value. Recursion with examples. Some C standard functions and libraries.

## **UNIT-IV:**

### **Structures and Pointers:**

**Structures:** Defining structures, initializing structures, unions, Array of structures,

**Pointers:** Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Passing arrays to functions and structures to functions. Dynamic memory allocation, self-referential structures

## **UNIT-V:**

### **Preprocessor Directives and File Handling in C:**

**Preprocessor Directives:** Symbolic constants, macro expansion and file inclusion.

**User Defined Data Types:** enum, typedef

**Files:** Text 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. C Programming and Data Structures, B. A. Forouzan and R. F. Gilberg, 3<sup>rd</sup> Edition, Cengage Learning
3. C: The Complete Reference, Herbert Schildt, 4<sup>th</sup> Edition, McGraw-Hill

## **REFERENCES:**

1. Problem Solving and Program Design in C, Jeri R. Hanly and Elliot B. Koffman, 7<sup>th</sup> Edition, Pearson
2. Computer Fundamentals and C, E. Balagurusamy, 2<sup>nd</sup> Edition, McGraw-Hill
3. Let us C, Yashavant Kanetkar, 18<sup>th</sup> Edition, BPB
4. How to Solve it by Computer, R. G. Dromey, 16<sup>th</sup> Impression, Pearson
5. Programming in C, Stephen G. Kochan, 4<sup>th</sup> Edition, Pearson Education

## **ONLINE RESOURCES:**

1. <https://nptel.ac.in/courses/106105171>
2. [https://ugcmoocs.inflibnet.ac.in/index.php/courses/view\\_ug/307](https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/307)

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. I Semester

### (22ES1CY101) INTRODUCTION TO CYBER SECURITY

TEACHING SCHEME		
L	T/P	C
2	0	2

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To analyze the various probability distributions
- To make statistical inferences about data
- To provide advanced statistical background for analyzing data and drawing inferences from the analysis
- To mathematically characterize optimal solutions for nonlinear optimization models
- To analyze Principle Component Analysis

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

**CO-1:** Understand data Science and basics of various distributions

**CO-2:** Calculate and interpret descriptive statistics appropriately

**CO-3:** Understand and apply the basic mathematical and statistical concepts in data science

**CO-4:** Optimize the available data using certain optimization techniques

**CO-5:** Able to simplify the complexity in high-dimensional data while retaining trends and patterns

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	3	2	3	2	1	1	2	2	3	2	3	3
CO-2	2	1	2	3	3	2	2	2	1	1	1	3	1	2	2
CO-3	3	2	1	2	3	3	1	1	1	2	2	3	2	1	3
CO-4	3	2	3	2	3	2	1	1	2	1	1	3	1	2	2
CO-5	2	2	3	2	2	2	2	1	2	2	2	3	2	3	2

#### UNIT-I:

What is Data Science? Three pillars of data science, Types of Data, Cumulative Distribution Function, Normal Distribution, Standard Normal Distribution, Empirical Rule, and Related Problems, Assessing Normality, Binomial Distribution, Poisson Distribution, Uniform distribution

#### UNIT-II:

Exponential distribution, lognormal distribution, Central limit theorem, K-S Test for similarity of two distributions, power law and pareto distribution, box-cox transform, Interpretation of Chebyshev's inequality.

**UNIT-III:**

Descriptive statistics, Inference statistics, Measures of Central Tendency, kurtosis, skewness, Matrices, solving linear equations, fields, vector spaces, linear independence, basis and advantages of rank, null space, rank nullity theorem, linear transformation, norms, inner products, orthogonality, orthonormal basis.

**UNIT-IV:**

Fundamentals of optimization, components of optimization problem, types of optimization problems, univariate optimization and related numerical examples, multivariate optimization and related numerical examples.

**UNIT-V:**

Why learn PCA, Geometric intuition of PCA, Eigen values and Eigen vectors, visualizing MNIST dataset, Limitations of PCA, PCA code example, PCA for dimensionality reduction.

**TEXT BOOKS:**

1. Probability and Mathematical Statistics, Prasanna Sahoo, 2008
2. Introduction to Information Retrieval, Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, Cambridge University Press, 2008
3. Linear Algebra and Optimization for Machine Learning, Charu C. Aggarwal, Springer

**REFERENCES:**

1. Computational and Inferential Thinking: The Foundations of Data Science, Adi Adhikari and John De Nero, 1<sup>st</sup> Edition, 2019
2. Doing Data Science, Straight Talk from The Frontline, Cathy O'Neil and Rachel Schutt, O'Reilly, 2014
3. Mathematical Foundations of Data Science Using R, Matthias Dehmer, Salissou Moutari, Frank Emmert-Streib, De Gruyter Oldenbourg, 2020
4. Probability and Statistics for Data Science: Math + R + Data, Norman Matloff, CRC Data Science Series, 2019

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. I Semester

### (22ES3ME102) ENGINEERING DRAWING

TEACHING SCHEME		
L	T/P	C
0	4	2

EVALUATION SCHEME				
D-D	SE	CP	SEE	TOTAL
10	20	10	60	100

#### COURSE OBJECTIVES:

- To understand the importance of engineering curves
- To learn to use the orthographic projections for points, lines and planes
- To Understand the Projections of Solids in different positions
- To learn the importance of Isometric Projections and its conversions

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

**CO-1:** Apply the concepts of engineering curves and its construction using AutoCAD

**CO-2:** Solve the problems of projections of points, lines and planes in different positions using AutoCAD

**CO-3:** Solve the problems of Projections of Solids using AutoCAD

**CO-4:** Solve the problems on Conversion of Isometric views to Orthographic Views & Orthographic to Isometric Views using AutoCAD

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	2	1	3	-	-	-	3	2	2	-	-	-
CO-2	3	2	2	1	3	-	-	-	3	2	2	-	-	-
CO-3	3	2	2	1	3	-	-	-	3	2	2	-	-	-
CO-4	3	2	2	1	3	-	-	-	3	2	2	-	-	-

#### 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 and Conventions

**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  
Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions

**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. Kannaiah, Scitech Publishers, 2010
3. Engineering Drawing and Computer Graphics, M. B. Shah & B. C. Rana, Pearson Education, 2010

**REFERENCES:**

1. Mastering AutoCAD 2021 and AutoCAD LT 2021, George Omura and Brian C Benton (AutoCAD 2021), 1<sup>st</sup> Edition, John Wiley & Sons

**ONLINE RESOURCES:**

1. <https://www.classcentral.com/course/swayam-engineering-graphics-5305>
2. <https://www.mooc-list.com/tags/engineering-drawing>

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. I Semester

#### (22BS2CH101) ENGINEERING CHEMISTRY LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

**COURSE PRE-REQUISITES:** Basic Knowledge of Volumetric Analysis and Mathematics

#### COURSE OBJECTIVES:

- To understand the preparation of standard solutions and handling of instruments
- To determine and evaluate the water quality
- To measure physical properties like absorption of light, surface tension, pH, conductance and viscosity of various liquids
- To conduct and collect the experimental data using different laboratory techniques
- To summarize the data and find the applicability to real world scenario

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

**CO-1:** Learn and apply the basic laboratory methodologies for the preparation of the standard solutions and handling of instruments

**CO-2:** Estimate the ions / metal ions present in domestic and industrial water

**CO-3:** Utilize the instrumental techniques to assess the physical properties of oils and water

**CO-4:** Analyze the experimental data to predict solutions for complex engineering problems

**CO-5:** Apply the skills gained to solve societal issues related to real world scenario

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2	-	-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-
CO-5	3	2	1	-	-	1	1	1	2	1	-	2	-	-

#### 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. Estimation of copper present in the given solution by colorimetric method.
4. Conductometric titration of Acid vs Base.
5. Titration of Acid vs Base using pH metric method.



6. Conductometric titration of mixture of strong acid and weak acid by strong base
7. Determination of viscosity of sample oil by Redwood Viscometer-I.
8. Estimation of acid value of given lubricant oil.
9. Determination of surface tension of a liquid by drop method using Stalagmometer.
10. Synthesis of a Polymer-Bakelite/Nylon.

#### **VIRTUAL LAB EXPERIMENTS:**

11. Basic operations of Transmission Electron Microscope (Imaging and Diffraction Pattern)
12. Polymer processing technology- study construction and working of compression moulding.
13. Basics of Scanning Electron Microscopy: Secondary Electron and BSE imaging mode.
14. Batteries for electrical vehicles

#### **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, Dr. 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

#### **ONLINE RESOURCES:** (Virtual labs)

1. <https://emb-iitk.vlabs.ac.in/exp/transmission-electron-microscope>
2. [http://vlabs.iitb.ac.in/vlabs-dev/labs/mit\\_bootcamp/polymer\\_process/experimentlist.html](http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/polymer_process/experimentlist.html)
3. <https://emb-iitk.vlabs.ac.in/exp/sem-basics/>

## VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

### B.Tech. I Semester

#### (22ES2CS101) PROGRAMMING FOR PROBLEM SOLVING LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

#### 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 will 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:** Execute the programs using derived and user defined data types

**CO-4:** Implement programs using modular approach and file I/O

**CO-5:** Solve a given problem using C language

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	2	3	2	1	-	-	-	2	2	-	2	-	-
CO-2	2	2	3	2	1	1	-	-	2	2	-	2	-	-
CO-3	1	2	3	1	1	1	-	-	2	2	2	2	-	-
CO-4	1	2	3	1	1	1	-	-	2	2	2	2	-	-
CO-5	2	2	2	2	1	1	-	-	2	2	2	2	-	-

#### LIST OF PROGRAMS:

##### WEEK 1:

- Programs on input, output statements
- Programs on various operators
- Programs on expression evaluation

##### WEEK 2:

- Program that converts one given data type to another using auto conversion and casting. Take the values from standard input.

- b. Programs on conditional statements- Simple if, if-else, Nested if-else, Else-if ladder, switch case

**WEEK 3:**

- a. Programs on simple loops- while, for, do. while
- b. Programs on Nested loops- while, for, do. while
- c. Programs to understand goto, break, continue

**WEEK 4:**

- a. Programs on 1-D arrays
- b. Programs on linear, binary searching
- c. Programs on bubble, selection and insertion sorting

**WEEK 5:**

- a. Programs on 1-D strings
- b. Programs using string handling functions

**WEEK 6:**

- a. Programs on 2-D arrays
- b. Programs on 2-D strings

**WEEK 7:**

- a. Programs on user defined functions
- b. Programs on passing arrays and strings to functions

**WEEK 8:** Internal Lab Exam -I

**WEEK 9:**

- a. Programs on recursion
- b. Programs on structures – simple structure, array of structures, array within structure, nested structure
- c. Programs on Unions

**WEEK 10:**

Programs on pointers to variables

- a. Programs on pointers to arrays(1-D, 2-D)

**WEEK 11:**

- a. Program to understand call by value and call by address
- b. Programs on pointers to strings
- c. Programs on pointers to structure
- d. Programs using malloc, calloc , realloc, free

**WEEK 12:**

- a. Programs on macros, file inclusion, enum , typedef
- b. Programs on sequential file accessing

**WEEK 13:**

- a. Programs on error handling functions in files
- b. Programs on Random file accessing

c. Programs on command line arguments

**WEEK 14:** Lab Internal Exam -2

**TEXT BOOKS:**

1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall of India
2. C Programming and Data Structures, B. A. Forouzan and R. F. Gilberg, 3<sup>rd</sup> Edition, Cengage Learning
3. C: The Complete Reference, Herbert Schildt, 4<sup>th</sup> Edition, McGraw-Hill

**REFERENCES:**

1. Problem Solving and Program Design in C, Jeri R. Hanly and Elliot B. Koffman, 7<sup>th</sup> Edition, Pearson
2. Computer Fundamentals and C, E. Balagurusamy, 2<sup>nd</sup> Edition, McGraw-Hill
3. Let us C, Yashwant Kanetkar, 18<sup>th</sup> Edition, BPB
4. How to Solve it by Computer, R. G. Dromey, Pearson, 16<sup>th</sup> Impression
5. Programming in C, Stephen G. Kochan, 4<sup>th</sup> Edition, Pearson Education

**ONLINE RESOURCES:**

1. <https://nptel.ac.in/courses/106105171>
2. [https://ugcmoocs.inflibnet.ac.in/index.php/courses/view\\_ug/307](https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/307)

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. I Semester

### (22ES2EE101) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

**COURSE PRE-REQUISITES:** Basic Electrical and Electronics Engineering

#### 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

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	3	3	3	2	1	1	1	1	1	1	1	-	-	-
CO-2	2	3	3	3	2	1	1	1	1	1	1	1	-	-	-
CO-3	3	2	3	2	1	1	1	1	1	1	1	1	-	-	-
CO-4	1	1	1	1	1	3	3	1	1	1	1	1	-	-	-
CO-5	3	2	3	2	1	1	1	1	1	1	1	1	-	-	-

#### LIST OF EXPERIMENTS:

1. Demonstration of safety precautions, measuring instruments, electrical and electronic components
2. Demonstration of LT switchgear components
3. Verification of KVL & KCL
4. Verification of superposition theorem
5. Verification of thevenin's theorem
6. Analysis of series RL, RC and RLC circuits
7. Load test on 1-  $\phi$  transformer
8. Speed Control of DC Shunt motor
9. Brake test on 3-  $\phi$  induction motor

10. Control of synchronous generator voltage through its field excitation
11. P-N junction diode characteristics
12. Transistor CE characteristics (Input and Output)

**TEXT BOOKS:**

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

**REFERENCES:**

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

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. II Semester

### (22BS1MT102) ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

TEACHING SCHEME		
L	T/P	C
2	1	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**COURSE PRE-REQUISITES:** Differentiation, Integration, Vectors, Vector Point Function

#### COURSE OBJECTIVES:

- To methods of solving first order differential equations and learn about its applications to basic engineering problems
- To methods of solving higher order differential equations and learn about its applications to basic engineering problems
- To application of Laplace transforms in solving differential equations
- To 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:** Formulate and solve the problems of first order differential equations

**CO-2:** Solve the problems of second and higher order differential equations

**CO-3:** Apply knowledge of Laplace transform to solve differential equations

**CO-4:** Find the gradient, divergence, curl and its physical interpretations

**CO-5:** Transform line integral to surface and surface to volume integrals

#### COURSE ARTICULATION MATRIX:

(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2	-	-	-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-	-
CO-5	3	2	1	-	-	1	1	1	2	1	-	2	-	-	-

#### UNIT-I:

##### First Order, First Degree ODE and its Applications:

**Differential Equations of First Order and First Degree:** Exact and non-exact differential equations, Linear and Bernoulli differential equations, Applications of differential equations of first order and first degree: Newton's law of cooling, Law of natural growth and decay.

## UNIT-II:

**Second and Higher Order Ordinary Differential Equations:** Higher 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  $x$ ,  $e^{ax}V(x)$ ,  $xV(x)$ . Variable coefficient differential equations-Method of variation of parameters, Euler-Cauchy differential equation.

## UNIT-III:

**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 with constant coefficients using Laplace transform.

## UNIT-IV:

**Vector Differential Calculus:** Vector point functions and scalar point functions. Gradient and its physical interpretation, Angle between the two surfaces, Directional derivatives, Divergence, Curl and their physical interpretations, Solenoidal vectors and Irrotational vectors, Scalar potential functions, Vector Identities (without proofs).

## UNIT-V:

### Vector Integral Calculus

**Line Integrals:** Work done by force and circulation, Evaluation of Surface and Volume Integrals. Vector integral theorems: Green's theorem, Gauss-Divergence theorem, Stokes theorem (without proofs) and their problems.

## TEXT BOOKS:

1. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Narosa Publications
2. Higher Engineering Mathematics, B.V. Ramana, 11<sup>th</sup> Reprint, Tata McGraw-Hill, 2010
3. Advanced Engineering Mathematics, Erwin Kreyszig, 9<sup>th</sup> Edition, John Wiley

## REFERENCES:

1. Advanced Engineering Mathematics, Peter 'O' Neil, Cengage Learning
2. Engineering Mathematics, N. P. Bali, 4<sup>th</sup> Edition, Laxmi Publications
3. Calculus and Analytic Geometry, G. B. Thomas and R. L. Finney, 9<sup>th</sup> Edition, Pearson, 2002



# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. II Semester

### (22BS1MT103) STATISTICAL METHODS FOR DATA ANALYSIS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To elementary ideas in basic probability
- To different types of probability distribution functions
- To develop problem-solving skills using R programming
- To present about the basic role of various methods to collect the data
- To develop a greater understanding of the importance of Data Visualization techniques

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

**CO-1:** Solve problems involving basic probability

**CO-2:** Evaluate statistical parameters of different probability distributions

**CO-3:** Examine a real-world problem and solve the same with the Knowledge gained from various distributions study through R Programming

**CO-4:** Develop the skills to collect and analyze the data

**CO-5:** Develop various visualizations of the data in hand and communicate results of analysis effectively

#### COURSE ARTICULATION MATRIX:

(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2	-	-	-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-	-
CO-5	3	2	1	-	-	1	1	1	2	1	-	2	-	-	-

#### UNIT-I:

**Basic Probability:** Sample space and events, Probability- The axioms of probability, some elementary theorems, conditional probability, Baye's theorem. Random variables - discrete and continuous distributions - Expectation of Random Variables.

#### UNIT-II:

**Probability Distributions:** Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions –related properties.

#### 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:**

**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. 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.

**TEXT BOOKS:**

1. Introduction to Probability and Statistics for Engineers and Scientists, Sheldon M. Ross, 4<sup>th</sup> Edition, Academic Press, 2009
2. Statistical Methods, S. P. Gupta, 42<sup>nd</sup> Revised Edition, Sultan Chand & Sons, 2012
3. R for Beginners, Sandip Rakshit, McGraw-Hill

**REFERENCES:**

1. R-The Statistical Programming Language, Dr. Mark Gardner, Wiley India, 2013
2. Introduction to the Theory of Statistics, A. M. Mood, F. A. Graybill and D. C. Boes, 3<sup>rd</sup> Edition, McGraw-Hill, 2017
3. Introduction of Probability Models, S. M. Ross, 11<sup>th</sup> Edition, Academic Press, 2014

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. II Semester

### (22HS1EN101) ENGLISH FOR SKILL ENHANCEMENT

TEACHING SCHEME		
L	T/P	C
2	0	2

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

#### COURSE OBJECTIVES:

- To enhance vocabulary through word formation processes
- 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 improve coherence and cohesion in writing and speaking
- To recognize and practice the use of 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.

**CO-3:** Apply principles of critical thinking and 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 and coherence, and use this knowledge to accurately communicate technical information

**CO-5:** Employ appropriate rhetorical patterns of discourse in scientific and technical communication

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	1	1	1	1	-	2	1	1	2	3	2	2	-	-
CO-2	2	2	2	2	2	2	2	1	3	3	2	2	-	-
CO-3	2	2	2	2	1	3	2	1	3	3	2	2	-	-
CO-4	1	1	1	1	1	2	2	1	2	3	2	2	-	-
CO-5	1	1	1	1	-	2	1	1	2	2	1	1	-	-

#### UNIT-I:

1. Reading: On the Conduct of Life by William Hazlitt
2. Grammar: Conjunctions and Prepositions
3. Vocabulary: Word Formation (Affixation, Compounding, Conversion, Blending, Borrowing)
4. Writing: Punctuation, Clauses and Sentences Transitional Devices- Paragraph Writing- Process

**UNIT-II:**

1. Reading: How I Became a Public Speaker by G.B. Shaw
2. Grammar: Articles, Noun-Pronoun Agreement, Concord
3. Vocabulary: Word Formation- (Prefixes, Suffixes, Root Words)
4. Writing Skills: Principles of Good Writing-Coherence, Cohesion Essay Writing - Descriptive, Argumentative, Expository

**UNIT-III:**

1. Reading: Muhammad Yunus
2. Grammar: Misplaced Modifiers
3. Vocabulary: Synonyms and Antonyms
4. Writing Skills: Letter Writing- Formal Letters - Letter of Complaint, Letter of Requisition, Email Writing; Email Etiquette

**UNIT-IV:**

1. Reading: Politics and the English Language by George Orwell
2. Grammar: Cliches, Redundancies
3. Vocabulary: Common Abbreviations
4. Writing Skills: Summary Writing; Job Application; Resume

**UNIT-V:****Organizational Patterns for writing**

1. Patterns of Writing: Comparison and Contrast Pattern
2. Patterns of Writing: Cause and Effect Pattern
3. Patterns of Writing: Classification Pattern
4. Patterns of Writing: Problem-Solution Pattern

**TEXT BOOKS:**

1. Language and Life: A Skills Approach, Orient Black Swan
2. Technical Communication Rebecca E. Burnett, 6<sup>th</sup> Edition, Cengage Learning

**REFERENCES:**

1. Communication Skills, Pushplata and Kumar, Sanjay, OU Press, 2015
2. Remedial English Grammar, Wood F. T., Macmillan, 2007
3. Study Writing, Hamp, Liz., Lyons and Heasley, Ben, C U Press, 2006
4. Practical English Usage, Swan, Michael, OU Press, 1995
5. Longman Dictionary of Common Errors, Turton N. D. and Heaton J. B., 1991

**B.Tech. II Semester**

**(22ES1CS102) DATA STRUCTURES**

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

**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 the 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:** Solve the given problem using linear data structures

**CO-4:** Execute the given problem using non-linear data structures

**CO-5:** Analyze appropriate and efficient data structure to implement a given problem

**COURSE ARTICULATION MATRIX:**

(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	-	-	3	-	-	-	-	2	-	2	3	2	2
CO-2	3	3	2	2	3	-	-	-	2	2	-	2	2	3	2
CO-3	3	3	2	2	3	-	-	-	2	2	-	2	2	3	3
CO-4	3	3	2	2	3	-	-	-	2	2	-	2	2	3	3
CO-5	3	3	3	2	3	2	2	2	3	3	1	2	3	3	3

**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

**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-III:**

**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-IV:**

**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-V:**

**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
3. Data Structures and Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman

### **REFERENCES:**

1. Algorithms, Data Structures, and Problem Solving with C++, Mark Allen Weiss, Addison-Wesley Publishing Company
2. How to Solve it by Computer, 2<sup>nd</sup> Impression, R. G. Dromey, Pearson Education
3. Introduction to Algorithms, Cormen, Leiserson and Rivest
4. Data Structures: A Pseudo-code Approach with C, Gilberg & Forouzan, Thomson Learning
5. Data Structures using C & C++, Ten Baum, Prentice-Hall International

### **ONLINE RESOURCES:**

1. <https://nptel.ac.in/courses/106102064>
2. [https://onlinecourses.swayam2.ac.in/cec19\\_cs04/preview](https://onlinecourses.swayam2.ac.in/cec19_cs04/preview)

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. II Semester

### (22BS1PH102) APPLIED PHYSICS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

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

#### COURSE OBJECTIVES:

- To apply the principles of lasers for various laser systems and optical fibers
- To understand the principles of quantum physics and band theory of solids
- To explain various types of semiconductors and semiconductor devices
- To study the fundamental concepts related to the dielectric and magnetic materials
- To identify the importance of energy materials and nanomaterials

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

**CO-1:** Explain various aspects of lasers, optical fiber and their applications in diverse fields.

**CO-2:** Apply quantum mechanics to behavior of a particle and classify solids based on band gap

**CO-3:** Identify the role of semiconductor devices in science and engineering applications.

**CO-4:** Illustrate applications of dielectric, magnetic materials.

**CO-5:** Explore the features and applications of energy materials and nanomaterials.

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	1	1	-	1	1	-	1	1	-	1	-	-	-
CO-2	3	2	1	-	1	1	-	-	1	1	-	1	-	-	-
CO-3	3	2	2	1	-	2	-	-	1	1	-	1	-	-	-
CO-4	3	2	1	1	-	1	-	-	1	1	-	1	-	-	-
CO-5	3	2	2	1	1	2	2	-	1	1	-	1	-	-	-

#### UNIT-I:

**Laser and Fiber Optics:** Lasers: Laser beam characteristics-Three quantum processes (Absorption, Spontaneous emission & Stimulated emission), Lifetime, Metastable state, Population inversion, Pumping methods- Lasing action -Block diagram of laser-Einstein coefficients and their relations, Ruby laser, He-Ne laser, Applications of laser.

**Fiber Optics:** Introduction to optical fiber- Advantages of optical fibers - Total internal reflection, Construction of optical fiber - Acceptance angle - Numerical aperture- Classification of optical fibers. fiber optic laser - Applications.

## **UNIT-II:**

### **Quantum Physics and Band Theory of Solids:**

**Quantum Physics:** Introduction to quantum physics-Planck's law, Wave-particle duality, de-Broglie hypothesis, Matter waves, Davisson and Germer experiment – Heisenberg uncertainty principle and its applications - Born interpretation of the wave function – Time independent Schrodinger wave equation - Particle in one dimensional infinite potential well.

**Band Theory Solids:** Free electron theory (Drude & Lorentz.)-Electrical Conductivity-Verification of Ohm's law -Bloch's theorem -Kronig-Penney model (qualitative) – E-k diagram, Effective mass of electron -Origin of energy bands- Classification of solids.

## **UNIT-III:**

### **Semiconductors and Devices:**

**Semiconductors:** Intrinsic Semiconductors-Intrinsic carrier concentration, Extrinsic semiconductors (Qualitative), Fermi level and its temperature dependence, Hall effect-Hall coefficient, Applications of Hall effect.

**Semiconductor Devices:** Direct and indirect band gap semiconductors-Formation and characteristics of P-N junction diode, construction, working principle, Characteristics and applications of LED, and Solar cell, Construction and working principle of Laser diode.

## **UNIT-IV:**

### **Dielectric and Magnetic Materials:**

**Dielectric Materials:** Basic definitions- Types of polarizations (qualitative) -Frequency dependence of polarization, Local field, Clausius-Mossotti relation, Ferroelectric, Piezoelectric, and Pyroelectric materials – Applications.

**Magnetic Materials:** Basic definitions- Types of Magnetic materials, Antiferro and ferri magnetic materials, Weiss-Domain theory of ferromagnetism, Hysteresis - Soft and hard magnetic materials, Multiferroics – Applications.

## **UNIT-V:**

### **Energy Materials and Nanotechnology:**

**Energy Materials:** Introduction to energy materials, Electrolytes for super capacitors - Rechargeable ion batteries, Solid fuel cells.

**Nanotechnology:** Introduction, Quantum confinement, Surface to volume ratio, Physical properties, Bottom-up approach: Sol-gel, Top-down approach: Ball milling - Characterization techniques – Average crystallite size using X-ray diffraction pattern, Scanning electron microscopy - Applications of nanomaterials.

### **TEXT BOOKS:**

1. A Text Book of Engineering Physics, M. N. Avadhanulu, P. G. Kshirsagar & T. V. S. Arun Murthy, 11<sup>th</sup> Edition, S. Chand Publications, 2019



2. Engineering Physics, B. K. Pandey and S. Chaturvedi, 2<sup>nd</sup> Edition, Cengage Learning, 2022
3. Engineering Physics, P. K. Palanisamy, Scitech Publications

**REFERENCES:**

1. Essentials of Nanoscience & Nanotechnology, K. Narasimha Reddy, 1<sup>st</sup> Edition, Nano Digest, 2021
2. Fundamentals of Physics, Halliday, Resnick and Walker, 11<sup>th</sup> Edition, John Wiley & Sons, 2018
3. Introduction to Solid State Physics, A. C. Kittel, Wiley Eastern, 2019
4. Nano Materials, A. K. Bhandhopadhyay, 1<sup>st</sup> Edition, New Age International, 2007
5. Energy Materials A Short Introduction to Functional Materials for Energy Conversion and Storage, A. S. Bandarenka, 1<sup>st</sup> Edition, CRC Press, Taylor & Francis Group Energy Materials, 2022

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. II Semester

### (22BS2PH102) APPLIED PHYSICS LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

#### COURSE OBJECTIVES:

- To understand the working principle of lasers and optical fibers
- To analyze the characteristics of semiconductor devices and resonance phenomena
- To measure the time constant of RC circuit and dielectric constant of material
- To study the behavior of magnetic materials and understand least square method
- 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 total internal reflection in optical fiber using lasers

**CO-2:** Realize importance of optoelectronics and resonance in daily life

**CO-3:** Illustrate discharging of a capacitor and polarizability of dielectric material

**CO-4:** Identify the importance of least square fitting and applications of magnetic materials

**CO-5:** Correlate the experimental results with the classroom learning

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2	-	-	-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-	-
CO-5	3	2	1	-	-	1	1	1	2	1	-	2	-	-	-

#### LIST OF EXPERIMENTS:

- Torsional pendulum: understanding the method of least squares
- Determination of acceptance angle and numerical aperture of an optical fiber
- Determination of wavelength of given LASER using grating
- Determine the width of given wire- using LASER
- Determination of energy gap of a semiconductor
- V-I characteristics of light emitting diode (LED)
- V-I Characteristics of solar cell
- Measurement of dielectric constant
- Study the B-H curve of magnetic material
- Determination of time constant of RC circuit
- Melde's Experiment

## 12. AC frequency sonometer

### **TEXT BOOKS:**

1. Applied Physics Laboratory Manual/Observation, Physics Faculty of VNRVJIE
2. A textbook of Practical Physics, S. Balasubramanian, M. N. Srinivasan, S. Chand Publishers, 2017

### **ONLINE RESOURCES:**

1. <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>
2. <https://vlab.amrita.edu/index.php?sub=1&brch=280&sim=1518&cnt=1>

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. II Semester

### (22HS2EN101) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

#### COURSE OBJECTIVES:

- To train students to use neutral accent through phonetic sounds, symbols, stress and intonation
- To provide practice in vocabulary usage & grammatical construction
- 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 defining technical terms and describing processes
- To equip students with excellent writing skills and information transfer skills

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

**CO-1:** Speak fluently with a neutral accent

**CO-2:** Use contextually apt vocabulary and sentence structures

**CO-3:** Make Presentations with great confidence

**CO-4:** Define technical terms and describe processes

**CO-5:** Write accurately, coherently, and lucidly

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	-	-	-	-	-	-	-	-	2	3	1	1	-	-
CO-2	1	1	1	1	3	1	1	1	2	3	1	1	-	-
CO-3	1	1	-	-	-	2	2	-	3	3	3	1	-	-
CO-4	2	2	2	2	-	2	2	-	2	3	1	1	-	-
CO-5	1	1	1	1	-	2	1	-	2	3	2	1	-	-

#### LIST OF EXERCISES:

- Self-Introduction
- Phonetics- Identifying sounds-Word stress- Intonation
- Reading Comprehension – Reading for Gist & for Specific Details; Making inferences
- Story Telling
- Making Short Oral Presentations
- Listening Comprehension- Listening for Global meaning & specific details; note taking
- Learning vocabulary from context
- Book Review
- Writing Resume and CV

10. Information Transfer
11. Social Media Skills – Writing a Blog
12. Defining Technical Terms and Describing Processes

**TEXT BOOKS:**

1. Technical Communication, Rebecca E. Burnett, 6<sup>th</sup> Edition, Cengage Learning

**REFERENCES:**

1. Practical English Usage, Swan, Michael, Oxford University Press, 1995
2. Remedial English Grammar, F. T. Wood, Macmillan, 2007
3. Exercises in Spoken English, Parts I-III, CIEFL, Hyderabad, Oxford University Press
4. Fowler's Modern English Usage-Revised, R. W. Burchfield
5. Technical Communication, Raman, Meenakshi and Sharma, Sangeeta, Oxford University Press, 2005

**ONLINE RESOURCES:**

1. <https://caw.ceu.edu/academic-skills>
2. <https://www.biz-e-training.com/resources-for-learners/academic-writing-online-resources/>

**B.Tech. II Semester**

**(22ES2CS102) DATA STRUCTURES LABORATORY**

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

**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:** Understand the complexity analysis of linear and non linear data structures

**CO-5:** Use appropriate data structure for any given problem

**COURSE ARTICULATION MATRIX:**

(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	2	-	3	-	-	-	2	2	-	2	2	2	2
CO-2	3	3	2	2	3	-	-	-	2	2	-	2	2	3	2
CO-3	3	3	2	2	3	-	-	-	2	2	-	2	2	3	2
CO-4	2	2	1	2	-	-	-	-	2	2	-	1	3	3	3
CO-5	3	3	3	2	3	2	2	2	3	3	1	2	3	3	3

**LIST OF EXPERIMENTS:**

**WEEK 1:**

Implement Stack using Array

**WEEK 2:**

- Program to convert infix expression to postfix expression.
- Program to postfix evaluation.

**WEEK 3:**

Implement the following

- Linear Queue using Array
- 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:** Lab Internal - 1**WEEK 9:**

Implement BST operations

**WEEK 10:**

Implement B Tree operations

**WEEK 11:**

Implement following sorting techniques

- a) Merge   b) Heap   c) Radix   d) Quick

**WEEK 12:**

Implement following Hashing Techniques

- a) Separate Chaining   b) Linear Probing

**WEEK 13:**

Implement following Graph traversals

- a)   BFS   b) DFS

**WEEK 14:** Internal Lab -2**TEXT BOOKS:**

1. Fundamental of Data Structure, Horowitz and Sahani, Galgotia Publication
2. Data Structure, Lipschutz, Schaum Series
3. Data Structures and Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman

**REFERENCES:**

1. Algorithms, Data Structures, and Problem Solving with C++, Mark Allen Weiss, Addison-Wesley
2. How to Solve it by Computer, 2<sup>nd</sup> Impression, R. G. Dromey, Pearson Education
3. Introduction to Algorithms, Cormen, Leiserson and Rivest
4. Data Structures: A Pseudo-code Approach with C, Gilberg & Forouzan, Thomson Learning
5. Data Structures using C & C++, Ten Baum, Prentice Hall International

**ONLINE RESOURCES:**

1. <https://nptel.ac.in/courses/106102064>
2. [https://onlinecourses.swayam2.ac.in/cec19\\_cs04/preview](https://onlinecourses.swayam2.ac.in/cec19_cs04/preview)



# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. II Semester

### (22ES2ME102) ENGINEERING AND IT WORKSHOP

TEACHING SCHEME		
L	T/P	C
1	2	2

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

#### COURSE OBJECTIVES:

- To provide hands-on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field
- To study different hand operated power tools, uses and their demonstration
- To provide training on PC Hardware, Installation of Operating system, Internet & World Wide Web
- To study productivity tools including Word, PowerPoint, and Publisher

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

**CO-1:** Identify and apply suitable tools for different trades of Engineering processes

**CO-2:** Apply basic electrical engineering knowledge for house wiring practice

**CO-3:** Understand Hardware components, Operating system and inter dependencies  
Safeguard computer systems from viruses/worms

**CO-4:** Apply the basic knowledge on Document/PowerPoint Preparation

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	1	2	1	2	1	2	1	2	1	1	3	-	-	-
CO-2	3	1	2	1	2	1	2	1	2	1	1	3	-	-	-
CO-3	3	2	3	2	3	1	2	1	2	1	1	3	2	1	-
CO-4	3	2	3	2	3	1	2	1	2	3	2	3	2	-	-

#### LECTURES & VIDEOS:

1. Additive Manufacturing
2. Robots
3. Power Tools
4. Electrical & Electronics
5. Tin smithy
6. Joining Process
7. PC Hardware
8. Installation of Operating System
9. Internet and World Wide Web
10. Latex
11. Word
12. Power point

## ENGINEERING WORKSHOP:

### 1. TRADES FOR EXERCISES

#### House-wiring:

1. Parallel & Series connection
2. Two-way Switch and Tube Light connection

#### Tin-Smithy:

1. Rectangular scoop
2. Rectangular Tray

#### Joining Practice:

1. Arc Welding
2. Soldering

### 2. EQUIPMENT/TOOLS FOR DEMONSTRATION & EXPOSURE:

1. 3D printer
2. Power tools

## IT WORKSHOP:

### 1. PC Hardware

- i. Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.
- ii. Every student should individually install MS windows on the personal computer using Virtual Machine. Lab instructor should verify the installation and follow it up with a Viva.
- iii. Every student should install Linux on the computer using Virtual Machine. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

### 2. Internet & World Wide Web

- i. **Web Browsers, Surfing the Web:** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop-up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.
- ii. **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.
- iii. **Cyber Hygiene:** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

### 3. LaTeX and WORD

- i. **Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.
- ii. Using LaTeX and Word to create a project certificate. Features to be covered- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colours, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.
- iii. Creating project abstract Features to be covered- Formatting Styles, inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.
- iv. Creating a Newsletter: Features to be covered- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

### 4. PowerPoint

- i. Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.
- ii. Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts, Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

### TEXT BOOKS:

1. Workshop Practice, B. L. Juneja, Cengage
2. Workshop Manual, K. Venugopal, Anuradha
3. IT Essentials PC Hardware and Software Companion Guide, Davis Anfinson and Ken Quamme, 3<sup>rd</sup> Edition, CISC Press, Pearson Education
4. PC Hardware and A+ Handbook, Kate J. Chase, PHI (Microsoft)

### REFERENCES:

1. Workshop Manual, P. Kannaiah, K. L. Narayana, Scitech
2. Workshop Manual, Venkat Reddy, B. S. Publications
3. LaTeX Companion, Leslie Lamport, PHI/Pearson
4. The Complete Computer Upgrade and Repair Book, 3<sup>rd</sup> Edition, Cheryl A. Schmidt, Wiley Dreamtech
5. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education

### ONLINE RESOURCES:

1. <http://ecoursesonline.iasri.res.in/course/view.php?id=86>
2. <https://alison.com/course/fundamentals-of-workshop-technology>
3. <https://www.youtube.com/watch?v=ctAVC2JwEwI>
4. <https://www.youtube.com/watch?v=ZXAPCy2c33o>

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. II Semester

### (22SD5CS101) ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME						
D-D	PE	LR	CP	VV	SEE	TOTAL
10	10	10	10	10	-	50

#### COURSE OBJECTIVES:

- To study/demonstrate the concepts of computer with respect to it's hardware
- To identify the importance of software engineering principles and software process framework
- To introduce operating systems, database management concepts and to give the description of structure of database systems
- To configure a network and build the web pages using HTML, CSS, XML
- To learn autonomous systems and the need of artificial intelligence

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

**CO-1:** Analyze the working principles of functional units of a basic computer

**CO-2:** Understand program development, the use of data structures and algorithms in problem solving

**CO-3:** Know the need and types of operating system, database systems

**CO-4:** Apply the significance of networks, internet, and WWW and cyber security

**CO-5:** Investigate the autonomous systems and application of artificial intelligence

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	1	1	1	1	2	-	-	-	-	-	1	3	3	2	2	-
CO-2	2	3	3	2	2	-	-	2	2	2	2	3	3	3	3	-
CO-3	2	2	2	2	2	-	-	2	2	2	1	3	3	3	2	-
CO-4	2	2	2	-	2	2	2	2	2	-	1	3	3	2	2	-
CO-5	2	2	2	3	2	2	2	2	2	-	2	3	3	3	3	-

#### LIST OF EXERCISES:

**WEEK 1:** Identify the different components of Computer

**WEEK 2:** Demonstrate the assembling and disassembling of Hardware

**WEEK 3:** Usage of PowerPoint, Word, and Excel sheet

**WEEK 4:** Design and understand the need of Flowcharts and Algorithms

**WEEK 5:** Demonstrate the installation and features of Windows

**WEEK 6:** Demonstrate the installation and features of LINUX Operating Systems

**WEEK 7:** Understand & Implement the DDL

**WEEK 8:** Understand & Implement the DML commands

**WEEK 9:** Analyse the IP Address, LAN Setting and Network Crimping.

**WEEK 10:** Usage of Basic Networking commands

**WEEK 11:** Create Web pages using basic tags of HTML, XML & CSS

**WEEK 12: Case Study:** Design a sample Student webpage using basic tags of HTML, XML & CSS

**WEEK 13:** Implement Image and Video Processing Tools

**WEEK 14:** Internal Lab Exam

**TEXT BOOKS:**

1. Invitation to Computer Science, G. Michael Schneider, Macalester College, Judith L. Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield
2. Elements of Computer Science, Cengage

**REFERENCES:**

1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press
2. Introduction to Computers, Peter Norton, 8<sup>th</sup> Edition, Tata McGraw-Hill
3. Computer Fundamentals, Anita Goel, Pearson Education, 2010

**ONLINE RESOURCES:**

1. [https://onlinecourses.swayam2.ac.in/cec19\\_cs06/preview](https://onlinecourses.swayam2.ac.in/cec19_cs06/preview)
2. [https://onlinecourses.swayam2.ac.in/nou20\\_cs03/preview](https://onlinecourses.swayam2.ac.in/nou20_cs03/preview)

# VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

## B.Tech. II Semester

### (22MN6HS103) HAPPINESS AND WELLBEING

TEACHING SCHEME		
L	T/P	C
2	0	0

EVALUATION SCHEME			
SE-I	SE-II	SEE	TOTAL
50	50	-	100

#### COURSE OBJECTIVES:

- To learn sustainable strategies to develop positive attitude and happy heart
- To develop self-awareness and self-discipline to meet the needs of happiness
- To practice good health & mindfulness for wellbeing
- To adapt personality attributes of happiness and success strategies
- To nature happiness development index for better living

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

**CO-1:** Recognize what is happiness in life and how to sustain it

**CO-2:** Focus on interpersonal skills for a mindful approach

**CO-3:** Develop to mindfulness to handle challenging situations

**CO-4:** Recognize the importance of positive attitude for personal and professional development

**CO-5:** Interpret the need for nurturing happiness development index through Indicators

#### COURSE ARTICULATION MATRIX:

(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	-	-	-	-	-	3	-	2	1	-	-	3	-	-	-
CO-2	-	-	-	-	-	3	-	3	1	-	-	3	-	-	-
CO-3	-	-	-	-	-	1	-	1	1	-	-	3	-	-	-
CO-4	-	-	-	-	-	2	-	2	1	-	-	3	-	-	-
CO-5	-	-	-	-	-	3	-	1	1	-	-	3	-	-	-

#### UNIT-I:

**Introduction to Happiness:** Definition & theories of happiness: Hedonism theory, Desire theory, Objective list theory. Identifying potential barriers of happiness: Devaluing happiness, chasing superiority, being needy, being overly control-seeking, distrusting others, distrusting life, and ignoring the source within. Strategies for overcoming the potential barriers

#### UNIT-II:

**Power of Emotions & Relationships:** Role of emotional intelligence, self-awareness, and empathy in creating harmonious relationship with ourselves and others. Balancing emotions. Hormones that promote happiness. The importance of social connections

for happiness. Role of share & care, gratitude, forgiveness & kindness in building relationships

#### **UNIT-III:**

**Health and Well-being:** The link between health & happiness-exercise regularly, eat a healthy diet, get enough sleep for physical fitness. Mental wellbeing-Take notice, keep learning, stay connected with nature, and financial wellbeing. The practice of mindfulness and its benefits for mental and physical health. Moving from restlessness to restfulness- meditation and yoga to increase awareness and reduce stress

#### **UNIT-IV:**

**Re-Wirement for Wellbeing:** Abundance in life, freedom of choice, accepting change, ways of implementation for wellbeing; practicing habits-be proactive, begin with end-in-mind, put-first things-first, think win-win, seek first to understand then to be understood, synergize, sharpen the saw, and effectiveness to greatness

#### **UNIT-V:**

**Nurturing Happiness Development Index:** Exploring the sources of temporary joy and lasting happiness. Acceptance, Appreciation, forgiveness, gracefulness, and creative procrastination. Time management with four D's (delete, delay, delegate, do). Developing happiness index-track changes in happiness levels over time and identify the indicators

#### **TEXT BOOKS:**

1. The How of Happiness: A Scientific Approach to Getting the Life You Want, Sonja Lyubomirsky, Penguin Books, 2008
2. Authentic Happiness: Using the New Positive Psychology to Realize Your Potential for Lasting Fulfillment, Martin Seligman, Atria Books, 2004
3. The Book of Joy: Lasting Happiness in a Changing World, Dalai Lama, Desmond Tutu, and Douglas Abrams, Avery, 2016

#### **REFERENCES:**

1. 7-Habits of Highly Successful People, Stephen Covey, Simon & Schuster, 2020
2. Mindfulness Book of Happiness: Mindfulness and Meditation, Aimen Eman, Publish Drive Edition, 2018
3. Mindfulness at Work: How to Avoid Stress, Achieve More, and Enjoy Life, Dr. Stephen McKenzie, Exisle Publishing, 2014
4. The 8<sup>th</sup> Habit: From Effectiveness to Greatness, Stephen R. Covey, Free Press, 2004

#### **ONLINE RESOURCES:**

1. Life of Happiness and Fulfillment, Indian School of Business, Coursera  
<https://in.coursera.org/learn/happiness>
2. Science of Wellbeing, Yale University, Coursera  
<https://www.coursera.org/learn/the-science-of-well-being>