LINEAR ALGEBRA AND MULTIVARIABLE CALCULUS

23MA1101 **Credits:3**

Instruction : 3 periods & 1 Tutorial/Week Sessional Marks:40
End Exam : 3 Hours End Exam Marks:60

Prerequisites: Matrices, Differentiation, Integration and Functions.

Course Objectives:

To provide the students with sufficient knowledge in calculus and matrix algebra, this can be used in their respective fields.

Course Outcomes: By the end of the course, students will be able to

1.	Apply elementary transformations to reduce the matrix into the echelon form and normal form to determine its rank and interpret the various solutions of system of linear equations.
2.	Identify the special properties of a matrix such as the eigen value, eigen vector, employ orthogonal transformations to express the matrix into diagonal form, quadratic form and canonical form.
3.	Equip themselves familiar with the functions of several variables.
4.	Evaluate double and triple integrals techniques over a region in two dimensional and three dimensional geometry.
5.	Express the given function in terms of sine and cosine.

CO-PO –PSO Mapping:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1	1							1	2			
CO2	3	2	1	1							1	2			
CO3	3	2	1	1							1	2			
CO4	3	2	1	1							1	2			
CO5	3	2	1	1							1	2			

Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes &Program Specific Outcomes:

	CO-PO-PSO Justification
1	CO1 is a basic tool which is used to find a solution of a complex problem after reducing it into a system of linear equations in many areas of the engineering sciences.
2	CO2 deals with eigen values, eigen vectors of a square matrix which are widely used in all the engineering branches like communications systems, Designing bridges, Machine learning.
3	CO3 deals with partial derivatives which are widely used in all the branches of engineering sciences.
4	CO4 delas with the techniques of multiple integrals which are used to find the area, volume and other physical and geometrical parameters in all the areas of engineering sciences.
5	CO5 is used to represent the given periodic function as an infinite sum of cosine and sine terms.

SYLLABUS

UNIT I **10 Periods**

Linear Equations : Rank of matrix - Normal form of a matrix - PAQ form - Gauss Jordan method of finding the inverse - Consistency of linear system of equations.

Sections: 2.7 and 2.10.

UNIT II **10 Periods**

Linear transformations and Quadratic forms : Eigen values - Eigen vectors - Properties of eigen values (without proofs) - Cayley Hamilton theorem (without proof) - Reduction of quadratic form to canonical form - Nature of the Quadratic form.

Sections: 2.13, 2.14, 2.15, 2.17 and 2.18.

UNIT III **10 Periods**

Multivariable Calculus : Total derivatives - Chain rule - Change of variables - Jacobians - Taylor's series expansion of two variable function - Maxima and minima of functions of two variables - Method of Lagrange's multipliers.

Sections: 5.5, 5.6, 5.7, 5.9, 5.11 and 5.12.

UNIT IV **10 Periods**

Multiple Integrals : Double integrals - Change of order of integration - Double integration in polar coordinates - Areas enclosed by plane curves - Triple integrals - Volumes of solids (by using double and triple integrals).

Sections: 7.1, 7.2, 7.3, 7.4, 7.5 and 7.6.

UNIT V **10 Periods**

Fourier Series : Introduction - Euler's formulae (without proof) - Conditions for a Fourier expansion - Functions having points of discontinuity - Change of interval - Even and odd functions - Half range series.

Sections: 10.1, 10.2, 10.3, 10.4, 10.5, 10.6 and 10.7.

TEXT BOOKS:

1. **B. S. Grewal**, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

REFERENCE BOOKS:

1. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. **N. P. Bali**, Engineering Mathematics, Lakshmi Publications.
3. **George B. Thomas, Maurice D. Weir and Joel Hass**, Thomas, Calculus, 13/e, Pearson Publishers, 2013.
4. **H. K. Dass**, Advanced Engineering Mathematics, S. Chand and complany Pvt. Ltd.
5. **Michael Greenberg**, Advanced Engineering Mathematics, Pearson, Second Edition.

ENGINEERING PHYSICS
(Common for ECE, EEE, Mechanical, Civil and Chemical)

Course Code: 23PY1101 **Credits: 03**
Instruction**:** L - 3, T- 1 P – 0 Sessional Marks: 40
End Exam : 3 Hours EndExam Marks: 60

Prerequisites: Basic concepts of Physics in 12th level

Course Objectives

1. To impart knowledge in basic concepts of physics relevant to engineering applications
2. To introduce advances in technology for engineering applications

Course Outcomes: At the end of the course the student will be able to:

CO	COURSE OUTCOMES	Bloom's Taxonomy	Bloom's Taxonomy Level
CO-1	**Interpret** the relation between heat, work, and entropy with thermodynamic laws.	**Interpret**	L3
CO-2	**Explain and analyze** the relation between electric field, electric current and magnetic fields, production and applications of ultrasonics	**Explain** **Analyze**	L2 L4
CO-3	**Apply** the optical phenomena like Interference, Diffractionand Polarization to various fields.	**Apply**	L3
CO-4	**Explain** the working principle and applications of lasers andfiber optics.	**Explain**	L2
CO-5	**Interpret** the microscopic behavior of matter with quantummechanics.	**Interpret**	L3

CO	Bloom's Level
CO1	Action Verb from Blooms Taxonomy- **Interpret** / Cognitive level- Analysis (BL-3)
CO2	Action Verb from Blooms Taxonomy- **Explain, Analyse** / Cognitive level- Application (BL-2, L-4)
CO3	Action Verb from Blooms Taxonomy- **Apply** /Cognitive level- Understand (BL-3)
CO4	Action Verb from Blooms Taxonomy-**Explain** /Cognitive level- Applying (BL-2)
CO5	Action Verb from Blooms Taxonomy-**Interpret** /Cognitive level- Understand (BL-3)

CO-PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1									1
CO2	3	3	1	1		1						
CO3	3	2		1								
CO4	3			1	1	1				1	1	2
CO5	3	2										

Correlation levels1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes

	CO-PO Justification
1	CO1 deals with the fundamental concepts of thermodynamic laws and entropy, which are associated in all working instruments and machines in the development of components, **related to** engineering problems. All the Thermodynamics concepts are related to electrical and mechanical devices in terms of understanding heat and heat dissipation mechanisms in daily life. So mapped to PO1, PO2, PO3 and PO12
2	CO2 deals with the fundamental laws of electromagnetism give us **deep insight** of **working nature** for different electronic devices and instruments. The knowledge of electromagnetism allows them to design systems with minimal electromagnetic interference, leading to more reliable and robust engineering solutions. The knowledge of basic properties and applications of ultrasonic waves will allow their utility in all fields of industry. So mapped to PO1, PO2, PO3, PO4 and PO6.
3	CO3 gives the knowledge of polarization allows them to design antennas with specific polarization characteristics, matching requirements of wireless communication applications. The study of Interference and diffraction phenomenon will help to analyse the colours in thin films, non-reflective surfaces, refractive index of materials and importance of polaroid's. So mapped to PO1, PO2 and PO4.
4	CO4 deals with the lasers and optical fibre properties and their basic principle of working mechanisms. From this knowledge students can gain insight into emerging technologies in various fields. So mapped to PO1, PO4, PO5, PO6, PO10, PO11 and PO12.
5	CO5 deals with the basic knowledge of Quantum mechanics will help to understand Microscopic **behaviour** of matter which decides the macroscopic property of the system. The conceptual knowledge of Quantum mechanics is useful to **identify** and analyse the complex engineering aspects. So mapped to PO1 and PO2.

SYLLABUS

UNIT – I 10 periods

Thermodynamics:

Heat and work, first law of thermodynamics and its applications, reversible and irreversible processes, heat engine, Carnot cycle and its efficiency, Carnot's theorem, second law of thermodynamics, entropy – entropy change in reversible and irreversible processes, entropy and second law, entropy and disorder, entropy and probability, third law of thermodynamics.

A text book of Engineering Physics -- M.N.Avadhanulu & P.G.Kshirasagar, S.Chand Publications

Learning Outcomes:

The students will be able to

- Explain the relation between heat and work.
- Recognize how much heat is converted into work.
- Identify the relation between entropy and different thermodynamic phenomena.

UNIT-II 10 periods

ELECROMAGNETISM

Electric charge, electric flux, experimental law of Coulomb, electric field intensity (E), electric flux density (D), electric Potential (V).

Magnetic flux, magnetic field intensity (H), magnetic flux density (B), Biot-Savart's law, current density (J), first form of Ohm's law.

Electromagnetic induction - Faraday's law of induction,

Properties of Dielectrics and its classifications (Polar, Non-Polar), Electric dipole, polarization,

Properties of magnetic materials and classification (Dia, Para, Ferro), magnetic dipole, magnetization

Physics - Resnick & Halliday Volume II Wiley India Publications

Ultrasonics: Properties of ultrasonic waves, production of ultrasonic waves by Magnetostriction and Piezoelectric methods, Applications of ultrasonics.

A text book of Engineering Physics -- M.N.Avadhanulu & P.G.Kshirasagar, S.Chand Publications

Learning Outcomes:

The students will be able to

- Explain how to generate electric current by electromagnetic induction Phenomena.
- Recognize the properties and production of ultrasoncs.
- Identify the use of ultrasonics in different fields.

UNIT–III

OPTICS & OPTICAL DEVICES [10 periods]

Interference: Parallel and wedge-shape thin films, Newton rings-Measurement of wavelength and refractive index, Applications as Non-reflecting coatings,.

Diffraction: Fraunhoffer Diffraction at a single slit, Applications - Dispersive and Resolving Powers.

Polarization: Double refraction, Nicol's prism, Production, detection, Applications – Anti-glare automobile headlights, Adjustable tint windows.

A text book of Engineering Physics M.N.Avadhanulu & P.G.Kshirasagar, S.Chand Publications.

Learning Outcomes:

The students will be able to

- Explain various types of coherent sources.
- Outline the conditions for sustained interference.
- Aanalyze the differences between interference and diffraction.
- Illustrate the concept of polarization of light and its applications.
- Classify the production and detection of different polarized light.

UNIT–IV 10 periods

Lasers: Introduction, characteristics of a laser beam, spontaneous and stimulated emission of radiation, population inversion, He-Ne laser, Nd – YAG, CO_2 and semiconductor laser, applications of lasers

Optical Fibres: Principle and working of optical fibre, structure, types, advantages of optical fibre, acceptance angle and acceptance cone, numerical aperture, applications of optical fibres

Modern Engineering Physics - S.L.Gupta & Sanjeev Gupta, Dhanpat Rai Publications

Learning Outcomes:

The students will be able to

- Explain the working principle and properties of lasers
- Analyze the production and applications of lasers.
- Explain the working principle of optical fibers and its classification based on refractive index profile and mode of propagation.
- Identify the applications of optical fibers in medical, communication and other fields.

UNIT–V 10 periods

Quantum mechanics:

Planck's hypothesis, wave-particle duality, introduction to quantum theory, de-Broglie concept of matter waves, Heisenberg's uncertainty principle, Schrodinger's time independent and time dependent wave equations, physical significance and properties of the wave function ψ , Application of Schrodinger wave equation for a particle in one dimensional well – Eigen wave functions and energy Eigen values of the particle and Quantum mechanical tunnelling- Potential Barrier

Elements of Statistical mechanics: Elementary concepts of Maxwell-Boltzman , Bose-Einstein and Fermi-Dirac statistics (no derivation)

Modern Engineering Physics -- S.L.Gupta & Sanjeev Gupta, Dhanpat Rai Publications
Engineering Physics -- M.N.Avadhanulu & P.G.Kshirasagar, S.Chand Publications

Learning Outcomes:

The students will be able to

- Explain the dual nature of radiation and matter.
- Realize de Broglie concept of matter waves and Heisenberg uncertain principle.
- Identify Schrodinger wave equation to solve the problems.
- Explain the importance of fundamentals of statistical mechanics.

Text Books :

1. M.N.Avadhanulu & P.G.Kshirasagar, "A Text Book of Engineering Physics" – IX Edition, S.Chand Publications, 2014.
2. S.L.Gupta & Sanjeev Gupta, "Modern Engineering Physics" -- Dhanpat Rai Publications, 2011.

Reference Books:

1) V. Rajendran, "Engineering Physics" , McGrawHill Education Private Ltd, 2011.
2) S.O.Pilai, Sivakami , "Engineering Physics" – IV Edition, New Age International Publishers , 2011.
3) Young & Freedman, "University Physics" – XI Edition, Pearson Education, 2004.
4) A.Marikani, "Engineering Physics" - PHI Learning Private Limited, 2009.
5) Resnick & Halliday, "Physics" Volume II – VI Edition,WileyIndia Publications 2001.
6) R K Gaur, S L Gupta, "Engineering Physics" – VIII Edtion, Dhanpat Rai Publications, 2001.
7) D.K.Bhattacharya, Poonam Tandon, "Engineering Physics" – Oxford University Press, 2010.

ENGINEERING CHEMISTRY
(for I/IV B.Tech EEE,Mech,ECE, Chemical students)

23CY1101 Credits: 3
Instruction: 3 periods/ 1 Tutorial per week Sessional marks:40
End exam: 3 hours End exam marks:60
Prerequisites: Chemistry at +1 and +2 level

Course Objective:

1. Equip students with essential knowledge and skills to assess, treat, and sustain water quality, emphasizing the importance of healthier communities and promoting sustainable water management practices.
2. Provide students with a comprehensive understanding of electrochemistry and its diverse applications. Prepare them for careers and research in energy-related fields, emphasizing sustainable technologies and their role in addressing global energy challenges.
3. Enhance students' comprehension of corrosion processes and their detrimental effects on structures and machinery, while equipping them with a wide range of corrosion protection methods to ensure the longevity and durability of engineering components.
4. Empower students with comprehensive knowledge and practical skills in analyzing energy sources, implementing efficient combustion practices, and fostering sustainable energy solutions to contribute towards a greener and more sustainable world.
5. Provide students with a strong foundation in plastics technology, covering various fabrication methods, and enabling them to identify and select appropriate plastics for specific engineering applications, considering their mechanical, thermal, and environmental properties.

Course Outcomes
By the end of the course, students will be able to

CO No.	Statement
1	Assess and contrast water treatment methods, analyse intricate challenges related to water impurities, hardness, boiler issues, and corrosion, and devise efficient, cost-effective, and environmentally conscious solutions.
2	Analyse and evaluate the appropriateness of battery technologies and solar cell knowledge for specific requirements and contexts, demonstrating expertise in energy storage and sustainable energy applications.
3	Assess the effects of corrosion on structures and equipment, exploring corrosion theories, types, and influential factors. Formulate effective corrosion protection strategies based on evaluating the efficiency of various protection methods.
4	Employ formulas and calculations for solving complex combustion-related numerical problems, and critically evaluate and propose innovative solutions for challenges in biodiesel production and utilization.
5	Critically analyse plastics' properties, fabrication techniques, and engineering applications. Evaluate the potential of Fiber Reinforced Polymer Composites (FRPC) in advanced applications like sensors and self-cleaning windows.

CO-PO-PSO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	2				1	1	1				1
2	3					1	1	1				1
3	3	1				1	1	1				1
4	3	1				1	1	1				1
5	3					1	1	1				1

Correlation levels: 1- Slight (Low) 2- Moderate (Medium) 3-Substantial (High)

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes:

CO-PO-PSO justification	
1	Understand drawbacks of hard water, and make informed decisions on water quality for domestic and industrial settings.
2	Evaluate and synthesize knowledge of electrode potentials, battery technologies, fuel cells, and solar cells, applying critical thinking to propose innovative solutions for advancements in energy storage and sustainable energy applications.
3	Critically assess the efficiency of corrosion protection methods and advanced coating technologies. Formulate suitable corrosion protection strategies for a variety of structures and applications based on the evaluation
4	Retrieve fundamental knowledge about calorific value, methods for determining the calorific value of solid and gaseous fuels, and the process of petroleum refining
5	Apply the knowledge of plastics and their properties to select appropriate materials for specific engineering applications and principles of plastic fabrication techniques to design and manufacture products

UNIT-I Water Technology **10 Periods**

Impurities in water - Specifications of water for domestic use (ICMR and WHO) - Hardness- Types, units of hardness, Numerical problems on hardness, Disadvantages in using hard water; Boiler troubles- Sludge & Scale formation, Internal Treatment (Carbonate, Phosphate & Calgon conditioning methods), Boiler corrosion.

Water softening method - Ion exchange resin process, advantages & disadvantages; Desalination methods - Reverse Osmosis & Electrodialysis.

Municipal water treatment - Sedimentation with coagulation, Sterilisation - Chlorination (break point chlorination), UV treatment.

UNIT-II Energy Storage Systems **10 periods**

Introduction to Electrode potentials, Electro Chemical Series; Batteries - Primary battery - Dry Cell, Secondary battery - Lead Acid battery, Lithium-ion batteries; Fuel cells - Hydrogen -Oxygen fuel cells, Applications.

Advanced batteries for Electrical vehicles - Lithium iron phosphate, Solid state battery - advantages & applications; Solar cells – Types - Polycrystalline and Thin film Solar cells, Principle, Working and Applications.

UNIT-III Corrosion and its prevention **10 Periods**

Corrosion & detrimental effects on buildings, machines, equipment's -Theories of corrosion - Dry and wet corrosion; Types of corrosion - Galvanic corrosion, Concentration cell corrosion, Illustrations; Factors Influencing corrosion.

Corrosion protection - Cathodic protection – sacrificial anodic and impressed current cathodic protection methods; Metallic coatings - electroplating of copper and electroless Nickel plating, Basic Concepts of Physical Vapour Deposition coating (PVD) and Chemical Vapour Deposition coating (CVD).

UNIT-IV Fuels and Combustion **10 periods**

Introduction; Calorific Value – Lower Calorific Value, Higher Calorific Value, Determination of Calorific Value of solid fuel using Bomb Calorimeter and Gaseous fuel using Boy's Calorimeter - Numerical Problems on Combustion.

Petroleum- Refining of petroleum - Synthetic petrol - Bergius process – Fischer-Tropsch process -Biodiesel.

UNIT-V Polymer Technology **10 Periods**

Introduction - Distinction between Thermoplastics and Thermosetting plastics; Preparation, Properties & Engineering applications of plastics – Poly Vinyl Chloride (PVC), Teflon, Bakelite, and Acrylo Butadiene Styrene (ABS).

Injection moulding (Car parts, bottle caps), Transfer moulding, Extrusion moulding (Pipes Hoses), Battery Trays), blown film moulding (PET bottles); Fibre Reinforced Polymer Composites (FRPC) - Applications of polymers in sensors, self-cleaning windows.

Prescribed books

1. P. C. Jain and M. Jain, "Engineering Chemistry", Dhanpat Rai & Sons , New Delhi.

Reference books

1. S.S.Dara ,"A text book of Engineering Chemistry" S.Chand & Co.New Delhi.
2. Dell, Ronald M Rand, David A J ,"Understanding Batteries",. ,Royal society of Chemistry,

MATERIAL SCIENCE

23ME3101 **Credits:3**

Instruction : 3 periods /Week Sessional Marks:40

End Exam : 3 Hours End Exam Marks:60

Prerequisites: Nil

Course Objectives:

 To give an insight to the student on the fundamentals of materials, their structure, properties and applications. In detail about different heat treatment methods, classify and study of ferrous materials, composites and basics of Powder Metallurgy

Course Outcomes:

By the end of the course, students will be able to

1.	**Analyse** the fundamental structures of materials and their properties.
2.	**Identify** various phases of alloys accompanied with various heat treatment methods.
3.	**Classify & explain** various properties and applications of ferrous alloys and **identify** the properties of various materials based on their composition.
4.	**Identify & synthesize** the composite material
5.	**Analyse** the principles of powder Metallurgy components.

CO-PO –PSO Mapping

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2											2		
CO2	2	2											2		
CO3	2	2											2		
CO4	2	2										2	2		
CO5	2	2										2	2		

Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes &Program Specific Outcomes:

CO-PO-PSO Justification	
1	Deals with application of basic knowledge of science to understand the Engineering Materials and Crystalline Solids. Hence it was mapped to medium level (PO-1 & PO-2). Competencies: 1.2 ,1.3, 2.1, 2.2
2	Deals with application of basic knowledge of science to understand the Binary Phase Diagrams and Heat treatment processes. Hence it was mapped to medium level (PO-1 & PO-2). Competencies: 1.2 ,1.3, 2.1, 2.2
3	Deals with application of basic knowledge of science to understand the Steels and Cast Irons & Non-ferrous metals and alloys. Requires analysis and formulation of various ferrous and

	Non-ferrous metals and alloys its properties and applications. Competencies: 1.2 ,1.3, 2.1, 2.2,
4	Deals with application of basic knowledge of science to understand the Composite Materials & Powder Metallurgy. Requires analysis and investigation to develop new Composite Materials to obtained required properties Competencies: 1.2 ,1.3, 2.1, 2.2, 12.1, 12.2
5	Deals with team works related to multidisciplinary tasks like developing biodegradable materials and aerospace materials by applying the knowledge of Powder Metallurgy. Related to lifelong learning and communication because these areas have a lot of scope in research and development to address the society requirements. Competencies: 1.2 ,1.3, 2.1, 2.2, 12.1, 12.2

SYLLABUS

UNIT I **8 Periods**

Engineering Materials & Crystalline Solids:

Engineering Materials: Properties, Classification of Materials, Necessity of alloying, types of solid solutions, Hume Rotherys rules.

Crystalline Solids: Unit cells, Crystal systems, Bravais Lattices, Atomic packing factor, Miller Indices for Crystallographic planes and directions. Crystal Defects: point, line and surface defects.

UNIT II **10 Periods**

Binary Phase Diagrams & Heat treatment of steel:

Binary Phase Diagrams: Gibbs Phase rule, Lever rule, Invariant reactions, Study of Fe-Fe_3C phase diagram.

Heat treatment of steel: Isothermal transformation curves, Annealing, Normalizing, Hardening, Tempering, Austempering and Martempering of steels, Surface hardening of steels: Carburizing, Nitriding, Cyaniding, Flame and induction hardening methods.

UNIT III **10 Periods**

Steels and Cast Irons:

Steels and Cast Irons: AISI-SAE classification of steel, Structure and properties of plain-carbon steels, low alloy steels, Tool steels, Stainless steels, Types of Cast irons: Grey CI, White CI, Malleable and Spheroidal Graphite irons, Alloy cast irons.

UNIT IV **10 Periods**

Composite Materials:

Composite Materials: Classification, Matrices and reinforcements, polymer matrix composite, ceramic matrix composite and metal matrix composites, Fabrication methods of composites.

UNIT V **10 Periods**

Powder Metallurgy:

Powder Metallurgy: Principles of Powder Metallurgy Process, Basic steps in Powder Metallurgy, Powder Manufacture, Powder Blending, Powder Compaction, Sintering, Advantages & limitations.

TEXT BOOKS:

1. Introduction to Physical Metallurgy, S.H. Avner, Tata McGraw Hill edition
2. Material Science and Metallurgy for Engineers, V.D. Kodgire & S.V. Kodgire, Everest Publishing House.
3. Materials Science and Engineering: An Introduction, William D. Callister Jr., David G. Rethwisch, wiley
4. Material Science and Engineering, L.H.Van Vleck, 5th edition, Addison Wealey (1985).

REFERENCE BOOKS:

1. Structure and Properties of Materials, R.M. Rose, L.A.Shepard and J.Wulff Vol.1, John Willey (1966).
2. Essentials of Material Science, A.G. Guy ,McGraw-Hill (1976).
3. Material Science and Engineering, V. Raghavan ,Printice Hall of India
4. Essential of Materials science and engineering - Donald R.Askeland - Cengage

COMPUTER AIDED ENGINERING GRAPHICS

(MECH, CHEM, CIVIL, CSD, CSM, EEE, ECE)

23ME3201 **Credits:3**

Instruction : 1 periods & 3 Practical/Week Sessional Marks:50

End Exam : 3 Hours End Exam Marks:50

Prerequisites: Nil

Course Objectives:

- The course is designed to introduce computer aided drafting skills and fundamentals of engineering drawing and further apply these principles to draw orthographic projections of points, planes, solids and isometric projections.

Course Outcomes:

By the end of the course, students will be able to

1.	**Draft** simple 2D drawings with dimensions using CAD software.
2.	**Draft** Engineering curves - conics , cycloids and involute using CAD software.
3.	**Project** orthographically points, lines and planes in various positions using CAD software.
4.	**Draw** orthographic projections of solids in various orientations using CAD software.
5.	**Construct** isometric views and isometric projections of simple Machine parts using CAD software.

CO-PO –PSO Mapping

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2			3			1		2		1		
CO2	2	2			3			1		2		1		
CO3	2	2			3			1		2		1		
CO4	2	2			3			1		2		1		
CO5	2	2			3			1		2		1		

Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes &Program Specific Outcomes:

	CO-PO-PSO Justification
1	CO-1 satisfies two competencies (1.3&1.4) it is mapped to PO-1 at medium level. As CO-1 satisfies two competencies (2.2 & 2.4), it is mapped at medium level to PO-2. As CO-1 satisfies three competencies (5.1, 5.2 & 5.3), it is mapped at high level to PO-5. As CO-1 satisfies one competency (8.2), it is mapped at low level to PO-8. As CO-1 satisfies two competencies (10.1 & 10.3), it is mapped at medium level to PO-10. As CO-1 satisfies one competency (12.2), it is mapped at low level to PO-12 (Case Study using any of the Drafting Tools).

2	CO-2 satisfies two competencies (1.3&1.4) it is mapped to PO-1 at medium level. As CO-2 satisfies two competencies (2.2 & 2.4), it is mapped at medium level to PO-2. As CO-2 satisfies three competencies (5.1, 5.2 & 5.3), it is mapped at high level to PO-5. As CO-2 satisfies one competency (8.2), it is mapped at low level to PO-8. As CO-2 satisfies two competencies (10.1 & 10.3), it is mapped at medium level to PO-10. As CO-2 satisfies one competency (12.2), it is mapped at low level to PO-12 (Case Study using any of the Drafting Tools).
3	CO-3 satisfies two competencies (1.3&1.4) it is mapped to PO-1 at medium level. As CO-3 satisfies two competencies (2.2 & 2.4), it is mapped at medium level to PO-2. As CO-3 satisfies three competencies (5.1, 5.2 & 5.3), it is mapped at high level to PO-5. As CO-3 satisfies one competency (8.2), it is mapped at low level to PO-8. As CO-3 satisfies two competencies (10.1 & 10.3), it is mapped at medium level to PO-10. As CO-3 satisfies one competency (12.2), it is mapped at low level to PO-12 (Case Study using any of the Drafting Tools).
4	CO-4 satisfies two competencies (1.3&1.4) it is mapped to PO-1 at medium level. As CO-4 satisfies two competencies (2.2 & 2.4), it is mapped at medium level to PO-2. As CO-4 satisfies three competencies (5.1, 5.2 & 5.3), it is mapped at high level to PO-5. As CO-4 satisfies one competency (8.2), it is mapped at low level to PO-8. As CO-4 satisfies two competencies (10.1 & 10.3), it is mapped at medium level to PO-10. As CO-4 satisfies one competency (12.2), it is mapped at low level to PO-12 (Case Study using any of the Drafting Tools).
5	CO-5 satisfies two competencies (1.3&1.4) it is mapped to PO-1 at medium level. As CO-5 satisfies two competencies (2.2 & 2.4), it is mapped at medium level to PO-2. As CO-5 satisfies three competencies (5.1, 5.2 & 5.3), it is mapped at high level to PO-5. As CO-5 satisfies one competency (8.2), it is mapped at low level to PO-8. As CO-5 satisfies two competencies (10.1 & 10.3), it is mapped at medium level to PO-10. As CO-5 satisfies one competency (12.2), it is mapped at low level to PO-12 (Case Study using any of the Drafting Tools).

SYLLABUS

UNIT I : COMPUTER AIDED DRAFTING

Introduction, Applications, CAD software- AutoCAD, GUI, function keys, Drawing entities, Drafting aids(limits, layers, dimensioning, object snap, zoom), modify commands, Block, WBlock and insert, List of commands, Setting Isometric mode, Iso-planes, isometric commands.

Weekly Exercises:

Week 1: **a)** Limits, command line, command list, function keys- Ortho, polar, Osnap, Otrack etc.

b) Draw lines using dynamic input, Ortho & Polar, Line divide, construction line.

c) Drawings using coordinate system, arbitrary coordinate system.

d) Selection & Modify commands – offset, move, copy, rotate, trim, Scale.

Week 2: **a)** Layers, Match property, line types

b) Arcs and Circles

c) Fillet and Chamfer

d) Annotations and Dimensioning

Week 3: **a)** Symmetrical drawings using mirror

b) Rectangular Array

c) Polar and Path Array

d) Annotations and Dimensioning

Week 4: **a)** polygons

b) hatching

c) block, wblock, group, ungroup, explode

d) iso planes

UNIT II: ENGINEERING CURVES

Conic sections- General methods, Cycloids, epi-cycloid, hypocycloid, Involute of circle and polygon

Week 5: **a)** Ellipse

b) Parabola

c) Hyperbola

Week 6: **a)** Cycloid

b) Hypocycloid

c) Epi-Cycloid

Week 7: **a)** Involute of polygon

b) Involute of a Circle

UNIT III: ORTHOGRAPHIC PROJECTIONS – POINTS & LINES & PLANES

Orthographic projections – projections of points – projections of straight lines (lines parallel to both HP&VP, lines parallel to one and inclined to other, lines inclined to both the planes) Projections of regular polygon planes – inclined to one plane, inclined to both the planes.

Weekly Exercises:

Week 8: a) Projection of points

b) Shortest distance of points from principle plane

Week 9: a) A line parallel to both the planes

b) A line inclined one plane

c) A line inclined to both the planes

Week 10: Projection of plane inclined to one plane.

Week 11: Projection of planes inclined to both planes

UNIT IV: ORTHOGRAPHIC PROJECTIONS – SOLIDS

Projection of solids: Prisms – Cylinder– Pyramids &Cones –simple positions & axis inclined to one plane.

Weekly Exercises:

Week 12: Projection of solids in simple positions.

Week 13: Projection of solids inclined to one plane.

UNIT V: ISOMETRIC PROJECTIONS

Isometric projections –Isometric scale, Isometric view & projection of prisms, pyramids, cone, cylinder, sphere, and their combination, conversion of orthographic projection into isometric projection.

Weekly Exercises:

Week 14: Isometric Projection of Primitives

Week 15: Isometric Projection of combination of solids

TEXT BOOKS:

1. **Pradeep Jain** "Engineering Graphics & Design" ISBN 9789391505066, Khanna Book Publishing
2. **N. D. Bhatt** "*Engineering Drawing"* Charotar Publishing House Pvt. Ltd, 53rd Edition : 2014

REFERENCE BOOKS:

1. **K. L. Narayana & P. Kanniah** "*Engineering Drawing"*
2. **R. B. Choudary** "*Engineering Graphics* with Auto CAD"
3. **TrymbakaMurty** "*Computer Aided Engineering Drawing"*
4. **B.V.R. Gupta and M.Raja Roy** *"Engineering Drawing with Auto CAD"* ISBN-13 978-9384588960 I K International Publishing House 3rd Edition : 2016

Engineering Chemistry Lab
(For 1/IV B. Tech EEE, ECE, Mech, Chemical Students 2023-24)

23CY1201 Credits: 1.5
Instruction: 3 periods per week Sessional marks:50
End exam: 3 hours End exam marks:50
Prerequisites: Chemistry at +1 and +2 level

Course Objectives:

1. To impart students with practical knowledge and hands-on experience in analytical chemistry and its engineering applications.
2. To enhance students' proficiency in utilizing instrumental analysis techniques for industrial and environmental applications.

By the end of the course, students will be able to

CO	Statement
1	Apply volumetric analysis and titration principles to prepare standard solutions, standardize acids with strong bases, and assess water quality, food, and soil samples.
2	Proficiently employ diverse analytical methods (spectrophotometric, pH metric, conductometric, and potentiometric) to estimate chemical properties of substances and accurately interpret data results.
3	Cultivate problem-solving and critical thinking skills through practical application of analytical methods and instrumentation in engineering design and decision-making.

CO-PO Mapping

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1		1		1		1	1	1		
CO2	2	1		1		1		1	1	1		
CO3	2	1		1		1		1	1	1		

Correlation levels: 1- Slight (Low) 2- Moderate (Medium) 3-Substantial (High)

1. Preparation of Standard solutions and Standardisation of acid by using Strong base.
2. Determination of Hardness, pH, TDS in ground water sample.
3. Estimation of Zinc in food samples by Complexometric method.
4. Analysis of Cement sample for Lime content to test the quality.
5. Estimation of available chlorine content in potable water using Iodometric method.
6. Estimation of Iron in an iron ore using potassium thiocyanate by Spectrophotometric method.
7. Determination of Strength of an acid in Lead acid battery by pH metric method
8. Estimate the strength of acids in an acid mixture by using Conductometric method.
9. Estimation of Chromium in Dichromate by using Potentiometric method.
10. Determination of Viscosity of various liquid fuels using Ostwald’s Viscometer.

Demonstration Experiments

11. Determination of Dissolved Oxygen in a water sample using Iodometric method.

12.Synthesis of Bakelite a thermosetting polymer.

13. Determination of rate constant of ester hydrolysis.

Prescribed Text books

1.Vogel's text book of Quantitative analysis, 5^{th} edition, G.H.Jeffery, J.Bassett ,J.Mendham, R.S.Denney.
2.Vogel's A text book of Macro and semi micro Inorganic analysis, revised by G.Svehla

ENGINEERING PHYSICS LAB
(Common for ECE, EEE, Mechanical, Civil and Chemical)

Course Code: 23PY1201 **Credits: 1.5**
Instruction**:** L - 0, T- 0 P – 3 Sessional Marks: 50
End Exam : 3 Hours EndExam Marks :50

Course Objectives:

To enable the students to acquire skill, technique and utilization of **the** Instruments

Course Outcomes:

At the end of this course, the students will be able to

	COURSE OUTCOMES
CO-1	**Apply** the theoretical knowledge as working principles of Laboratory experiments related to Optics, Mechanics, Electromagnetic and Electronics. (**L3**)
CO-2	**Adop**t the experimental procedure to perform the experiments for Data procurement / Acquisition. (**L3**)
CO-3	**Compute** the required parameters by suitable formula using experimental values (observed values) in Mechanics, Optics, Electromagnetic and Electronics. (**L3**)
CO-4	**Analyze** the experimental data and obtain the results through graphical interpretation. (**L4**)
CO-5	**Perform** effectively as an individual or as a team and be Accountable / Responsible to the work rendered. (**L4**)

CO-PO Mapping:

	Program Outcomes (POs)												**PSOs**	
	Domain Specific POs					**Domain Independent POs**								
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				1	2						3		
CO2		2	1											
CO3				2				1						
CO4	1			3								1		
CO5								2	3	1	2			

List of experiment (any eight to ten experiments have to be completed)

1. Estimation of thickness of a thin paper by forming parallel interference fringes-Wedge method.
2. Newton’s rings- determination of radius of curvature of a convex lens
3. Find out the wavelengths of spectral lines in mercury spectrum-using diffraction grating in normal incidence position.
4. Evaluation of refractive indices o-ray and e-ray in quartz crystal (double refraction)

5. Calculation of Cauchy's constants of the material of the prism using spectrometer.
6. Determination of band gap of semiconductor (thermistor) by varying resistance with temperature
7. Verification of laws of resistance and determination of specific resistance of wire by using Carey- Foster's bridge.
8. Calibration of a low-range voltmeter using potentiometer.
9. Study of variation of magnetic field along the axis of a current carrying circular coil – Stewart and Gee's apparatus
10. Evaluation of moment of inertia by using Flywheel
11. Estimation of rigidity modulus and moment of inertia using Torsional pendulum
12. Find the Numerical aperture of a given optical fibre
13. Determination of the velocity of ultrasound in liquids by using the phenomenon of diffraction of light by ultrasound
14. Estimation of the wavelength of diode laser using a transmission grating
15. Determination of Planck's constant

Beyond the Syllabus Experiments:

1. Determination of the particle size of micro particles (lycopodium powder) using laser diffracting grating.
2. Measurement of dielectric constant with temperature variation (Ba TiO_3)
3. Magnetic Hysteresis curve experiment (B-H curve)
4. Determination of Resolving power of the Grating
5. Determination of the frequency of an electrically maintained tuning fork - Meldi's experiment.

Learning Outcomes:

The students will be able to

- **Handle** optical instruments like microscope and spectrometer
- **Determine** thickness of a hair/paper with the concept of interference
- **Estimate** the wavelength and resolving power of different colors using diffraction grating

- **Plot** the intensity of the magnetic field of circular coil carrying current with varying distance
- **Determine** the band gap of a given semiconductor
- **Evaluate** the acceptance angle of an optical fiber and numerical aperture
- **Determine** resistance and resistivity of the given material
- **Plot** the accuracy / correction of low range voltmeter using potentiometer
- **Evaluate** the refractive index using double refraction phenomena
- **Determine** frequency of electrically maintained tuning fork
- **Evaluate** the loss of energy in magnetic materials

Prescribed Book

Physics Laboratory Manual Prepared by Department of Physics ANITS

Reference books

1. D.P Siva Ramaiah and V. Krishna Murthy, "Practical Physics", Marutibook Depot, 2000.
2. A.R Vegi, "Comprehensive Practical Physics", Vegi Publishers Pvt.Ltd., 2004.

Engineering and IT Workshop (R23)

(CHEM, CSD, CSM, EEE, IT)

23ME3202 **Credits:1.5**

Instruction : 3 Practical/Week Sessional Marks:50

End Exam : 3 Hours End Exam Marks:50

Prerequisites: Nil

Course Objectives:

- To provide training and hands on experience to the students on basic Engineering relatedskills like carpentry, fitting, tin smithy and house wiring
- Explain the internal parts of a computer, peripherals, I/O ports, connecting Cables.
- Demonstrate OS installation and Hardware Troubleshooting.
- Demonstrate Office Tools such as Word processors, Spread-sheets, and Presentation.

Course Outcomes:

By the end of the course, students will be able to

1.	**Produce** a variety of carpentry, fitting and Tin Smithy jobs.
2.	**Prepare** electrical circuits for Series & Parallel connection and Stair case wiring.
3.	**Comprehend** the fabrication process through 3D Printing
4.	**Demonstrate** the capability of OS installation, network connectivity and Hardware Troubleshooting
5.	**Draft, present** and **perform** analyses on a given problem using MS-office tools

CO-PO –PSO Mapping

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2						1							
CO2	1	2						1							
CO3	1	2			2										
CO4	1	2		2				1	1						
CO5	1	3			1			1	1	2		2			

Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes &Program Specific Outcomes:

CO-PO-PSO Justification	
1	CO-1 satisfies only competency-1.4, so it is mapped to PO-1 at low level. As CO-1 satisfies two competencies (2.3 & 2.4), it is mapped at medium level to PO-2. As CO-1 satisfies one competency (8.1), it is mapped at low level to PO-8.
2	CO-2 satisfies only competency-1.4, so it is mapped to PO-1 at low level. As CO-2 satisfies two competencies (2.3 & 2.4), it is mapped at medium level to PO-2. As CO-2 satisfies one competency (8.1), it is mapped at low level to PO-8.

2	CO-3 satisfies only competency-1.4, so it is mapped to PO-1 at low level. CO-3 satisfies two competencies- (2.1 & 2.2) so it is mapped to PO-2 at medium level. As CO-5 satisfies two competency-5.1& 5.2, so it is mapped to PO-5 at medium level.
3	CO-4 satisfies only competency-1.4, so it is mapped to PO-1 at low level. CO-4 satisfies two competencies- (2.1 & 2.2) so it is mapped to PO-2 at medium level. As CO-4 satisfies one competency-4.1& 4.3, it is mapped at medium level to PO-4. As CO-4 satisfies one competency (8.1), it is mapped at low level to PO-8. As CO-4 satisfies one competency-9.1, it is mapped at low level to PO-9.
4	CO-5 satisfies only competency-1.4, so it is mapped to PO-1 at low level. As CO-5 satisfies three competencies- (2.2, 2.3 & 2.4) it is mapped at high level to PO-2. As CO-5 satisfies one competency (5.1), it is mapped at low level to PO-5. As CO-5 satisfies one competency (8.1), it is mapped at low level to PO-8. As CO-5 satisfies one competency-9.1, it is mapped at low level to PO-9. As CO-5 satisfies two competencies-(10.1 & 10.2), it is mapped at medium level to PO-10. As CO-5 satisfies two competencies-(12.2 & 12.3) it is mapped at medium level to PO-12.

ENGINEERING WORKSHOP SYLLABUS

LIST OF EXPERIMENTS

Carpentry	1. Cross Lap Joint
	2. Dovetail Joint
Fitting	1. V Fit
	2. Square Fit
Tin Smithy	1. Taper Tray
	2. Square Box without lid
House Wiring	1. Parallel / Series Connection of three bulbs
	2. Stair Case wiring
3D Printing	1. Demonstration of Fused Filament Fabrication Process

Reference book:

1. **S.K.Hajra Choudhury** "*Elements of Workshop Technology" Vol I Manufacturing Processes,* ISBN:8185099146(2017).
2. **Lab Manual**

IT WORKSHOP SYLLABUS

Week 1: Introduction to PC Hardware **CO3**

Types of Computing Devices such as PC, Laptops, Servers, Smart Phones, Tablets, other accessories, PC parts, Input/Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

Week 2: **CO3**

Task 1: OS Installation: Every student should individually install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.

Task 2: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

Week 3: **CO3**

Task 1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate how to access the websites and email.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop-up blockers.

Week 4: MS word & PowerPoint Presentation **CO4**

Task 1: 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 in word.

Task 2: create basic power point presentation: PPT Orientation, Slide Layouts, Inserting Text, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting Images, Tables and Charts.

Week 5: Spreadsheet Orientation: **CO4**

Accessing, overview of toolbars, saving spreadsheet files, Using help and resources. Format Cells, Summation, auto fill, Formatting Text. Calculating GPA -. Features to be covered: - Cell Referencing, Formulae in spreadsheet – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, Sorting, Conditional formatting.

Case Study:

1. Create Department Newsletter of Latest academic year.
2. Create a presentation on short term goals vs long term goals.
3. Perform result analysis

Reference Books:

1. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
2. MOS Study Guide for Microsoft Word, Excel, Power point & Outlook by Joan Lambert & Joyce Cox

UNIVERSAL HUMAN VALUES AND PROFESSIONAL ETHICS

(Common for All Branches except CE, CSE-AIML, DS)

23MC0101 **Credits: 0**
Instruction : 2 periods /Week Sessional Marks: 50

Prerequisites:

None.

Course objectives:

The objective of the course is to enable the student in

1. Development of a holistic perspective based on self-exploration about him/her (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course outcomes:

By the end of the course, students are expected to

1. Articulate Basic human aspirations and requirements for their fulfilment and identify the Role and process of Value education
2. Articulate the needs and activities of the self and body and frame program for self-regulation and health for harmony of the self and body
3. Recognize the value of Relationship and the nine feelings in Relationship for fulfilment of relationship for harmony in the family
4. Identify human goals and articulate systems for their fulfilment leading to harmony in the society; Also identify the characteristics of four orders of nature and mutually fulfilling interaction for harmony in nature.
5. Identify the nature of existence and the role of human being for harmony in existence; Also articulate ethical human conduct, humanistic constitution and holistic Criteria for Technologies, production systems and management models for Universal human order.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**						2	2	3				2	2	2	2
	2								3				2			
	3								3				2			
	4						2	3	3	2			2	2	2	2
	5							2	3				2	2		2

SYLLABUS

UNIT – I 6 Periods

Introduction – Fulfillment of Basic Human Aspirations: Need for value education – Process of Value Education – Self-Exploration – Its content and process – Natural Acceptance and Experiential Validation – Basic Human Aspirations – Basic requirements for fulfillment of aspirations – Right understanding, Relationship and Physical Facility- Priority – Human Consciousness – Role of Education-Sanskar – Understanding Happiness and Prosperity – Programme for perpetual happiness and prosperity.

UNIT – II 6 Periods

Harmony in the Self: Human being as co-existence of Self and Body - Needs of Self and Body – Distinguishing Self and Body –Imaginations and its sources – Self-organized /Enslaved behavior - Harmony of the Self and body – Programme for self-regulation and health – Prosperity – Identification of physical facilities.

UNIT – III 6 Periods

Harmony in the Family: Human relationship – Feelings in Relationship – Trust – Intention and competence – Respect as right evaluation– Other feelings in Relationship – Love.

Harmony in the Society: Human Goals – Systems for fulfillment of human goals - Education-Sanskar - Health-Self regulation - Production-Work - Justice-Preservation - Exchange-Storage - Undivided Society, Universal Human Order.

UNIT – IV 6 Periods

Harmony in the Nature: Four Orders of Nature – Characteristics of the four orders – Mutually fulfilling interaction - Understanding the harmony in the Nature

Harmony in the Existence: Existence as Units in Space – Submergence of Units in Space – Existence as Co-existence - Development in the Existential Sense – Role of Human being in Existence

UNIT – V 6 Periods

Universal Human Values and Ethical Human Conduct: Natural acceptance of human values - Definitiveness of Ethical Human Conduct - Humanistic Constitution and Humanistic Universal Order - Holistic Criteria for Technologies, production systems and management models - Holistic Community Model - Journey towards Universal Human Order.

TEXT BOOKS

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

REFERENCES

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

ORDINARY DIFFERENTIAL EQUATIONS AND NUMERICAL METHODS

23MA1102 **Credits:3**

Instruction : 3 periods & 1 Tutorial/Week Sessional Marks:40
End Exam : 3 Hours End Exam Marks:60

Prerequisites: Matrices, Differentiation, Differential equations, Integration and Functions.

Course Objectives:

Create and analyze mathematical models using first and higher order differential equations to solve application problems such as electrical circuits, orthogonal trajectories and Newton's law of cooling and also familiarize the student in various topics in numerical analysis such as interpolation, numerical differentiation, integration and direct methods for solving linear system of equations.

Course Outcomes: By the end of the course, students will be able to

1.	Demonstrate solutions to first order differential equations by various methods and solve basic application problems related to electrical circuits, orthogonal trajectories and Newton's law of cooling.
2.	Discriminate among the structure and procedure of solving a higher order differential equations with constant coefficients and variable coefficients.
3.	Apply various numerical methods to solve linear and non-linear equations.
4.	Familiarize with numerical integration and differentiation.
5.	Understand Laplace transforms and its properties, and finding the solution of ordinary differential equations.

CO-PO –PSO Mapping:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1	1							1	2			
CO2	3	2	1	1							1	2			
CO3	3	2	1	1							1	2			
CO4	3	2	1	1							1	2			
CO5	3	2	1	1							1	2			

Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes &Program Specific Outcomes:

CO-PO-PSO Justification	
1	CO1 is widely used to solve complex engineering problems in all the areas like Fluid dynamics, Mass transfer, Signals and Systems, and Dynamics.
2	CO2 is widely used to solve complex engineering problems in all the areas like Fluid dynamics, Mass transfer, Signals and Systems, and Dynamics.
3	CO3 deals with the techniques that are used to find an approximate real root of the given algebraic and transcendental equations.
4	CO4 deals with the knowledge of interpolation, numerical differentiation and integration, which is used all the areas of engineering sciences.
5	CO5 deals with the knowledge of Laplace transforms which are widely used in all the areas of engineering sciences.

SYLLABUS

UNIT I **10 Periods**

Ordinary differential equations of first order and its applications : Linear equations - Bernoulli's equations - Exact differential equations - Equations reducible to exact equations - Orthogonal trajectories - Simple electric circuits (L –R circuit problems) - Newton's law of cooling.

Sections: 11.9, 11.10, 11.11, 11.12, 12.3, 12.5 and 12.6.

UNIT II **10 Periods**

Higher order linear differential equations and its applications : Definitions - Operator D - Rules for finding the complementary function - Rules for finding the particular integral - Method of variation of parameters - Equations reducible to linear equations with constant coefficients: Cauchy's homogeneous linear equation - Legendre's linear equation. Applications**:** L – C – R circuit problems.

Sections: 13.1, 13.3, 13.4, 13.6, 13.8(I), 13.9, 14.5(ii).

UNIT III **10 Periods**

Numerical solutions of algebraic and transcendental equations :

Solution of algebraic and transcendental equations: Bisection method - Regula-Falsi method - Newton-Raphson method.

Solution of linear simultaneous equations: Gauss elimination - Gauss Jordan - Gauss Seidel.

Sections: 28.2, 28.3, 28.5, 28.6(1,2), 28.7(2)

UNIT IV **10 Periods**

Interpolation, Numerical Differentiation and Integration : Finite differences - Other difference operators - Relation between operators - To find one or more missing terms - Newton's interpolation formulae. Interpolation with unequal intervals: Lagrange's interpolation formula.

Numerical differentiation: Newton's forward and backward differences formula to compute first and second derivatives**.**

Numerical integration: Trapezoidal rule - Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.

Sections: 29.1(1,2), 29.4(i), 29.5, 29.6(1,2), 29.9, 29.10, 30.2(1,2), 30.6, 30.7, 30.8.

UNIT V **10 Periods**

Laplace Transforms and its applications : Introduction - Definitions - Transforms of elementary functions - properties of Laplace transforms - Transforms of periodic functions - Transforms of derivatives - Transforms of integrals - Multiplication by t^n - Division by t – (All properties without proofs) - Evaluation of integrals by Laplace transforms.

Inverse transforms – method of partial fractions - Other methods of finding inverse transforms - Convolution theorem (without proof) - Application's to differential equations - Unit step function and unit impulsive functions.

Sections: 21.1, 21.2, 21.3, 21.4, 21.5, 21.7, 21.8, 21.9, 21.10, 21.11, 21.12, 21.13, 21.14, 21.15, 21.17 and 21.18.

TEXT BOOKS:

1. **B. S. Grewal**, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

REFERENCE BOOKS:

1. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. **N. P. Bali**, Engineering Mathematics, Lakshmi Publications.
3. **George B. Thomas, Maurice D. Weir and Joel Hass**, Thomas, Calculus, 13/e, Pearson Publishers, 2013.
4. **H. K. Dass**, Advanced Engineering Mathematics, S. Chand and complany Pvt. Ltd.
5. **Michael Greenberg**, Advanced Engineering Mathematics, Pearson, Second Edition.

COMMUNICATIVE ENGLISH

Code: 23EN2101 **Credits:3**

Instruction : 3 periods & 1 Tutorial/Week Sessional Marks:40

End Exam : 3 Hours End Exam Marks:60

Prerequisites: Basic English grammar

Course Objectives:

1. To develop awareness about the importance of LSRW skills
2. To implement verbal and nonverbal cues properly in their career and personal life
3. To prepare the students impress everyone with their effective communication skills
4. To familiarize the students with latest terminology and jargon.
5. To train them to attempt various vocabulary tests to get employment.

Course Outcomes:

1.	Comprehend LSRW skills and various linguistic aspects of multicultural milieu.**(L2)**
2.	Acquire verbal and nonverbal Communication skills through varied individual and team activities. **(L3)**
3.	Apply proper vocabulary and appropriate grammar to draft different types of writings collectively and separately for effective professional and personal communication**. (L3)**
4.	Analyze and relate advanced terminology in conceptual conversations, writings and in pronunciation. **(L4)**
5.	Distinguish and practice several kinds of vocabulary tests for better employability with competence. **(L4)**

CO-PO –PSO Mapping

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1									M	M		M		2	
CO2									M	M		M		2	
CO3									M	M		M		2	
CO4									M	M		M		2	
CO5									M	M		M		2	

Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes &Program Specific Outcomes:

CO-PO-PSO Justification	
1	CO1 is mapped with PO 9,10, and 12 as many of the LSRW skills are related to both individual performance and team activity-based. Students can use language in multicultural and multidisciplinary events with effective communication skills. It's a life-long learning.
2	CO2 is mapped with PO 9,10, and 12 as students do activities in teams and individually to get effective communication skills and learn new avenues of English language.

3	CO3 is mapped with PO 9,10, and 12 as effective writing skills and communication skills are developed through group activities and individual presentations.
4	CO4 is mapped with PO 9,10, and 12 as using new vocabulary or terminology is needed for collective and single performances
5	CO5 is mapped with PO 9,10, and 12 as language exercises are done in groups and in isolated tests which develop students' oral and written communication skills.

SYLLABUS

UNIT I **10 Periods**

Listening: Motivational Speech (Martin Luther King, Jr. Dr. Abdul Kalam, Sundar Pitchai)
Speaking: Self Introduction – Introducing others
Reading: Motivational Speech or Essays (H G Wells, Stephen Hawking)
Writing: Paragraph Writing - Letter Writing – Profile Building
Grammar: Types of Sentences – Assertive, Interrogative, Imperative and Exclamatory - Phrases & Clauses - Verb Forms
Vocabulary: Root words – Foreign words and Phrases **CO1**

UNIT II **10 Periods**

Listening: TED Talks **-** Can global food companies make the shift to regenerative agriculture?
Speaking: Basics of Communication - Verbal, Nonverbal - Oral talk on selected topics (Women empowerment and gender issues) - Extempore
Reading: Newspaper reading
Writing: Written Communication – Essay Writing – Assertive essays
Grammar: Tenses - Agreement: Subject-verb, Noun-pronoun – Articles – Prepositions
Vocabulary: One-word Substitutes – Word Associations – Portmanteau Words **CO2**

UNIT III **10 Periods**

Listening: Poems – Sonnets and Haikus
Speaking: Presenting point of view on current affairs
Reading: Editorials reading
Writing: Writing structured, analytical and argumentative essays on general topics
Grammar: Active & Passive Voice, Use of Passive Verbs in Academic Writing - Discourse Markers or Transition Words
Vocabulary: Modifiers and Misplaced Modifiers–Academic words– Synonyms–Antonyms **CO3**

UNIT IV **10 Periods**

Listening: Role-plays
Speaking: Debate
Reading: Skimming and Scanning - Failure to Success Stories (KFC, J K Rowling, Walt Disney)
Writing: Summary
Grammar: Direct and Indirect Speech – Degrees of Comparison
Vocabulary: Homonyms & Homophones – Collocations – Etymology **CO4**

UNIT V **10 Periods**

Listening: News Bulletins- Recycle for Life: Karaikal's success in battling waste
Speaking: Mock Press, Floor Crossing
Reading: The role of Social Media analytics in new-age Digital Market-
Writing: Resume Writing – Dialogue Writing
Grammar: Quantifiers, Prescribed Phrases – Correction of Sentences
Vocabulary: Affixation – Paronyms – Acronyms – Word Building **CO5**

***Note-** Additional topics that can be introduced during the course but are out of the prescribed syllabus.

TEXT BOOKS:

1. **Text book prepared by the faculty of English, ANITS**

REFERENCE BOOKS:

1. Bailey, Stephen. *Academic writing: A handbook for international students*, Routledge, 2014.
2. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
3. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012(Student Book, Teacher Resource Book, CD & DVD).
4. Varma, Shalini. *Body Language: Your Success Mantra*. Amazon: India, 2005

E-Resources

1-language.com;http://www.5minuteenglish.com/https://www.englishpractice.com/
Grammar/Vocabulary English Language Learning Online;
http://www.bbc.co.uk/learningenglish/
http://www.better-english.com/;
http://www.nonstopenglish.com/
https://www.vocabulary.com/;
BBC Vocabulary Games
Free Rice Vocabulary Game
Reading
https://www.usingenglish.com/comprehension/; https://www.englishclub.com/reading/short-stories.htm; https://www.english-online.at/
All Skills
https://www.englishclub.com/; http://www.world-english.org/http://learnenglish.britishcouncil.org/
Online Dictionaries
Cambridge dictionary online; MacMillan dictionary; Oxford learner's dictionaries
Listening:
Unit-I-
https://www.ted.com/talks/steve_presley_can_global_food_companies_make_the_shift_to_regenerative_agriculture
Unit-V- https://www.youtube.com/watch?v=_YlNmkbsL74&t=2s

https://www.ourbetterworld.org/series/environment/story/working-hand-in-hand-for-change?utm_source=taboola&utm_medium=indianexpress-indianexpress&utm_content=Watch+Hand+In+Hand+India+Make+Waste+Work&utm_campaign=OBW_ENV_SERIES_2022#tblciGiBX-q8Y7DpgDlPlmvjD7pcLI4ECqb3eMNOy27aIpILTMiCPuj0ogbbDp9K5kf2cAQ

Reading:
Unit-V-The role of Social Media-
https://timesofindia.indiatimes.com/education/upskill/the-role-of-social-media-analytics-in-new-age-digital-marketing/articleshow/101944496.cms

Problem Solving and Programming Using C (Common to CSE, IT, Civil, EEE, ECE, Mechanical and Chemical)	
Course Code: 23CS3101	**Credits : 03**
Instruction **:** L - 3, T- 1 P – 0	Sessional Marks : 40
End Exam : 3 Hours	End Exam Marks : 60

Course Objectives:

1. To learn how to solve a given problem.
2. To illustrate the basic concepts of C programming language.
3. To discuss the concepts of Functions, Arrays, Pointers and Structures.
4. To familiar with Dynamic memory allocation concepts.
5. To apply concepts of structures and files to solve real word problems.

Course Outcomes

After course completion, the students will be able to:

1	Demonstrate the ability to analyze complex problems and apply appropriate problem-solving techniques to devise effective solutions.
2	Apply control structures to solve programming problems effectively
3	Design efficient algorithms involving arrays, demonstrating a clear understanding of array data structures.
4	Solve programming problems that require the use of pointers, including pointer arithmetic and manipulation.
5	Demonstrate the ability to declare structure variables and define their member data types.

CO-PO –PSO Mapping

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	1	1				2				2		
CO2	3	3	3	3	2			1	2	2			2		
CO3	3	3	3	3	2	1		1	2		1	1	2	1	
CO4	3	3	3	3	2	1		1	2	1	2	1	2	1	
CO5	3	3	3	3	2	1		1	2	1	2	1	2	1	

Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes &Program Specific Outcomes:

CO-PO-PSO Justification	
1	CO1 deals with analyzing complex problems and applying problem-solving techniques, which requires a solid foundation of application of engineering knowledge, problem analysis, design/development of solutions, investigations of complex problems, modern tool usage, and considering the societal implications of engineering practice.
2	CO2 equips students with essential problem-solving and programming skills, which are crucial in addressing complex engineering problems and using modern tools effectively to develop solutions for the betterment of society.
3	CO3 can be attainable by enabling students to gain engineering knowledge, apply problem analysis, develop solutions, investigate complex problems, utilize modern tools, consider the engineer's role in society, and enhance their programming and software development skills in a progressive approach.
4	CO4 can be attained by enabling students to develop comprehensive expertise in utilizing pointers for efficient problem-solving while integrating a broad range of essential engineering and programming competencies with a societal context.
5	CO5 can be attained by aligning with the broader objectives of engineering knowledge application, problem analysis, design/development of solutions, and investigation of complex problems, modern tool usage, and consideration of societal and ethical responsibilities in professional engineering practice in progressive manner.

SYLLABUS

UNIT-1: **10 Periods**

Introduction to Problem Solving: Problem Solving Aspect, Problem Identification, Problem Understanding, Algorithm Development, Solution Planning, Flowcharts, flowgorithm.

Overview of C: History of C, C Language Elements, Basic Structure of C Program, C Tokens-Variables and Data Types, Operators, Expressions and Type Conversions.

UNIT-2: **10 Periods**

Control Statements: Selection Statements- if and switch statements.

Iterative Statements: for, while and do-while statements.

Jump Statements: break , continue and goto statements.

UNIT-3: **10 Periods**

Arrays: Declaration, accessing array elements, Storing values, Operations on arrays, Multi-dimensional arrays.

Functions: Introduction, Using Functions, Function declaration, Function definition and Function call, Scope of variable, Types of functions, Parameter passing, Passing arrays to functions, Recursion, Storage classes.

UNIT-4: **10 Periods**

Pointers: Declaration and Initialization of pointer variables, Pointer arithmetic, Pointers and arrays, Pointer to pointer, Array of pointers, Pointers and functions, Dynamic Memory Allocation.

Strings: Introduction to Strings, String I/O functions, String handling functions, Preprocessor Directives.

UNIT-5: **10 Periods**

Structures: Introduction, Nested Structures, Array of Structures, Structures and Functions, Unions.**Command-Line Arguments:** Command-line Arguments

Text Books:

1. Reema Thareja, Programming in C, Oxford University Press, AICTE Edition, 2018.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

Reference Books:

1. Jeri R. Hanly, Ellot B. Koffman, Problem Solving and Program Design in C, 5/e, Pearson
2. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, 3/e, Cengage Learning, 2007.
3. Brian W Kernighan and Dennis M Ritchie, The C Programming Language, Second Edition, Prentice Hall Publication.
4. Paul Deitel, Harvey Deitel -C How to Program with an introduction to C++, Eighth Edition

ENGINEERING MECHANICS

23ME3103 **Credits:3**

Instruction : 2 periods & 1 Tutorial/Week Sessional Marks:40

End Exam : 3 Hours End Exam Marks:60

Prerequisites: Engineering Mathematics, Physics

Course Objectives:

To enable the students understand and distinguish different force systems, evaluate the conditions required for their equilibrium, apply the concepts of dry friction, determine the properties of surfaces and solids, distinguish between particle and rigid body mechanics and further apply the principles of dynamics to motion.

Course Outcomes:

By the end of the course, students will be able to

1.	**Compute** the resultant force for the given coplanar and non-coplanar force systems.
2.	**Calculate** the forces required to keep the body in equilibrium by considering friction and **identify** the centroid of composite sections and Solids.
3.	**Calculate** the Moment of Inertia of composite sections, mass moment of inertia of regular solids and further a**nalyze** the forces in planar trusses.
4.	**Apply** the kinematic and kinetic principles for a particle under rectilinear and curvilinear translation.
5.	**Solve** the Problems of kinematics and kinetics of a rigid body in rotation and general plane motion.

CO-PO –PSO Mapping

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1										2		
CO2	3	2	1										2		
CO3	3	2	1										2		
CO4	3	2	1										2		
CO5	3	2	1										2		

Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes &Program Specific Outcomes:

CO-PO-PSO Justification	
1	CO1 deals with Laws of Equilibrium, principles & theorems of Static Force system which are the core engineering knowledge and uses complex mathematical formulations, so it is mapped to PO1 and PSO1. As the problems involves the first principle of engineering and mathematics, It is mapped to PO2 . The concepts form the basis for design of systems and so mapped to PO3
2	CO2 deals with Laws of Equilibrium considering friction and use mathematical knowledge to identify the centroid of areas, so it is mapped to PO1 and PSO1. As the problems involves the first principle of engineering and mathematics, It is mapped to PO2 . The concepts of centroid forms the basis for design of systems and so mapped to PO3

3	CO3 deals with Analyzing the forces in truss members and calculating moment of Inertia friction and use mathematical knowledge to identify the centroid of areas, so it is mapped to PO1 and PSO1. As the problems involves the first principle of engineering and mathematics, It is mapped to PO2 . The concepts of centroid forms the basis for design of systems and so mapped to PO3
4	CO4 deals with applying principle of kinematics and kinetics to particles that uses mathematical knowledge to solve complex problems, so it is mapped to PO1 and PSO1. As the problems involves the first principle of engineering and mathematics, It is mapped to PO2 Only Kinmeatic parameters and forces are calculated in simple systems and so mapped to PO3
5	CO5 deals with applying principle of kinematics and kinetics to rigid bodies that uses mathematical knowledge to solve complex problems, so it is mapped to PO1 and PSO1. As the problems involves the first principle of engineering and mathematics, It is mapped to PO2 Only Kinemeatic parameters and forces are calculated in rigid bodies under rotation and so mapped to PO3

SYLLABUS

UNIT I **Periods: 6L+3T=9**

STATICS

Statics of Particles: Fundamental concepts and principles- Resultant of coplanar concurrent forces and non-concurrent forces, Principles of superposition and transmissibility. free body diagrams, Equilibrium of particles. Resultant of concurrent forces in space (vector method). **Statics of rigid bodies:** Moment and Couple -Varignon's theorem – Free body diagram

UNIT II **Periods: 6L+3T=9**

FRICTION AND CENTROID

Friction: Laws of static and Dynamic Friction, Cone of friction, Problems on connected bodies, wedges and ladders.

Centroids & Centre of Gravity: Centroid of Plane areas–determination by first principles, Centroid of Composite areas.

UNIT III **Periods: 6L+3T=9**

MOMENT OF INERTIA AND TRUSSES

Moment of Inertia: Moment of inertia of Plane areas and composite sections - Parallel and perpendicular axis theorems - Mass moment of inertia of Solids.

Trusses: Definition of a truss - Simple Trusses - Analysis of planar Trusses - Method of Joints.

UNIT IV **Periods: 6L+3T=9**

DYNAMICS OF PARTICLES

Kinematics of Motion – Rectilinear and Curvilinear motion. Uniform and Non Uniform Motion

Kinetics of Motion - Newton's laws – D'Alembert's Principle-Work-Energy Equation, Conservative Forces – Impulse Momentum Principle–Impact of elastic bodies- Impact - direct and central impact – coefficient of restitution.

UNIT V **Periods: 6L+3T=9**

DYNAMICS OF RIGID BODIES

Kinematics and Kinetics of Rotation of rigid body about fixed Axis, D'Alembert's Principle - Work Energy Principle - Simple Harmonic Motion.

TEXT BOOKS:

1. Engineering Mechanics by S. Timoshenko and D.H.Young, McGraw-Hill
2. Engineering Mechanics by S.S.Bhavikatti, New age international publishers
3. Engineering Mechanics – Statics and Dynamics by A.K.Tayal
4. Vector Mechanics for Engineers: Statics and Dynamics by Ferdinand P.Beer & E. R. Johnston (9th Edition), Tata McGraw-Hill International Edition.

REFERENCE BOOKS:

1. Engineering Mechanics – STATICS by J. L. Meriam and L. G. Kraige, Wiley India
2. Engineering Mechanics – DYNAMICS by J. L. Meriam and L. G. Kraige, Wiley India
3. Engineering Mechanics – Statics and Dynamics by Irving Shames, Prentice Hall of
4. Engineering Mechanics by K.L.Kumar, McGraw-Hill.

WEB RESOURCES:

1. https://nptel.ac.in/courses/112/106/112106286/
2. https://imechanica.org/

ASSEMBLY AND PRODUCTION DRAWING

23ME3203 **Credits:3**

Instruction : 1 periods & 3 Practical/Week Sessional Marks:50

End Exam : 3 Hours End Exam Marks:50

Prerequisites: Engineering Graphics, Computer Aided Drafting

Course Objectives:

- The course is designed to familiarize the student with the fundamentals of Computer Aided Drafting software and applying it to draw orthographic projections of sectioned solids and development of their lateral surfaces. The course is also aimed at using software to draw orthographic projections of intersections of primitives, converting isometric to orthographic projections and vice versa. The course is also finally intended to impart the basics of Machine drawing and Production Drawing of the Machine parts

Course Outcomes:

By the end of the course, students will be able to

1.	**Draw** orthographic projections for sections of solids & further develop surfaces of regular and truncated solids using CAD software.
2.	**Draw** orthographic projections for intersections of prisms, cylinders and cones using CAD software.
3.	**Draw** orthographic projections from isometric projections and Vice-versa using CAD software.
4.	**Draw** various screwed fastenings and further produce half and full sectional views of simple machine parts using CAD software and prepare Assembly Drawings.
5.	**Develop** the production drawings and process sheets of Mechanical parts using CAD software.

CO-PO –PSO Mapping

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3	1		3			1		2		1	1	1
CO2	2	3	1		3			1		2		1	1	1
CO3	2	3	1		3			1		2		1	1	1
CO4	2	3	1		3			1		2		1	1	1
CO5	2	3	1		3			1		2		1	1	1

Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes &Program Specific Outcomes:
CO-PO-PSO Justification

1	CO-1 satisfies two competencies (1.3 & 1.4), so it is mapped to PO-1 at medium level. As CO-1 satisfies three competencies (2.1, 2.2 & 2.4), it is mapped at high level to PO-2. As CO-1 satisfies one competency (3.1), it is mapped at low level to PO-3. As CO-1 satisfies three competencies (5.1, 5.2 & 5.3), it is mapped at high level to PO-5. As CO-1 satisfies one competency (8.2), it is mapped at low level to PO-8. As CO-1 satisfies two competencies (10.1 & 10.3), it is mapped at medium level to PO-10. As CO-1 satisfies one competency (12.2), it is mapped at low level to PO-12 (Case Study using any of the Drafting Tools). As PSO-1 envelopes PO-1&2 and as CO-1 is mapped to PO-1&2 at low and medium level, it is mapped at low level to PSO1. As PSO-2 envelopes PO-3,4&5 and as CO-1 is mapped to PO-3&5 at low and high level, it is mapped at low level to PSO-2.
2	CO-2 satisfies two competencies (1.3 & 1.4), so it is mapped to PO-1 at medium level. As CO-2 satisfies three competencies (2.1, 2.2 & 2.4), it is mapped at high level to PO-2. As CO-2 satisfies one competency (3.1), it is mapped at low level to PO-3. As CO-2 satisfies three competencies (5.1, 5.2 & 5.3), it is mapped at high level to PO-5. As CO-2 satisfies one competency (8.2), it is mapped at low level to PO-8. As CO-2 satisfies two competencies (10.1 & 10.3), it is mapped at medium level to PO-10. As CO-2 satisfies one competency (12.2), it is mapped at low level to PO-12 (Case Study using any of the Drafting Tools). As PSO-1 envelopes PO-1&2 and as CO-2 is mapped to PO-1&2 at low and medium level, it is mapped at low level to PSO1. As PSO-2 envelopes PO-3,4&5 and as CO-2 is mapped to PO-3&5 at low and high level, it is mapped at low level to PSO-2.
3	CO-3 satisfies two competencies (1.3 & 1.4), so it is mapped to PO-1 at medium level. As CO-3 satisfies three competencies (2.1, 2.2 & 2.4), it is mapped at high level to PO-2. As CO-1 satisfies one competency (3.1), it is mapped at low level to PO-3. As CO-3 satisfies three competencies (5.1, 5.2 & 5.3), it is mapped at high level to PO-5. As CO-3 satisfies one competency (8.2), it is mapped at low level to PO-8. As CO-3 satisfies two competencies (10.1 & 10.3), it is mapped at medium level to PO-10. As CO-3 satisfies one competency (12.2), it is mapped at low level to PO-12 (Case Study using any of the Drafting Tools). As PSO-1 envelopes PO-1&2 and as CO-3 is mapped to PO-1&2 at low and medium level, it is mapped at low level to PSO1. As PSO-2 envelopes PO-3,4&5 and as CO-3 is mapped to PO-3&5 at low and high level, it is mapped at low level to PSO-2.

4	CO-4 satisfies two competencies (1.3 & 1.4), so it is mapped to PO-1 at medium level. As CO-4 satisfies three competencies (2.1, 2.2 & 2.4), it is mapped at high level to PO-2. As CO-1 satisfies one competency (3.1), it is mapped at low level to PO-3. As CO-4 satisfies three competencies (5.1, 5.2 & 5.3), it is mapped at high level to PO-5. As CO-4 satisfies one competency (8.2), it is mapped at low level to PO-8. As CO-4 satisfies two competencies (10.1 & 10.3), it is mapped at medium level to PO-10. As CO-4 satisfies one competency (12.2), it is mapped at low level to PO-12 (Case Study using any of the Drafting Tools). As PSO-1 envelopes PO-1&2 and as CO-4 is mapped to PO-1&2 at low and medium level, it is mapped at low level to PSO1. As PSO-2 envelopes PO-3,4&5 and as CO-4 is mapped to PO-3&5 at low and high level, it is mapped at low level to PSO-2.
5	CO-5 satisfies two competencies (1.3 & 1.4), so it is mapped to PO-1 at medium level. As CO-5 satisfies three competencies (2.1, 2.2 & 2.4), it is mapped at high level to PO-2. As CO-1 satisfies one competency (3.1), it is mapped at low level to PO-3. As CO-5 satisfies three competencies (5.1, 5.2 & 5.3), it is mapped at high level to PO-5. As CO-5 satisfies one competency (8.2), it is mapped at low level to PO-8. As CO-5 satisfies two competencies (10.1 & 10.3), it is mapped at medium level to PO-10. As CO-5 satisfies one competency (12.2), it is mapped at low level to PO-12 (Case Study using any of the Drafting Tools). As PSO-1 envelopes PO-1&2 and as CO-5 is mapped to PO-1&2 at low and medium level, it is mapped at low level to PSO1. As PSO-2 envelopes PO-3,4&5 and as CO-5 is mapped to PO-3&5 at low and high level, it is mapped at low level to PSO-2.

SYLLABUS

Module-I : SECTIONS AND DEVELOPMENT

Section plane: auxiliary inclined plane, auxiliary vertical planes. Sections of prisms, pyramids, cone, cylinder in simple positions and true shape of sections. Development of prisms, pyramids, cone, cylinder.

Weekly Exercises:

Week 1:
- **a)** Prism cut by auxiliary inclined plane, true section, development of lateral surface
- **b)** Prism cut by auxiliary vertical plane, true section, development of lateral surface
- **c)** Cylinder cut by auxiliary inclined plane, true section, development of lateral surface
- **d)** Cylinder cut by auxiliary vertical plane, true section, development of lateral surface

Week 2:
- **a)** Pyramid cut by auxiliary inclined plane, true section, development of lateral surface
- **b)** Pyramid cut by auxiliary vertical plane, true section, development of lateral surface
- **c)** **C**one cut by auxiliary inclined plane, true section, development of lateral surface
- **d)** Cone cut by auxiliary vertical plane, true section, development of lateral surface

Module-II : INTERSECTION OF SURFACES

Intersection of surfaces: Intersection of square prisms face equally inclined to principle planes with their axis perpendicular(axis intersecting and offset), intersection of cylinders with their axis perpendicular(axis intersecting and offset), intersection of cone and cylinder with their axis perpendicular and intersecting.

Weekly Exercises:

Week 1: **a)** Intersection of two square prisms axis perpendicular and intersected, while their lateral faces are equally inclined to ground.

b) Intersection of two square prisms axis perpendicular and offset, while their lateral faces are equally inclined to ground.

Week 2: **a)** Intersection of two cylinders axis perpendicular and intersected.

b) Intersection of Vertical cone with horizontal cylinder axis perpendicular and offset.

Module-III : ISOMETRIC PROJECTIONS

Isometric projections, conversion of orthographic projection into isometric projection and vice-versa of simple machine parts.

Weekly Exercises:

Week 1: Isometric view to orthographic views

Week 2: Orthographic Views to Isometric Views

Module-IV : MACHINE DRAWING

Orthogonal views, Half sectional and full sectional views of machine parts. Screw Threads, Screw Fasteners, locking arrangements, Foundation bolts and Riveted joints using standard Empirical formulae and Assembly drawing.

Week 1: **a)** Orthogonal Views of Machine Parts

b) Half Sectional Views of Machine Parts

c) Full Sectional Views of Machine parts

Week 2: **a)** Screw Threads

b) Screw Fasteners

c) Locking arrangements

Week 3: **a)** Foundation bolts

b) Riveted joints

Week 4: Assembly Drawing of Stuffing Box

Module-V : PRODUCTION DRAWING

Limits, fits, tolerances, geometrical tolerance, surface roughness and process sheet

Week 1: Production Drawings of shaft and bush

Week 2: Production Drawing of spur/ Helical/bevel gear

TEXT BOOKS:

1. **N. D. Bhatt** *" Engineering Drawing"* 53rd Edition Charotar Publishing House Pvt. Ltd,: 2014
2. **N. D. Bhatt** *"Machine Drawing"* V. M. Panchal, Charotar Publishing House Pvt. Ltd
3. **K.L Narayana, P. Kannaiah and K. Venkata Reddy "**Machine Drawing" by, New age international Publishers.

REFERENCE BOOKS:

1. **K. L. Narayana& P. Kanniah** *"Engineering Drawing"*
2. **R. B. Choudary "***Engineering Graphics with Auto CAD"*
3. **TrymbakaMurty** *"Computer Aided Engineering Drawing"*
4. **K.L Narayana, P. Kannaiah and K. Venkata Reddy** "*Machine Drawing*" by, New age international Publishers.
5. Lab Manual for Advanced Engineering Graphics

WEB REFERENCES:

1. http://www.rajaroy.co.in/p/machine-drawing.html

Note: *The exercises to be done each week shall be as per the internal lab manual*

ENGLISH LANGUAGE LABORATORY

23EN2201 **Credits:1.5**

Instruction : 3 periods Sessional Marks:50

End Exam : 3 Hours End Exam Marks:50

Prerequisites: Basic English Grammar

Course Objectives:

1. To give idea about phonetics, linguistics and LSRW skills
2. To develop conversational skills among the students
3. To introduce different accents of English language through presentations
4. To train the students to do various exercises on vocabulary and grammar

Course Outcomes:

By the end of the course, students will be able to

1.	Understand various linguistic, phonetic and communicative aspects	L2
2.	Apply general conversational activities in different socio-cultural contexts with logical thinking.	L3
3.	Analyze cultural diversity of several nations' languages through presentations.	L4
4.	Appraise and reframe various exercises for getting better employability	L4

CO-PO –PSO Mapping

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1									2	2		2			
CO2									2	2		2			
CO3									2	2		2			
CO4									2	2		2			

Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes:

	CO-PO-PSO Justification
1	CO1 is mapped with the POs 9, 10, 12. Students can understand various accents of English language and they learn and practice individually and in groups
2	CO2 is suitable to the POs 9, 10, 12 as it makes the students converse, understand and participate in various activities like JAM, Debate, Role-Play etc. Students perform singly and team-wise.
3	CO3 is mapped with the POs 9, 10, 12. Students understand cultural diversity and give effective individual and team presentations.

4	CO4 deals with POs 9, 10, 12 as students write and practice various exercises by using contemporary vocabulary.

SYLLABUS

UNIT I **12 Periods**

Introduction to Phonetics – IPA – RP – Phonetic Transcription – Word stress or accent

UNIT II **9 Periods**

Functional English – JAM – Debate – Situational Dialogues or Role Plays

UNIT III **12 Periods**

Presentations on various topics from academic contexts and on international issues

UNIT IV **9 Periods**

Discussing specific topics and practising exercises and short structural talks

REFERENCE BOOKS:

Reference Books

1. Everyday dialogues in English----- Robert J.Dixon.
2. Speak well----- orient black swan.
3. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
4. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
5. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012

e- Resources & other digital material Grammar/Listening/Writing 1-language.com http://www.5minuteenglish.com/ https://www.englishpractice.com/ Listening https://learningenglish.voanews.com/z/3613; http://www.englishmedialab.com/listening.html Speaking https://www.talkenglish.com/BBC; Learning English – Pronunciation tips Merriam-Webster – Perfect pronunciation Exercises All Skills https://www.englishclub.com/; http://www.world-english.org/ http://learnenglish.britishcouncil.org/ Online Dictionaries Cambridge dictionary online; MacMillan dictionary; Oxford learner's dictionaries

Problem Solving and Programming Using C Lab (Common to CSE, IT, Civil, EEE, ECE, Mechanical and Chemical)	
Course Code: 23CS3201	**Credits : 1.5**
Instruction **: L - 0, T- 0 P – 3**	Sessional Marks : 50
End Exam : 3 Hours	End Exam Marks : 50

Course Objectives:

1. To learn how to solve a given problem.
2. To illustrate the basic concepts of C programming language.
3. To discuss the concepts of Functions, Arrays, Pointers and Dynamic MemoryAllocation.
4. To understand and implement Structures and Unions.

Course Outcomes

After course completion, the students will be able to:

1	Develop an algorithm and flowchart by applying various control structures to solve real world problems
2	Apply iterative statements, arrays and modular programming to solve the complex problems
3	Implement Programs using pointers and String handling Functions.
4	Develop code for complex applications using structures, unions.

CO-PO –PSO Mapping

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	2							2		
CO2	3	3	3	3	3	2							2	1	
CO3	3	3	3	3	3	2							2	1	
CO4	3	3	3	3	3	2							2	1	

Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Mapping of Course Outcomes with Program Outcomes &Program Specific Outcomes:

CO-PO-PSO Justification	
1	CO1 equips students with essential problem-solving abilities using algorithms, control structures, and flowcharts while integrating engineering principles and ethical considerations.
2	CO2 can be attained by equipping students with essential programming techniques and problem-solving abilities, thereby preparing them to contribute effectively to the engineering field, society, and their professional development.
3	CO3 can be attained by enabling students to develop comprehensive expertise in utilizing pointers for efficient problem-solving while integrating a broad range of essential engineering and programming competencies with a societal context.
4	CO4 can be attained by aligning with the broader objectives of engineering knowledge application, problem analysis, design/development of solutions, and investigation of complex problems, modern tool usage, and consideration of societal and ethical responsibilities in professional engineering practice in progressive manner.

SYLLABUS

Week-1: Draw flowcharts for fundamental algorithms.
Week-2: C Programs to demonstrate C-tokens.
Week-3: C Programs on usage of operators.
Week-4: C Programs to demonstrate Decision making and branching (Selection).
Week-5: C Programs to demonstrate different loops.
Week-6: C Programs to demonstrate 1-D arrays.
Week-7: C Programs to demonstrate multi-dimensional arrays.
Week-8: C Programs to demonstrate functions.
Week-9: C Programs on pointers.
Week-10: C Programs to perform operations on Strings with String handling functions and without String handling functions.
Week-11: C Programs on Structures and Unions.
Week-12: C Programs to demonstrate Files.

Text Books:

1. R.G. Dromey, How to Solve it by Computer, 1/e, Pearson Education, 2006.
2. Reema Thareja, Programming in C, Oxford University Press, AICTE Edition, 2018.

Reference Books:

1. B. A. Forouzan and R. F. Gilberg, Computer Science: A Structured Programming Approach Using C, 3/e, Cengage Learning, 2007.
2. Pradip Dey, Manas Ghosh, Programming in C, Oxford University Press, AICTE Edition,
3. B. Gottfried, Programming with C, 3/e, Schaum's outlines, McGraw Hill (India), 2017.
4. Jeri R. Hanly, Ellot B. Koffman, Problem Solving and Program Design in C, 5/e, Pearson.

INTERNET OF THINGS (IOT) LABORATORY

Code: 23EC4212 **Credits:3**

Instruction:3Periods &1E/Week SessionalMarks:50

EndExam: 3Hours EndExam Marks:50

Course objectives:

- To Interface various input and output devices with Arduino Uno
- To Design the minimum system for sensor-based application.
- To solve the problems related to the primitive needs using IoT.

CourseOutcomes: At the end of the course the student will be able to:

CO	BL	CO Statement
CO1	BL-2	Make a basic electronic test circuit connection to familiarize with lab components
CO2	BL-3	Interface simple input/output devicesto Arduino Uno
CO3	BL-3	Implement basic wired data communication using Arduino Uno
CO4	BL-3	Perform I/O operations over local wireless network
CO5	BL-3	Perform basic data sending and visualization operation using IoTCloud

Program Matrix

COs	Program Outcomes (POs)											
	Domain Specific POs					Domain Independent POs						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	-	-	2	-	-	-	1	-	-	-
CO2	2	1	2	-	2	-	-	-	1	-	-	-
CO3	2	1	2	-	2	-	-	-	1	-	-	-
CO4	2	1	2	-	2	-	-	-	1	-	-	-
CO5	2	2	2	-	2	-	-	-	1	-	-	-

List of Experiments

1. Familiarization of Electronic lab tools and glow LED using simple circuit *(CO1)*
2. Familiarization of Arduino Uno, its Setup & Installationand control LED*(CO1)*
3. Interface and control Buzzer with Arduino Uno*(CO2)*
4. Interface push button/digital sensors withArduino Uno*(CO2)*
5. Interface DHT sensor and read the humidity using Arduino Uno*(CO3)*
6. Perform Serial Communication and transmit “Hello World!”*(CO3)*
7. Interface HC-05 Bluetooth module to send data to PC applications*(CO4)*
8. Interface HC-05 Bluetooth module to receive data from PC applications*(CO4)*
9. Interface relay and remotely operate an electrical device *(CO4)*
10. Sending sensor data to Cloud and Visualization (CO5)

Reference Book: Lab Manual

ENVIRONMENTAL SCIENCE
With effect from 2023-24
Mandatory (Non Credit) course for all branches

23MC0102 **Credits:0**

Instruction : 3 periods & 1 Tutorial/Week Sessional Marks:50
Prerequisites : +1 & +2

COURSE OBJECTIVES:

1. Inculcating in students the awareness toward components in environment.
2. Understand the importance natural resources, Structure, and functions of an ecosystem.
3. Inducing knowledge on Sources, effects, and methods to reduce environmental pollution.
4. Able to know the meaning of sustainable development and correlate social issues related to environment.

Course Outcomes:

By the end of the semester, the student will beable to:

CO	Statement
1	Identify the characteristics of various natural resourcesand can implement the conservation practices
2	Realize the importance of Ecosystem and Biodiversityfor maintaining ecological balance
3	Classify, analyze various pollutants and can develop methods for solving problems related to environment
4	Implement the environmental laws or defend issuesby getting awareness on legal aspects related to environmental issues
5	Promote awareness on local environmental issues by participating in group activities, seminars, takingproject work

CO-PO-PSO Mapping

PO/CO's	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1						1	2	1		1		1		
CO2						1	2	1		1		1		
CO3						2	2	1		1		1		
CO4						2	3	1		1		1		
CO5						2	2	1	3	2		1		

Correlation levels: 1- Slight (Low) 2- Moderate (Medium) 3-Substantial (High)

Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes:

	CO-PO-PSO justification
1	Understand the scope of environmental science. Can Elaborate their knowledge over Natural resources their conservation practices.
2	Apply knowledge of structure and functions of Ecosystem in various applications. Able to gain knowledge over values of biodiversity.
3	Acquire knowledge on sources, effects of various pollutants and also understand the advanced methodologies to reduce contamination
4	Correlate social issues caused due to environmental changes and can plan for solutions for society related problems

SYLLABUS

UNIT I **8 Periods**

INTRODUCTION TO ENVIRONMENT AND NATURAL RESOURCES

Introduction: Definition, Multidisciplinary nature of environmental studies, Scope and Importance of Environmental Sciences, Need for public awareness.

Natural Resources: Renewable and Non-Renewable resources- Forest resources-use and overexploitation, deforestation, Water resources- aquifers, dams and benefits, conflicts over water; Food resources- effects of modern agriculture practices, Energy resources-conventional and non -conventional energy resources.

Activities:

Need for Public Awareness (Campaign), Renewable vs. Non-Renewable Resources(Group Discussion), Deforestation and its Impact, Water Conflict(Case studies).

UNIT- II **8 Periods**

ECOSYSTEM & BIO DIVERSITY

Ecosystem: Concept of an ecosystem-structure and function of an ecosystem Food chains, food webs andecological pyramids, Energy flow in an ecosystem, Ecosystem regulation, Ecological succession.

Biodiversity: Definition, types, India as a Mega diversity Nation, Values of biodiversity, Hot spots ofbiodiversity, Threats to biodiversity, Endangered and endemic species, Conservation of biodiversity.

Activities:

Ecosystem (Field trip), Food chain and Food Web (Models), Endangered Species (Case Studies), Ecosystem regulation, Values of Biodiversity (Group Discussion), Endangered Species Awareness (Poster presentation).

UNIT –III **8 Periods**

ENVIRONMETAL POLLUTION AND WASTE MANAGEMENT

Pollution: Sources, effects and control measures of Air pollution, Noise Pollution, Water Pollution, SoilPollution, Radio Active Pollution; Climate Change, Ozone depletion, Acid rains –causes and adverse effects.

Solid waste management: Sources and effects of municipal waste, bio-medical waste, Industrial waste, e- waste, Process of waste management-composting, sanitary landfills, incineration. Green Chemistry concepts,

Activities:

Pollution (Slogan writing), Pollution Control Measures (Group Discussion) ,Climate Change (Case Studies), Waste-to-Art (Poster presentation).

UNIT- IV **8 Periods**

SOCIAL ISSUES AND ENVIRONMENTAL LEGISLATIONS

Social Issues and the Environment: Sustainable development, Environmental Impact Assessment, Rain water harvesting, water shed management. Resettlement and rehabilitation of people, Environmental ethics.

Legislational Acts: Importance of Environmental legislation, Air (Prevention and Control of Pollution) act, Water (Prevention and control of Pollution) act, Wildlife Protection act, Forest Conservation act.

Activities:

Sustainable Development, Environmental Ethics (Group Discussion), Environmental Impact Assessment (EIA), Resettlement and Rehabilitation (Case Studies), Rainwater Harvesting(Model), Environmental Legislation (Awareness Campaign).

UNIT- V **5 Periods**

HUMAN POPULATION AND THE ENVIRONMENT

Human population and environment- Population growth, Population explosion; Family Welfare Programmes; Role of information technology on environment and human health; Value Education – HIV/AIDS – Women andChild Welfare

FIELD WORK/PROJECT: Visit to a local area to document environmental problem and submit a Record

Activities:

Population Growth, Role of Information Technology and Environment, Women Empowerment, Family Welfare Program (Awareness Campaign), Women and Child Welfare (Case Study), Population and Environment (Short film).

Prescribed Book

1. **Anubha Kaushik & C.P.Kaushik**, "*Perspertives of Environmental Studies"* by 5th edition New AgeInternational Publications, 2015.
2. **Erach Bharucha** *Text book of "Environmental Studies for Undergraduate Courses*", universities PressCommission, 2013.
3. **Palaniswamy**- "*Environmental Studies"*, 2nd edition, Pearson education 2015.

Reference Books

1. **S. Deswal, A. Deswal**, "*Basic course in Environmental studies"*, 2nd edition, Dhanpatrai Publications, 2008.