DEPARTMENT OF

MECHANICAL ENGINEERING

VISION OF THE DEPARTMENT

To develop into a Centre of Excellence in Education and interdisciplinary research with cutting edge technologies in the field of Mechanical Engineering, consistent with the contemporary and future societal needs of the country

MISSION OF THE DEPARTMENT

- To impart high quality education by using modern pedagogical tools so as to make the students technically competent in their chosen fields.
- To inculcate quality research by developing linkages with Industry and R & D organizations in India & abroad for developing technically competent and socially responsible engineers, managers and entrepreneurs.

B.TECH.
(MECHANICAL ENGINEERING)

B.TECH. (ME)

PROGRAM EDUCATIONAL OBJECTIVES

PEO-I: To prepare students for successful careers as mechanical engineers in organizations that meet the needs of Indian and global/multinational industrial/research establishments.

PEO-II: To provide a strong foundation in mathematical, scientific and engineering fundamentals in both domain and cross domain spheres, that enables students to visualize, analyze and solve mechanical engineering problems and be innovative and research oriented.

PEO-III: To train students with a wide spectrum of scientific and engineering courses so that students could comprehend, analyze, design and create products and services that address real life problems, which are efficient and cost effective.

PEO-IV: To inculcate in students a professional and ethical attitude, impart effective communication skills and ability to work in teams with multidisciplinary approach, be part of and interact with professional bodies so as to resolve engineering issues of social relevance.

PEO-V: To provide students with an academic environment that fosters excellence, leadership, yearning to pursue higher studies and passion for lifelong learning so as to have a successful professional career.

B.TECH. (ME)

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 analyse 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 modelling 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 in the broadest context of technological change.

B.TECH. (ME)

PROGRAM SPECIFIC OUTCOMES

PSO-1: Analyse, design, evaluate and provide solutions to the real-life mechanical engineering problems.

PSO-2: Research and Innovate on Product Design & Development using smart technologies and Apply managerial skills to execute professional responsibilities in industry or as an Entrepreneur.

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

I SEMESTER **R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22BS1MT101	Matrices and Calculus	3	1	0	4	4
22BS1CH101	Engineering Chemistry	3	0	0	3	3
22ES1CS103	C Programming and Data Structures	3	0	0	3	3
22PC1ME103	Engineering Materials	2	0	0	2	2
22PC1ME101	Fundamentals of Manufacturing Processes	2	0	0	2	2
22ES2ME101	Engineering Workshop	1	0	2	3	2
22ES2CS103	C Programming and Data Structures Laboratory	0	0	2	2	1
22BS2CH101	Engineering Chemistry Laboratory	0	0	2	2	1
22PC2ME101	Manufacturing Processes Laboratory	0	0	2	2	1
22SD5ME101	Elements of Mechanical Engineering	0	0	2	2	1
22MN6HS101	Induction Programme	2	0	0	2	0
Total		**16**	**1**	**10**	**27**	**20**

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
22BS1PH101	Engineering Physics	3	0	0	3	3
22PC1ME102	Metallurgy and Materials Science	3	0	0	3	3
22ES1ME101	Engineering Mechanics	3	1	0	4	4
22ES3ME101	Engineering Graphics	0	0	4	4	2
22HS1EN101	English for Skill Enhancement	2	0	0	2	2
22HS2EN101	English Language and Communication Skills Laboratory	0	0	2	2	1
22PC2ME102	Metallurgy and Materials Science Laboratory	0	0	2	2	1
22BS2PH101	Engineering Physics Laboratory	0	0	2	2	1
22MN6HS103	Happiness and Wellbeing	2	0	0	2	0
Total		**15**	**2**	**10**	**27**	**20**

L – Lecture T – Tutorial P – Practical D – Drawing CH – Contact Hours/Week
C – Credits SE – Sessional Examination CA – Class Assessment ELA – Experiential Learning Assessment
SEE – Semester End Examination D-D – Day to Day Evaluation LR – Lab Record
CP – Course Project PE – Practical Examination

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, 11th 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, 9th 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, 4th Edition, Laxmi Publications (P) Ltd.
4. Calculus and Analytic Geometry, G. B. Thomas and R. L. Finney, 9th 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

(22BS1CH101) ENGINEERING CHEMISTRY

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 advanced materials for sustainable living

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 advanced materials for better efficiency 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).

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:

Advanced Materials:

Composites: Introduction, need for composites, classification of composites-Fibre reinforced composites-Glass fibre, carbon fibre and aramid fibre-Features and applications, Hybrid composites-natural and synthetic.

Self -healing materials-Features, principle, 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. Biodegradable lubricants-Definition, comparison with conventional lubricants, applications.

TEXT BOOKS:

1. Engineering Chemistry, P. C. Jain and M. Jain, Dhanpat Rai, 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 and Company, 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

(22ES1CS103) C PROGRAMMING AND 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 the basics of programming, computing environments
- To understand various C language constructs
- To explore operations and concepts of different data structures
- To know various file operations

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

CO-1: Illustrate algorithm, flow chart for a given problem

CO-2: Explore the basics of C and various data types in C

CO-3: Develop modular programs using different language constructs

CO-4: Analyse the basic concepts and different operations on Linear and Non-Linear Data structures

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	PSO-3
CO-1	1	2	2	-	-	-	-	1	1	1	-	1	-	-	-
CO-2	3	2	3	1	2	-	-	-	1	-	-	2	-	-	-
CO-3	3	3	3	2	2	-	-	2	2	2	-	2	-	-	-
CO-4	3	3	2	2	-	-	-		2		-	2	-	-	-
CO-5	3	3	3	2	2	-	-	2	2	2	-	2	-	-	-

UNIT-I:

Algorithm: Flowchart- Structure of C program- Identifiers- Basic data types-Constants-variables- Operators-Expressions- Precedence and order of evaluation.

Input-Output Statements: If and switch statements- Loops- While- Do-while and for Statements- Break- Continue- Goto and Labels- Example C Programs.

UNIT-II:

Functions: basic concepts- parameter passing- storage classes- scope rules- user defined functions- standard library functions- recursive functions- example C programs.

UNIT-III:

Arrays: Basic concepts- one-dimensional and two-dimensional arrays- Character array- string handling functions- example C programs.

Sorting: Selection sort- Bubble sort- Insertion sort.

Searching-Linear and Binary search methods.

UNIT-IV:

Structures: Declaration-Definition and Initialization of Structures-Accessing Structures-Operations on Structures, typedef. Unions- Declaration-Definition and Initialization of Unions.

Pointers: Basic concepts- Pointers and functions- Pointers and strings- Pointers and arrays- Pointers and structures- Self referential structures, Dynamic Memory Allocation-Example C programs.

UNIT-V:

Introduction to Data Structures: Stacks and Queues(Linear, Circular, Dequeue)-ADT-Implementation Using Arrays.

Linked List: Definition, representation, ADT, List of applications, Trees - Definition, representation ADT, List of applications and Graphs - Definition, representation, ADT, List of applications

TEXT BOOKS:

1. Computer Science - A Structured Programming Approach Using C, B. A. Forouzan and R. F. Gilberg, 3rd Edition, Thomson
2. The C Programming Language, B. W. Kernighan, Dennis M. Ritchie, PHI/Pearson Education
3. C Programming and Data Structures, E. Balagurusamy, TMH

REFERENCES:

1. Data Structures Using C, A. S. Tanenbaum, Y. Langsam and M. J. Augenstein, PHI/ Pearson Education
2. Programming in C, Stephen G. Kochan, 3rd Edition, Pearson Education
3. Data Structures and Program Design in C, R. Kruse, C. L. Tondo, B. P. Leung, Shashi M, 2nd Edition, Pearson Education

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22PC1ME103) ENGINEERING MATERIALS

TEACHING SCHEME		
L	T/P	C
2	0	2

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

COURSE OBJECTIVES:

- To provide basic understanding of engineering materials, their structure, classification and usage
- To introduce the testing methods for various material properties and ASTM standards used in testing
- To understand the various materials used in mechanical engineering like metals, ceramics, polymers, composite materials and other new materials

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

CO-1: Classify the various materials that will be essential for the mechanical engineering applications

CO-2: Express the mechanical properties of metals and their testing procedures.

CO-3: Understand the application of materials and their processing

CO-4: Interpret the requirement and need for the development of the new materials

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	1	1	1	1	1	2	2	2	2	3	1	-	-
CO-2	2	2	1	2	1	1	2	2	2	-	-	2	2	-
CO-3	3	2	-	-	2	2	1	1	2	1	2	-	-	-
CO-4	-	-	2	2	-	-	1	1	3	2	-	2	-	3

UNIT-I:

Introduction: Classification of Engineering Materials, Ashby chart, Mechanical Properties of Metals and their testing equipment / procedures, ASTM standards for testing, Stress-strain behavior of various materials.

UNIT-II:

Metals and Metal Alloys: Classification of Metal Alloys, Classification, composition, properties and applications of Ferrous alloys: Steel, HSS, Grey cast iron, White cast iron; Classification, composition, properties and applications of Non-ferrous materials: Aluminum, Titanium, Zinc, Copper, Nickel, Cobalt and their alloys.

UNIT-III:

Composites: Definitions, Reinforcements and matrices, Types of reinforcements, Types of matrices, Classification of composites, Properties of composites in comparison with standard materials

UNIT-IV:

Ceramics: Classification of ceramic materials, Applications and Properties of Ceramics, Ceramic fabrication techniques, Carbon, Diamond and Graphite.

Plastics: Important sources of plastics, Classification of plastics and their uses, food grade plastics, Applications of plastics in automobile and domestic use.

UNIT-V:

Materials in Nano Technology:

Semiconductor Nanomaterials: Zinc oxide nano materials, ceramic nano materials, titanium dioxide nanoparticles, metal nano particles (Silver, gold, iron and copper), and their applications, bio-materials and other recent materials.

TEXT BOOKS:

1. Introduction to Engineering Materials, George Murray, Charles V. White, Wolfgang Weise, CRC Press, 2007
2. Materials Science and Engineering: An Introduction, William D. Callister, David G. Rethwisch, 10th Edition, John Wiley & Sons, 2018
3. Essentials of Materials Science and Engineering, Pradeep P. Fulay, Donald R. Askeland, 2013

REFERENCES:

1. Mechanical Engineers' Handbook, Myer Kutz, John Wiley & Sons, 2015
2. Nanotechnology: The Science of Small, M. A. Shah, K. A. Shah, 2nd Edition, Wiley, 2019
3. Materials and Processes in Manufacturing, E. Paul De Garmo, J. T. Black, R. A. Kohler, 11th Edition, John Wiley and Sons, Inc., 2012
4. Ceramic Matrix composite Materials, K. K. Chawala, Kluwer Academic Publishers, 2002
5. Plastics Engineering, R. J. Crawford, Pergamon Press, 2013

ONLINE RESOURCES:

1. https://www.my-mooc.com/en/mooc/materials-science-and-engineering/
2. https://materialseducation.org/

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22PC1ME101) FUNDAMENTALS OF MANUFACTURING PROCESSES

TEACHING SCHEME		
L	T/P	C
2	0	2

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

COURSE PRE-REQUISITES: Engineering Materials, Manufacturing Science

COURSE OBJECTIVES:
- To understand about sand casting and metal casting techniques
- To impart the knowledge of various welding processes
- To evaluate the importance of rolling, forging and sheet metal operations
- To analyze the processing of plastics

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyze and select the suitable casting technique for making the components
CO-2: Analyze the different types of welding processes are needed for various materials and importance of welding
CO-3: Apply the methods involved in sheet metal operations, rolling, forging etc.
CO-4: Apply the various manufacturing methods in processing of plastics

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	2	-	-	1	-	1	1	1	1	3	3	1
CO-2	2	2	2	-	-	1	-	1	1	1	1	3	3	1
CO-3	2	2	2	-	-	1	-	1	1	1	1	3	3	1
CO-4	2	2	2	-	-	1	-	1	1	1	1	3	3	1

UNIT – I:
Casting: Steps involved in making a casting; advantage of casting and its applications; types of foundry sands, types of patterns – materials used for patterns; pattern allowances and their construction; principles of gating.

UNIT – II:
Welding: Classification of welding processes, gas welding, arc welding, resistance welding, tungsten inert gas welding, metal inert gas welding, soldering & brazing. welding defects.

UNIT – III:
Mechanical Working-I: Hot working; cold working; comparison of properties of cold and hot worked parts.
Sheet Metal Working: Stamping, forming and other cold working processes: Blanking and piercing; Bending and forming; Coining;
Rolling: Rolling fundamentals; theory of rolling; types of rolling mills and products.

UNIT – IV:

Mechanical Working-II:

Extrusion: Basic extrusion process and its characteristics; Hot extrusion and Cold extrusion; Forward extrusion and backward extrusion hydrostatic extrusion.

Drawing: Principle of drawing and its types; Wire drawing and Tube drawing;

Forging Processes: Principle of forging; types of forging; smith forging; drop forging; roll forging; rotary forging;

UNIT – V:

Plastic Materials and Processes: Types of plastics; advantages of plastics, Injection moulding; Blow moulding; Thermoforming. Compression moulding.

TEXT BOOKS:

1. Manufacturing Technology Volume-I, P. N. Rao
2. Production Technology, R. K. Jain

REFERENCES:

1. Manufacturing Engineering and Technology, Kalpak Jian S.
2. Process and Materials of Manufacturing, Lindberg/PE
3. Principles of Metal Castings, Rosenthal
4. Welding Process, Parmar
5. Production Technology, Sharma P. C.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22ES2ME101) ENGINEERING 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 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, equipment 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: Understand various types of manufacturing processes
CO-2: Fabricate/make components from wood and steels through hands on experience
CO-3: Understand different machining processes like turning, drilling, tapping, etc.
CO-4: Understand electrical and electronic components and their assembly

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	2	2	2	1	2	1	3	2	1	2	3	2
CO-2	2	1	2	2	2	1	2	1	3	2	1	2	3	2
CO-3	2	2	2	2	2	1	2	1	3	2	1	2	3	2
CO-4	2	1	2	2	2	1	2	1	3	2	1	2	3	2

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

LIST OF EXPERIMENTS:

I. Carpentry
i. Cross lap joint
ii. Mortise & tenon joint

II. Fitting
i. Square fitting
ii. L-fitting

III. Arc Welding
I. Butt joint
II. Lap joint

IV. Smithy
i. Rectangular Tray (Tin smithy)
ii. U-hook (Black smithy)

V. Electrical & Electronics
i. Single lamp connection & Stair case connection
ii. Soldering and de-soldering on a PCB.

VI. Machine Shop
i. Step turning on lathe
ii. Drilling & tapping

TEXT BOOKS:

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

REFERENCES:

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

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22ES2CS103) C PROGRAMMING AND 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 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 use different basic and derived data types
- To understand the concept of modular programming
- To identify various operations on data structures

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

CO-1: Use various data types and apply basic concepts of the language for a specified problem

CO-2: Choose appropriate language constructs to develop a solution for a given problem

CO-3: Execute the programs using modular approach

CO-4: Implement various operations of a given data structure

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	PSO-3
CO-1	2	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO-2	2	2	2	1	-	-	-	-	-	-	-	2	-	-	-
CO-3	2	2	1	2	1	-	-	-	2	1	-	2	-	-	-
CO-4	2	2	1	2		-	-	-	2	1	-	2	-	-	-
CO-5	2	2	2	2	1	-	-	2	2	1	-	2	-	-	-

LIST OF PROGRAMS:

WEEK 1:

Small programs on input output statements

Small programs on various types of operators

WEEK 2:

Small but tricky codes on decision making statements(If, If-else, Nested If-Else, Else if Ladder, Switch.

Programs using loops (goto, while, do..while, for)

Programs to understand difference between Break and Continue

WEEK 3:

Programs on proper parameter passing techniques

Programs to understand storage classes
Programs using recursion

WEEK 4:
Programs on I-D arrays
Programs on 2-D arrays

WEEK 5:
Programs on strings
Programs using string handling functions

WEEK 6:
Programs on searching and sorting

WEEK 7:
LAB INTERNAL-1

WEEK 8:
Programs using structures, Unions

WEEK 9:
Simple Programs using pointers

WEEK 10:
Programs using pointers on arrays, strings
Programs using pointers on structures

WEEK 11:
Program to implement stacks using arrays

WEEK 12:
Program to implement Linear queue using arrays

WEEK 13:
Program to implement Circular and Dequeue using arrays.

WEEK 14:
LAB INTERNAL-2

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
3. https://emb-iitk.vlabs.ac.in/exp/sem-basics/

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22PC2ME101) MANUFACTURING PROCESSES 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: Engineering Materials, Manufacturing Science

COURSE OBJECTIVES:
- To understand and evaluate casting techniques and sand properties
- To understand different welding processes and their use
- To understand different press working operations
- To understand about the processing of plastics

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply the knowledge involved in casting techniques
CO-2: Decide the selection of various welding techniques applicable for different materials
CO-3: Integrate the knowledge involved in press working operations
CO-4: Analyze the techniques involved in processing of plastics

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	1	1	-	1	-	1	3	3	2	3	3	1
CO-2	2	2	1	2	-	1	-	1	3	3	2	3	3	1
CO-3	2	2	1	2	-	1	-	1	3	3	2	3	3	1
CO-4	2	2	2	1	-	1	-	1	3	3	2	3	3	1

LIST OF EXPERIMENTS:

Experiments to be performed from the following:

I. Metal Casting:
1. Pattern design and making - for one casting drawing.
2. Sand properties testing - Exercise for strength and permeability.
3. Moulding, Melting and Casting.

II. Welding:
1. Gas Welding
2. Spot Welding
3. TIG Welding
4. MIG Welding
5. Brazing

III. Mechanical Working:
1. Blanking and Piercing operations

2. Bending operation

IV. Processing of Plastics:

1. Injection Molding
2. Blow molding

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22SD5ME101) ELEMENTS OF MECHANICAL 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 measure the length, width and height of the components and calibrate the measuring instruments
- To identify the errors in measuring instruments
- To study the working principle of various machines and components
- To find the thermos-physical properties of fuels and lubricants

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

CO-1: Measure the dimensions of the components by using various measuring instruments

CO-2: Identify the errors in measuring instruments

CO-3: Understand the operation, usage and application of different machines (IC engines, lath, drilling, milling, grinding, etc) and their components (gear box, boilers etc.)

CO-4: Determine the thermo-physical properties of fuels and lubricants (flash point, fire point, viscosity, calorific value, carbon reside etc.)

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	-	-	1	-	2	2	1	2	3	2
CO-2	3	2	2	1	-	-	1	-	2	2	1	2	3	3
CO-3	3	2	2	1	-	-	1	-	2	2	1	2	3	3
CO-4	3	2	2	1	-	-	2	-	2	2	1	2	3	3

LIST OF EXPERIMENTS:

1. Measurement of length, height, diameter by vernier calipers.
2. To measure diameter of a given wire and sphere, thickness of a given sheet using micrometer screw gauge.
3. Calibration of measuring instruments using slip gauges.
4. Measure the Taper angle using Sine bar
5. Demonstration of Friction stir welding.
6. Study of transmission system –gear box
7. Study of Boilers
8. Assembly /disassembly of Engines
9. Determination of Flash and Fire points of Liquid fuels/Lubricants using: Abels Apparatus.
10. Determination of Viscosity of Liquid lubricants and Fuels using: Redwood Viscometer
11. Determination of Carbon Residue of Liquid fuels using: Carbon Residue test.

12. Determination of Calorific value Solid/Liquid/ fuels using: Bomb Calorimeter

TEXT BOOKS:

1. The Principles of Metallographic Laboratory Practice, George L. Kehl, McGraw-Hill
2. Internal Combustion Engineering, Ganesan V., 4th Edition, Tata McGraw-Hill, 2017
3. A Course in Internal Combustion Engines, M. L. Mathur, R. P. Sharma, Dhanpat Rai Pub., 2003

REFERENCES:

1. Fuels – Solids, Liquids, Gaseous, Brame J. S. S. and King J. G.

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 eax,sin (ax), cos (ax), polynomials in x, eaxV(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, 11th Reprint, Tata McGraw-Hill, 2010
3. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley

REFERENCES:

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

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22BS1PH101) ENGINEERING 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 basic crystal structures, XRD and defects in solids
- To explore the concepts related to the dielectric materials
- To study the fundamental concepts related to the magnetic materials and superconductors
- 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: Identify different types of crystals, importance of X-ray studies in crystals and realize the importance of crystal defects

CO-3: Illustrate applications of dielectric materials

CO-4: Realize the applications of magnetic and superconducting 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
CO-1	3	2	1	1	-	1	1	-	1	1		1	-	-
CO-2	3	2	2	1	2	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:

Crystallography and Defects in Solids: 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.

Point defects (Vacancies, Interstitial and Impurities) Line imperfections, Edge and Screw dislocation, Burger vector, Surface defects and volume defects (Qualitative Treatment).

UNIT-III:

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

UNIT-IV:

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, Type I and Type II superconductors, Applications of Superconductors.

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, 11th Edition, S. Chand Publications, 2019
2. Engineering Physics, B. K. Pandey and S. Chaturvedi, 2nd Edition, Cengage Learning, 2022
3. Engineering Physics, P. K. Palanisamy, Scitech Publications

REFERENCES:

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

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22PC1ME102) METALLURGY AND MATERIALS SCIENCE

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE OBJECTIVES:

- To learn the concepts of metallurgy and materials science in manufacturing processes
- To interpret phase diagrams of different alloy systems
- To describe the concept of heat treatment and other strengthening mechanisms

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Memorize the types of Crystal structures and their defects
CO-2: Learn the necessity of alloying and identify types of alloy phases
CO-3: Demonstrate importance of critical understanding of heat treatment in achieving required properties
CO-4: Apply the knowledge of heat treatment to enhance surface properties
CO-5: Analyze the microstructure and characteristics of ferrous and non-ferrous alloys

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	1	1	-	-	1	-	-	-	-	-	-	-	-
CO-2	3	2	2	3	2	3	2	2	2	2	1	2	3	2
CO-3	2	3	2	2	2	3	3	2	1	1	2	2	2	1
CO-4	3	2	3	2	3	2	3	2	1	1	1	1	1	1
CO-5	3	3	3	2	2	3	2	1	1	1	1	1	1	1

UNIT-I:
Crystal Structure: Unit cells, Metallic and Ceramic crystal structures. Imperfection in solids: Point, line, surface and volume defects; dislocations, strengthening mechanisms, slip systems, critical resolved shear stress.

UNIT-II:
Hume – Rothery Rules: Alloys, substitutional and interstitial solid solutions- Phase diagrams: Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, Eutectoid, peritectoid and monotectic reactions. Iron, Iron-carbide phase diagram and microstructural aspects of ledeburite, austenite, pearlite, ferrite, and cementite.

UNIT-III:
Heat Treatment of Steels: Isothermal transformation diagrams for Fe-C alloys and microstructures development. Martensite, Bainite. Annealing. Normalizing, Hardening, Tempering and Spheroidising.

UNIT-IV:
Continuous cooling curves and interpretation of final microstructures and properties- Thermo mechanical treatments like austempering, martempering, surface hardening methods like case hardening, carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening.

UNIT-V:
Micro structure and characteristics of Alloy steels, stainless steels and tool steels, maraging steels, cast irons (grey, white, malleable and spheroidal graphite cast irons), copper and its alloys (Brass and bronze)- Aluminum and its alloys (Al-Cu Alloys).

TEXT BOOKS:

1. Material Science and Engineering, V. Raghavan, 5th Edition, Prentice Hall of India
2. Materials Science and Engineering: An Introduction, William. D. Callister, David G. Rethwisch, John Wiley & Sons, 2018
3. Introduction to Physical Metallurgy, Sidney H. Avner, McGraw-Hill, 2017

REFERENCES:

1. Engineering Materials, Kenneth G. Budinski and Michael K. Budinski, 9th Edition, Prentice Hall of India, 2009
2. Engineering Materials and Metallurgy, U. C. Jindal, Pearson, 2011

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22ES1ME101) ENGINEERING MECHANICS

TEACHING SCHEME		
L	T/P	C
3	1	4

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

COURSE OBJECTIVES:

- To understand and 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 and friction bodies
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

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	3	2	2	-	1	-	-	-	-	2	2	3	-
CO-2	3	3	3	2	-	1	-	-	-	-	1	2	3	-
CO-3	3	3	2	2	-	1	-	-	-	-	2	2	3	-
CO-4	3	3	2	2	-	1	-	-	-	-	2	2	3	-

UNIT-I:
System of Forces: Basic concepts of mechanics-units, classification of mechanics, force, characteristics of force, types of forces, Principle of transmissibility. Resultant of coplanar system of forces- parallelogram law of forces, triangle law of forces, polygon law of forces, method of resolution of forces, equilibrant and resultant of coplanar concurrent forces-problems.
Equilibrium of Forces: Free Body Diagram, equilibrium conditions, Lami's theorem, equilibrium of roller- problems. Moment, couple, Varignon's principle, resultant of parallel forces- problems.

UNIT-II:
Friction: Types of Friction, laws of friction, coefficient of friction, angle of friction, angle of repose, cone of friction, limiting friction. Equilibrium of connected bodies on rough horizontal and inclined planes- problems.
Centroid & Centre of Gravity: Introduction, Centroid, Centroids of lines, Standard areas and volumes, Centroids of composite sections, Centre of gravity of simple bodies, Pappu's Theorems-Problems.

UNIT-III:

Area Moment of Inertia: Introduction to area moment of inertia, polar moment of inertia, radius of gyration, parallel axis theorem, perpendicular axis theorem, moment of inertia of standard sections -problems.

Mass Moment of Inertia: Introduction to mass moment of inertia, radius of gyration, transfer formula for Mass moments of inertia. Derivations of mass moment of Inertia for simple sections- rectangular plate, ring, circular disc, slender rod, cylinder, sphere & cone.

UNIT-IV:

Kinematics of Particles: Kinematics of particles- rectilinear motion, curvilinear motion – Projectiles-problems.

Kinetics of Particles: Kinetics of particles – Newton's Second Law, Dynamic equilibrium, Inertia force, D Alembert's Principle and its applications to connected bodies-problems.

UNIT-VI:

Work–Energy: Work and Energy principle, Application of Work-Energy principle to-spring systems and connected bodies-problems.

Impulse–Momentum: Impulse-Momentum Principle, Application of Impulse-Momentum principle to connected bodies-problems.

TEXT BOOKS:

1. Engineering Mechanics, S. Timoshenko, D. H. Young & J. V. Rao, 5th Edition, TMH, 2017
2. Singer's Engineering Mechanics, K. Vijaya Kumar Reddy & J. Suresh Kumar, 3rd Edition, B. S. Publishers, 2011

REFERENCES:

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

ONLINE RESOURCES:

1. https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT
2. https://www.youtube.com/watch?v=TnWBAnkCDuc&list=PLq7jO-L_k0yUk2tfPwhea9asGRBXcUEpL

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22ES3ME101) ENGINEERING GRAPHICS

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 know the importance of engineering scales and curves
- To learn to use the orthographic projections for points, lines and planes in different positions
- To learn to draw the projections of solids and its sections in different positions
- To learn to draw the development of surfaces and intersection of solids
- To learn to draw the isometric projections of solids

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 and planes in different positions using AutoCAD

CO-3: Draw the orthographic projections of solids and its sections in different positions using AutoCAD

CO-4: Obtain the development of surfaces of solids and intersection of solids using AutoCAD

CO-5: Construct the isometric projections of solids 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	-	3	1
CO-2	3	2	2	1	3	-	-	-	3	2	2	-	3	1
CO-3	3	2	2	1	3	-	-	-	3	2	2	-	3	1
CO-4	3	2	2	1	3	-	-	-	3	2	2	-	3	1
CO-5	3	2	2	1	3	-	-	-	3	2	2	-	3	1

Introduction to AutoCAD Software:

User interface, Menu System, Toolbars (Draw, Modify, Dimension, Layers), Setting drawing area, Status Bar (ortho, grid, snap, osnap, iso, lineweight etc.), Display control commands (pan, zoom etc.), Print setup.

UNIT-I:

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

Engineering Curves

Conic Sections: Ellipse, Parabola and Hyperbola- General methods only, Rectangular Hyperbola

Cycloidal Curves & Involutes: Cycloid, Epicycloid, Hypocycloid and Involutes

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 regular Solids like Prism, Cylinder, Pyramid and Cone inclined to both the Planes - Auxiliary Views

Sections of Solids: Section and sectional views of right regular solids like Prism, Cylinder, Pyramid and Cone – Auxiliary Views

UNIT-IV:

Development of Surfaces of Right Regular Solids: Development of surfaces of Right Regular Solids like Prism, Pyramid, Cylinder and Cone

Intersection of Solids: Intersection of prism vs prism, cylinder vs cylinder

UNIT-V:

Isometric Projections: Principles of isometric projection, Isometric Scale, Isometric Views, Conventions, Isometric Views of lines, Planes and Solids like Prism, Pyramid, Cylinder and Cone

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

TEXT BOOKS:

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

REFERENCES:

1. Engineering Drawing and Graphics using AutoCAD, T. Jeyapoovan, 3rd Edition, S. Chand
2. Engineering Drawing, Basant Agrawal and C. M. Agrawal, 3rd Editon, McGraw-Hill
3. Mastering AutoCAD 2021 and AutoCAD LT 2021, George Omura and Brian C. Benton (AutoCAD 2021), 1st Edition, John Wiley & Sons

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/112103019
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php

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, 6th 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 Heasly, 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

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:

1. Self-Introduction
2. Phonetics- Identifying sounds-Word stress- Intonation
3. Reading Comprehension – Reading for Gist & for Specific Details; Making inferences
4. Story Telling
5. Making Short Oral Presentations
6. Listening Comprehension- Listening for Global meaning & specific details; note taking
7. Learning vocabulary from context
8. Book Review
9. 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, 6th 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/

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22PC2ME102) METALLURGY AND MATERIALS SCIENCE 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: Metallurgy and Material Science

COURSE OBJECTIVES:

- To understand the significance of microstructure of non-ferrous materials under microscopic testing
- To understand the changes in microstructures after different heat treatments processes
- To understand the significance of microstructure of ferrous materials under microscopic testing
- To understand the changes processes of testing for different materials

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Test and Identify different microstructures of various materials
CO-2: Prepare appropriate heat treatment for a given material by checking its microstructure
CO-3: Conduct mechanical test on ferrous and non-ferrous materials for mechanical properties
CO-4: Able to identify and analyze various mechanical properties for different mechanical applications

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	1	1	-	-	-	-	-	-	-	-	-	3	2
CO-2	3	2	2	3	2	3	2	2	2	1	1	2	2	2
CO-3	2	3	2	2	2	3	3	2	1	2	2	2	2	1
CO-4	3	2	3	2	3	2	3	2	1	1	1	1	1	1

LIST OF EXPERIMENTS:

1. Preparation and study of the microstructure of metals like Iron, Cu and Al.
2. Preparation and study of the microstructure of mild steels, low carbon steels, and high carbon steels.
3. Study of the microstructures of cast irons.
4. Study of the microstructures of non-ferrous alloys.
5. Study of the microstructures of heat-treated steels.
6. Finding Hardenability of steels by Jominy end quench test.
7. Identify the microstructure of cutting tools.
8. Analyze the microstructures of stainless steel.
9. Observe the microstructures of bearing materials.

10. Analyze the microstructure of weld metals
11. Study of microstructure of mechanical working materials

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22BS2PH101) ENGINEERING 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
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. Torsional pendulum: understanding the method of least squares.
2. Determination of acceptance angle and numerical aperture of an optical fiber.
3. Determination of wavelength of given LASER using grating.
4. Determine the width of given wire- using LASER
5. Determination of the beam divergence of a given LASER.
6. V-I characteristics of light emitting diode (LED)
7. V-I Characteristics of solar cell.
8. Measurement of dielectric constant.
9. Study the B-H curve of magnetic material.
10. Determination of time constant of RC circuit.
11. Melde's Experiment
12. AC frequency sonometer

TEXT BOOKS:

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

(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 Fulfilment, 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 8th 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