ACADEMIC REGULATIONS

COURSE STRUCTURE AND SYLLABUS

B.TECH.

CIVIL ENGINEERING

Effective for the B.Tech. Students admitted into first year For The academic year

2023-2024

PRAGNANAM BRAHMA
ANITS
(AUTONOMOUS)

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES (AUTONOMOUS)
Approved by AICTE & Affiliated to Andhra University
SANGIVALASA-531162, BHEEMUNIPATNAM MANDAL, VISAKHAPATNAM DISTRICT

INSTITUTE VISION

- To emerge as a world class technical institution

INSTITUTE MISSION

- To impart holistic technical education by providing
- The state of the art infrastructure
- Exceptional technical and teaching expertise
- Best of human value

VISION OF THE DEPARTMENT

- To emerge as a leading Civil Engineering Department globally

MISSION OF THE DEPARTMENT

- Empower our students with contemporary and industry relevant skills in Civil Engineering using outstanding technical and teaching expertise and best of infrastructure
- Nurture holistic development of our students inculcating universal human values and life skills for serving the society as leaders of their profession

Program Educational Objectives (PEOs)

PEO1: Successfully practice Civil Engineering in construction industry, public sector and entrepreneurship, ensuring a prosperous professional career.

PEO2: Pursue higher education and Research for professional development contributing to the advancement of civil engineering through lifelong learning

PEO3: Demonstrate leadership abilities actively contributing to societal needs with a focus on sustainable development and human values.

Program Outcomes

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilitiesrelevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one‘s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

1. Plan and develop safe, economical and sustainable buildings and other structures based on applicable professional standards, codes and ethics.
2. Analyze and solve stability problems in soils for design of foundations and earth structures and plan and design highway, railway and other transportation systems based on applicable safety standards, codes and ethics.
3. Plan and develop irrigation and water supply systems and analyze and solve problems due to pollution of air, water and land leading to a nourished, richer and healthy society.

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES (AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING

B.TECH. 4 YEAR DEGREE COURSE STRUCTURE

(Effective for the B.Tech. students admitted into first year from the academic year 2023-24)

B.TECH. I Year - I Semester

Semester - I			
Course Code	**Title of the course**	**Category**	**Credits**
23PY1101	Engineering Physics (CE)	BS	3
23ME3203	Computer aided Engineering Graphics	ES	3
23MA1101	Linear Algebra and Multivariable Calculus	BS	3
23CY1102	Material Chemistry	BS	3
23CE4111	Civil Engineering Materials	PC	3
23PY1201	Engineering Physics lab	BS	1.5
23CY1202	Material Chemisty lab	BS	1.5
23CE3201	Data Analysis and Presentation Tools	ES	1.5
23MC0101	Universal Human Values and Ethics- I	MC	-
Total			**19.5**

B.TECH. I Year – II Semester

Semester - II			
Course Code	**Title of the course**	**Category**	**Credits**
23EN2101	Communicative English	HSS	3
23MA1102	Ordinary Differential Equations and Numerical Methods	BS	3
23CS3101	Problem Solving with Programming using C	ES	3
23CE4112	Building Planning and Construction	PC	3
23CE1101	Engineering Geology	BS	3
23EN2201	Communicative English Lab	HSS	1.5
23CS3202	Civil Engineering Workshop	ES	1.5
23CS3201	Problem Solving with Programming using C lab	ES	1.5
23MC0102	Environmental Science	MC	-
	Total		**19.5**

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 TaxonomyLevel
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**	L 2 L 4
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 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 and 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 Physic --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.

COMPUTER AIDED ENGINERING GRAPHICS

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

23ME3203 **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.	**Project** orthographically points and lines in various positions using CAD software.
3.	**Produce** orthographic projections of plane surfaces 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	1	2			3			1		2		1		
CO2	1	2			3			1		2		1		
CO3	1	2			3			1		2		1		
CO4	1	2			3			1		2		1		
CO5	1	2			3			1		2		1		

Correlation levels1: 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-1.3, so it is mapped to PO-1 at low 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.

2	CO-2 satisfies only Competency-1.3, so it is mapped to PO-1 at low 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 only Competency-1.3, so it is mapped to PO-1 at low 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 only Competency-1.3, so it is mapped to PO-1 at low 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
5	CO-5 satisfies only Competency-1.3, so it is mapped to PO-1 at low 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: ORTHOGRAPHIC PROJECTIONS – POINTS & LINES

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)

Weekly Exercises:

Week 5: a) Projection of points

b) Shortest distance of points from principle plane

Week 6: a) A line parallel to both the planes

b) A line inclined one plane

c) A line inclined to both the planes

UNIT III: ORTHOGRAPHIC PROJECTIONS – PLANES

Projections of regular polygon planes – inclined to one plane, inclined to both the planes.

Weekly Exercises:

Week 7: Projection of plane inclined to one plane.

Week 8: 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 9: Projection of solids in simple positions.

Week 10: 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 and vice-versa of simple machine parts.

Weekly Exercises:

Week 11: Iso-Ortho conversions of simple machine parts.

Week 12: Ortho-Iso conversions of simple machine parts.

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

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 beused 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, PearsonPublishers, 2013.
4. **H. K. Dass**, Advanced Engineering Mathematics, S. Chand and complany Pvt. Ltd.
5. **Michael Greenberg**, Advanced Engineering Mathematics, Pearson, Second Edition.

Material Chemistry Syllabus
(for I/IV B.Tech Civil students 23-24)

23CY1102 **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 objectives

1. To make them understand about composition of water resources, determination of water quality parameters, mechanism of corrosion and methods to control corrosion.
2. To provide knowledge on various cement composition, setting & hardening process, composition of soil, instrumental techniques and ceramics materials.

Course Outcomes

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 various building materials and apply the knowledge in construction activities
3	Acquire Knowledge on composite materials, their applications and able to know characterisation of Nanomaterial.
4	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.
5	Attain knowledge on minerals in soil and their analysis using instrumental techniques

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**3**	**2**	**2**	**1**			**2**					**1**
2	**3**	**1**		**1**	**1**		**2**					**1**
3	**3**	**2**		**1**	**1**		**2**					**1**
4	**3**	**1**	**1**	**1**			**2**					**1**
5	**3**	**2**	**1**	**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	Understand drawbacks of hard water, and make informed decisions on water quality for domestic and industrial settings.
2	Acquire knowledge on composition of cement and can understand the function of ingredient's in analysis of cement.
3	Will get an understanding on polymers, heterogeneous materials and their applications. Acquire knowledge on Bituminous materials.
4	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
5	Analyse the composition of soil and understand methodology of analysing samples for knowing the soil composition

UNIT-I Water Technology. 10 Periods

Impurities of surface & ground water, Types of water– hardness, Types- Determination, problems in hardness –Boiler troubles- Sludge & scale formation- caustic embrittlement.

Water softening methods: -Lime soda- Ion exchange processes and their applications. Municipal water treatment- Sedimentation with coagulant-Sterilisation– chlorination, break point chlorination-Desalination Methods-Reverse Osmosis, Electro dialysis.

UNIT-II Cement Chemistry 8 periods

Introduction to building materials, Process of manufacturing of cement, composition of cement, Chemical requirements as per IS:269:2013.

Computation of amounts of constituent compounds in cement, Setting & Hardening of cement, Chemistry involved in Concrete, Decay of concrete, RCC

UNIT-IIIIndustrial materials 10 periods

Ferrous and Non-Ferrous materials (Iron, steel, Aluminum ,copper), classification of steel, Introduction to polymers-Thermoplastics and Thermosetting plastics, Preparation, properties, applications of Vinyl resins (PE, PVC, PS).

Definition of composite- components in composites-classification of composites- Fibre Reinforced Composites-Engineering-Bituminous Materials-Tar, Bitumen & Asphalt

UNIT-IV Corrosion Chemistry 10 Periods

Theories of corrosion-Dry and wet corrosion – Applications-detrimental effects to buildings, machines, devices -Types of corrosion-Galvanic corrosion- Concentration cell corrosion-Illustrations - Factors Influencing corrosion.

Corrosion protection - cathodic protection – sacrificial anodic and impressed current protection methods; advanced protective coatings: electroplating and electroless plating, Corrosion issues in specific industries (Power generation, Chemical Processing, Oil & Gas, Pulp & paper industry).

UNIT-V Soil Chemistry 10 Periods

Thermal analysis of soil minerals, Infrared absorption analysis of soils, Cation exchange capacity determination of soils, soil organic matter separation and characterisation, cation activity measurement for soils-Instrumental techniques in chemical analysis(pH metry, conductometry, potentiometry & spectrophotometry)- Principle &Methods with Illustrations

Prescribed books

1.Engineering chemistry -Pc jai nans M.Jain-Dhanpath Rai & Sons , New Delhi.

Reference books

1. A text book of Engineering Chemistry-S.S.Dara- S.Chand & Co.New Delhi.

CIVIL ENGINEERING MATERIALS

23CE4111 **Credits: 3**

Instruction: 3 Lectures & 1 Tutorial / week Sessional Marks: 40

End Exam: 3 Hours End Exam Marks: 60

Course Objectives:

1. To know the characteristics of good building materials such as bricks, stone, timber, metals, plastics, geosynthetics, paints, varnishes, distempers etc.
2. To understand the procedure to conduct required tests to determine the suitability of the material for the given application.
3. To study the engineering materials available in the region of Visakhapatnam, Andhra Pradesh and India.

Course Outcomes:

At the end of course student will be able to:

1. Analyse different types of Bricks & Tiles based on their Characteristics.
2. Analyse different types of Stones & Timber based on their Characteristics
3. Identify various types of Metals, Glass & Miscellaneous materials used in construction.
4. Analyse different types of Geosynthetics & Plastics based on their Characteristics.
5. Identify & Plan Various Types of Paints, Varnishes & Distempers Required for a building.

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	3	2											2		
	2	3	2											2		
	3	3	2											2		
	4	3	2											2	1	
	5	3	2											2		

SYLLABUS

Unit I

Introduction: Classification of Building materials, uses

Bricks & Other Clay Products:

Clay Bricks- Ingredients of good brick earth; Harmful substances, Additives; Manufacture of bricks (IS:2117); Characteristics of good bricks; Classification of bricks; defects of bricks; Tests on bricks: compressive strength, water absorption, Efflorescence (IS:3495); Uses of bricks; Special bricks: Fire bricks, Heavy duty bricks, perforated bricks, Facing bricks, Lining bricks, Paving bricks, Hollow bricks, Sewer bricks, Soling bricks; Fly ash bricks; Special brick shapes.

Other Clay Products: Tiles- Characteristics of good tiles; Types of common tiles; Classification and properties of Flooring tiles (IS:1478) and Roofing tiles (IS:654); Terracing tiles (IS:2690); Mangalore tiles, Country tiles, Hollow clay tiles. Terra-cotta; Earthenware, stoneware, porcelain; Glazing; Refractories

Unit II

Stones: Quarrying & dressing of stones; Characteristics of good building stones, Common building stones, Uses in Civil Engineering

Timber: Characteristics of good timber; defects in timber, Decay of timber, Seasoning and preservation, properties, tests; uses of timber; Commercial forms of timber products in Civil Engineering; Indian timber trees.

Unit III

Metals: Ferrous metals: Properties & uses of different types of iron; non-ferrous metals: Aluminium & Lead, properties, uses in civil engineering

Glass: Classification & Commercial forms of glasses, uses in civil engineering

Miscellaneous Materials: Asbestos- Properties; uses; Gypsum- Gypsum boards; Gypsum plaster; Rubber – Properties & uses

Unit IV

Plastics: Types of plastics, properties, uses in civil engineering, Fibre glass Reinforced plastics, Properties & Applications.

Geosynthetics: Introduction, Functions and their Applications-tests on geo-textiles, geogrids; geo-membranes and geo-composites;

Unit V

Paints, Varnishes and Distempers: Paints: Characteristics of good paint; PVCN; Ingredients of oil-
borne paint; Types of paints; Defects in painting; Varnishes: Characteristics of good varnish; Ingredients; Types; process of varnishing; Distempers: Properties & ingredients; Process of distempering; Wall Paper; White wash; Colour wash.

Case study on Engineering materials commonly used in Visakhapatnam, Andhra Pradesh and India

Text Books

1. Rangwala, Engineering Materials, 41st Edition: 2014, Charotar Publishing House Pvt. Ltd.

References

1. S.K.Duggal, Building Materials, New Age International Publishers
2. D.N. Ghose, Materials of construction, Tata-McGraw-Hill Publishing Company Limited.
3. P. C. Varghese (2005), Buliding Materials, Prentice Hall

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. Determination of the frequency of an electrically maintained tuning fork - Meldi’s experiment.
11. Evaluation of moment of inertia by using Flywheel
12. Estimation of rigidity modulus and moment of inertia using Torsional pendulum
13. Determination of the particle size of micro particles (lycopodium powder) using laser

diffracting grating.

14. Find the Numerical aperture of a given optical fibre
15. Determination of the velocity of ultrasound in liquids by using the phenomenon of diffraction of light by ultrasound
16. Estimation of the wavelength of diode laser using a transmission grating
17. Measurement of dielectric constant with temperature variation (Ba TiO_3)

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.

Material Chemistry Lab

Syllabus

(For 1/IV B.Tech Civil Students 2023-24)

23CY1202 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,

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.Preperation of standard solutions and standardisation of acid using a strong base by neutralisation method

2. Determination of Hardness in ground water sample (EDTA Method)

3. Estimation of Zinc in a ground water sample / Zinc Ore by complexometric method.

4. Estimation of Iron in Cement using Permanganometric method.

5. Determination of Copper in copper ore using iodometric method.

6. Estimation of lime in a cement sample using Permanganometric method

7.Determination of strength of acidic content in a soil sample using pH metric method (instrumentation method)

8.Determination of electrolytic strength in Soil by using conductometric method.

9.Estimation of Chromium in chrome steel by Redox method using potentiometer.

10.Determination of viscosity of various oil samples using Ostwald viscometer.

Demonstration Experiments

11.Determination of available chlorine content in a sample of bleaching powder.

12. Tests on soil- Determination of pH, $CaCO_3$, total soluble sulphates.

13. Estimation of metal ion (Fe, Cu, Mn, Cr, Ni) content in a soil sample using spectrophotometric method.

Prescribed Text books

1.Vogel's text book of Quantitative analysis, 5th 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

DATA ANALYSIS AND PRESENTATION TOOLS

(For I B.Tech. I Semester Civil Engineering effective from 2023-24)

23CE3201 **Credits: 1.5**
Instruction: 3 Practicals / week **Sessional Marks: 50**
End Exam: 3 Hours **End Exam Marks: 50**

Course Objectives:

From this course students will learn the following

1. Develop Proficiency in Excel: Equip students with the skills to perform various data operations in Excel, including data manipulation, formatting, sorting, filtering, and creating and modifying charts.
2. Enhance Presentation Skills: Enable students to effectively use PowerPoint for creating, editing, and formatting presentations, including working with multimedia elements, animations, and transitions.

Course Outcomes (COs):

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

1. Analyse various data manipulation techniques in Excel, including sorting, filtering, and using functions and formulas.
2. Create and format different types of charts in Excel for data presentation.
3. Design and format professional PowerPoint presentations, incorporating multimedia elements and animations.
4. Create and Share PowerPoint presentations in various formats and ensure the security of the documents.

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**	3	3	3		3				3	3					
	2	3	3	3		3				3	3					
	3	3	3	3		3				3	3					
	4	3	3	3		3				3	3					
	5	3	3	3		3				3	3					

Task 1:

Introduction to Excel: Operation on data in Excel- creating, opening, saving the document as per the requirement; cells, rows, and columns; Inserting rows and columns; Navigation: Moving between cells; Selecting multiple cells; Selecting entire rows and columns; Selecting multiple rows and columns

Formatting: Cells;Tables; Choosing a table style to create a table; Adjust the table style; Creating or deleting a custom table style; Removing a table style; Converting a table to a range of data; Formatting table elements; Pivot tables

Task 2:

Conditional formatting: Highlight cells rules; Greater than; Less than; Between; Equal to; Text that contains; A date occurring; Duplicate values; Top/bottom rules; Top 10 items; Top 10%; Above average; Data bars; Color scales; New rule; Clear rules; Manage rules;

separating text within a cell

Task 3:
Sorting: Alphabetical; Numerically; Multi-level sorting; Sorting by cell color; Filters
Functions and formulas: Basic functions/formulas; Sums; Subtotaling; One level subtotals; Nested level subtotals; Removing subtotals; Average; Count numbers; Maximum and minimum

Task 4:
Using Excel for Creating charts: Creating a Bar Chart; Creating a Column Chart; Creating a Line Chart; Creating a Scatter Chart; Creating a Pie Chart

Task 5:
Using Excel for Creating charts: Creating an Area Chart; Bubble Charts; Creating a Doughnut Chart; Creating a Stock Chart; Surface Charts
Using Excel for Modifying Charts: Redefining Chart Data; Switching Rows and Columns; Select Data; Filtering Charts; Moving Charts; Chart Layouts; Chart Styles Group; The Chart Styles and Colors button; Chart Elements; Saving a Chart Template; Save the Template; Using the Chart Template

Task 6:
Introduction to PowerPoint ─ Getting Started─ Creating Presentation─ Adding New Slides─ Adding Text in Boxes─Deleting Existing Slide─ Rearranging Slides- Normal View- Slide Sorter View─ Adding Slide Notes─ Managing Sections─ Working with Outlines─ Sidebars─ Presentation Views-Normal View-Slide Sorter View-Reading View-Slideshow
Setting Backgrounds─ Slide Orientations─ Saving Presentation ─ Reviewing Presentation ─ Adding Slide Numbers─ Adding Header & Footer─ Running Slideshow─ Keyboard Shortcuts─ Getting Context Help

Task 7:
EDITING PRESENTATION─ Copy & Paste Content─ Find & Replace Content─ Undo Edited Changes- ─ Duplicating Content- Cut-Paste Procedure- Copy-Paste Procedure─ Special Characters─ Slides Zoom In-Out─ Spell Check─ Content Translation─ Setting Language Type
FORMATTING PRESENTATION─ Font Management─ Setting Text Fonts─ Text Decoration─ Changing Text Case─ Changing Text Size─ Changing Text Color─ Text Alignments─ Indent Paragraphs─ Setting Line Spacing─ Borders and Shades- Applying Borders-Applying Shades─ Apply Formatting─ Using Slide Master─ Saving Design Template

Task 8:
WORKING WITH MULTIMEDIA─ Adding Pictures to Slide ─ Editing Added Pictures-Image Adjustments-Picture Styles─ Formatting Added Pictures -Picture Arrangement Features-Picture Sizing Features─ Inserting a Screenshot─ Adding Shapes to Slide─ Editing Added Shapes-Insert Shape Features-Shape Styles Features─ Formatting Added Shapes-Shape Arrangement Features-Shape Sizing Features─ Adding Text to Shapes─ Arranging Shapes/Images─ Grouping/Ungrouping Objects─ Adding Audio & Video

Task 9:
Adding & Formatting Tables-Table Design Features- Table Format Features─ Adding &

Formatting Charts-Chart Design Features - Chart Layout Features-Chart Format Features─ Adding & Formatting SmartArt-SmartArt Design Features - SmartArt Format Features─ Adding & Previewing Animations─ Adding & Previewing Transitions

Task 10:
SHARING PRESENTATION─ Creating a PDF File─ Creating a Video File– Creating an Image File─ Printing Presentation─ Broadcasting Slideshow─ Packaging Presentation ─ Setting Document Password ─ Emailing Slideshow

References:

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for Word, Excel, PowerPoint & Outlook Exams, Joan Lambert, Joyce Cox, PHI
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Excel and Power Point Tutorials

UNIVERSAL HUMAN VALUES AND ETHICS- I

(Mandatory Non-Credit Course as part of Induction Program - R23 Regulations)

Course Code – Category: 23MC0101 OE - HSC **Credits: 0**

L	T	P
1	0	0

Prerequisites:

None. Universal Human Values 1 through Induction Program (desirable)

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 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.

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 3 Periods

Introduction – Fulfillment of Basic Human Aspirations: 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

UNIT – II 4 Periods

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

UNIT – III 4 Periods

Harmony in the Family: Human relationship – Feelings in Relationship – Trust – Intention and competence – Respect as right evaluation – Over, under and otherwise-evaluation – Minimum content of Respect – Complete content of Respect – Other feelings in Relationship – Love – Response and Reaction.

UNIT – IV 2 Periods

Harmony in the Society: Human Goals – Systems for fulfillment of human goals.
Harmony in the Nature: Understanding the harmony in the Nature

UNIT – V 2 Periods

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

TEXT BOOK

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

B.TECH. I Year – II Semester

Semester - II			
Course Code	**Title of the course**	**Category**	**Credits**
23EN2101	Communicative English	HSS	3
23MA1102	Ordinary Differential Equations and Numerical Methods	BS	3
23CS3101	Problem Solving with Programming using C	ES	3
23CE4112	Building Planning and Construction	PC	3
23CE1101	Engineering Geology	BS	3
23EN2201	Communicative Langauge Lab	HSS	1.5
23CE3202	Civil Engineering Workshop	ES	1.5
23CS3201	Problem Solving with Programming using C lab	ES	1.5
23CE0102	Environmental Science	MC	-
	Total		**19.5**

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:

6.	Comprehend LSRW skills and various linguistic aspects of multicultural milieu.**(L2)**
7.	Acquire verbal and nonverbal Communication skills through varied individual and team activities. **(L3)**
8.	Apply proper vocabulary and appropriate grammar to draft different types of writings collectively and separately for effective professional and personal communication**. (L3)**
9.	Analyze and relate advanced terminology in conceptual conversations, writings and in pronunciation. **(L4)**
10.	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- Justification	
1	CO1 is not mapped with any PO as the topics should be explained by the teachers and students' previous knowledge and comprehension are tested.
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 **CO1** **10 Periods**

Listening: I have a dream by Dr. Martin Luther King Jr. (Motivational Speeches)
Speaking: Self Introduction – Introducing others
Reading: The Time Machine by H G Wells
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 – C2 Level Vocabulary

UNIT II **CO2, CO3** **10 Periods**

Listening: Speech of Howard Roark in The Fountainhead by Ayn Rand
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: Essay Writing – Narrative Essay and Descriptive Essay
Grammar: Tenses - Agreement: Subject-verb, Noun-pronoun – Articles – Prepositions
Vocabulary: One-word Substitutes – Word Associations – Portmanteau Words

UNIT III **CO3** **10 Periods**

Listening: "If" poem by Rudyard Kipling
Leave This Chanting by Ravindranath Tagore
Haikus
Speaking: Oral Presentation
Reading: Editorials reading
Writing: Argumentative Essays and Informative Essays on general topics

Grammar: Active and Passive Voice, Modifiers and Misplaced Modifiers
Vocabulary: Academic words– Synonyms and Antonyms

UNIT IV **CO4** **10 Periods**

Listening: Role-plays
Speaking: Debating Skills
Reading: Skimming and Scanning - Failure to Success Stories
Writing: Summary Writing – J. K. Rowling and Jadav Payeng
Grammar: Direct and Indirect Speech – Degrees of Comparison
Vocabulary: Homonyms & Homophones – Collocations – Etymology

UNIT V **CO5, CO3** **10 Periods**

Listening: News Bulletins- Recycle for Life: Karaikal's success in battling waste
Speaking: Mock Press, Floor Crossing
Reading: Cover Story - 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 – Commonly Confused Words in English – Acronyms – Word Building

PRESCRIBED TEXT BOOK:

1. ***Communicative English – A Pragmatic Approach to Language Learning*, prepared by the Department of English, ANITS and published by Immortal Publications.**

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

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

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 dictionarie

	SCHEME OF EVALUATION		
I	**Semester End Examination :**		**60 M**
II	**Internal Evaluation :**		**40 M**
1.	**Two Mid Exams**	**20 M**	
2.	**Two Assignments**	**10 M**	
3.	**Quiz / Class tests**	**05 M**	
4.	**Attendance**	**05 M**	
	TOTAL MARKS		**100 M**

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

11.	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.
12.	Discriminate among the structure and procedure of solving a higher order differential equations with constant coefficients and variable coefficients.
13.	Apply various numerical methods to solve linear and non-linear equations.
14.	Familiarize with numerical integration and differentiation.
15.	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:

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

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 levels1: 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

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 levels1: 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, controlstructures, 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 engineeringfield, society, and their professional development.
3	CO3 can be attained by enabling students to develop comprehensive expertise in utilizingpointers 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 andwithout 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 ProgrammingApproach 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.

BUILDING PLANNING & CONSTRUCTION

23CE4112 **Credits:3**

L	T	P	E	O
2	0	2	0	2

Sessional Marks:40

End Exam: 3 Hours **End Exam Marks:60**

Course Objectives:

1. Understand about masonry, floors and doors types in construction.
2. Learn about hazards and safety requirments construction.
3. To understand climatology, principles of planning and bye laws of buildings.

Course Outcome:

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

1. Identify the component parts of a building and the types of walls used in construction.
2. Describe the various types of floors, doors, windows, ventilators, and their applications.
3. Explain the safety protocols and common hazards in construction activities.
4. Assess the impact of climate on building design and use relevant tools for planning.
5. Develop plans for residential buildings that adhere to regulations and consider site selection.

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	3												2		
	2	3												2		
	3	2	3			3								2		
	4	3	3											2		
	5	2	3	2	2	2								2		

SYLLABUS

UNIT - I **12 Periods**

Introduction: Component Parts of a Building - Load bearing construction - Framed buildings - Tall buildings, Advantages, problems - Other types of Buildings - Setting and laying out a building - Responsibilities and Duties of the Client and Engineer.

Walls: Classification of walls; Technical terms - Stone masonry construction - types and rules - Brick masonry walls - bonds and rules - cavity wall construction.

UNIT - II 12 Periods

Floors: Terminology; Materials – Types of floors – suitability (Industrial, Indoor, Stilt & Terrace Floors) and construction; Concrete, mosaic, terrazzo, tiled, stone & synthetic floors and floor finish.

Doors, Windows and Ventilators: Location of doors and windows, technical terms, Dimensions of doors and windows, Door frames, Types of doors and windows, Ventilators.

UNIT - III 12 Periods

Building Conveyance Verticality: Stair cases - Lifts - Escalators - Ramps - Basic terms - Types.

Construction safety: Safety in construction - general requirements - common hazards during excavation; piling and other deep foundations - common hazards during walling; roofing; additional safety requirements for erection of concrete framed structures - additional safety requirements for erection of structural steel work - general requirements; safety in demolition of buildings

UNIT - IV **12 Periods**

Climatology: Elements of climate: Sun, Wind, Relative Humidity, and Temperature. Comfort conditions for house, Various types of Macro-climatic zones, Design of Houses and layouts with reference to climatic zones, Mahoney tables, Solar charts, Wind rose diagrams, Orientation of Buildings

UNIT - V **12 Periods**

Residential buildings: Different types of Residential Buildings, Description of a Multi-Storied Building, Selection of site for residential buildings, Guidelines for planning and drawing of residential building, General Building regulations and Bye laws for Residential Buildings

TEXT BOOKS

1. Kumara Swamy.N and KameswaraRao.A(2013), Building Planning and Drawing, Charotar Publishing House.
2. Gurucharansingh and JagadishSingh(2009), Building Planning Designing and Scheduling, Standard Publishers Distributors.
3. The Text Book Of Building Construction by S.P.Arora, S.P.Bindra, Dhanpatrai Publications.
4. Building Construction by B.C. Punmia, Laxmi Publications (p) Ltd.

REFERENCES

1. Shah.M.G, Kale.C.M and Patki.S.Y.(2002), Building drawing with an integrated approach to the built environment, McGraw-Hill Publishing Company Limited.
2. Trimurty.R.(2008), Civil Engineering Drawing, Premier Publishing House.
3. National Building Code of India, SP 7 (1): 1983, First Revision 1992, Bureau of Indian Standards
4. Building Construction by Sushil kumar, Standard publishers distributors.
5. Building construction by P.C.Verghese, PHI Learning (P) Ltd.
6. Relevant NPTEL Courses.

ENGINEERING GEOLOGY

23CE1101 **Credits: 3**

Instruction: 3 Lectures & 1 Tutorial / week Sessional Marks: 40

End Exam: 3 Hours End Exam Marks: 60

Course Objectives:

The objective of the course is to prepare the students

1. To identify & classify different minerals and map the geological structures present insubsurface.
2. Investigate the selected project site to obtain data and determine the favourableconsiderations in study area.
3. Measure earthquakes and landslides to classify the hazardous zones and interpretgeological maps.

Course Outcomes:

1. Apply the knowledge of geological concepts to analyze the causes of specific failures in civil engineering constructions.

2. Apply the principles of petrology to classify rocks and understand their formation, structure, texture, and mineralogical composition in the context of civil engineering.

3. Utilize the knowledge of minerology to determine their relevance and applicability in civil engineering projects.

4. Analyze the ground conditions by applying appropriate Geophysical Exploration technique.

5. Apply appropriate construction precautions and safety measures for structures in case of Earthquakes, Landslides & Tsunamis..

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														
	3	3														
	4		3		2											2
	5	3						2						2	2	

SYLLABUS

UNIT - I **12 Periods**

Introduction: Definition of Geology and Engineering Geology, Branches of Geology, Scope and importance of geology from Civil Engineering point of view.Brief study of case histories of failure of some civil engineering constructions due to geological draw backs. Role of engineering geologist in planning, design and construction stages in Civil Engineering works

Earth: Internal structure of the Earth and its composition, Elementary knowledge on isostasy, continental drift, plate tectonics and sea floor spreading.

Geological Cycle: Weathering, Effect of Weathering over the properties of rocks, Importance of Weathering with reference to civil engineering constructions like dams, reservoirs and tunnels.

Learning outcomes:
At the end of this unit the student will be able to

- **Enumerate** various branches of Geology
- **Understand** elementary knowledge on isostasy
- **Comprehend** the concept of weathering and its effects

UNIT - II **12 Periods**

Petrology: Definition of rock, Civil Engineering importance – Geological classification of rocks –Rock cycle, Formation, Structure, texture and mineralogical composition of igneous, sedimentary and metamorphic rocks, Study of physical properties of different types of igneous, sedimentary and metamorphic rocks. Igneous rocks: Granite, synite, dolerite, gabro, diorite, basalt. Sedimentary rocks, dykes and sills: Breccia, conglomerate, Sandstone, Shale, limestone. Metamorphic rocks: Gneiss, khondalite, schist, slate, marble, quartzite, charnokite. Engineering properties of rocks.

Soils: Soil formation, Soil profile, – Geological classification – Engineering classification and description of Indian soils; Soil erosion and conservation.

Learning outcomes:
At the end of this unit the student will be able to

- **Explain** the rock cycle
- **Identify** the properties of various rocks
- **Comprehend** the process of soil formation

UNIT - III **12 Periods**

Mineralogy: Definition of mineral, Importance of study of minerals, Different methods of study of minerals, Study of physical properties of different rock forming minerals: Silicate structures,

Quartz, feldspars, pyroxenes, amphiboles, micas and clays, Introductory knowledge on Chemical and optical properties of minerals.

Structural Geology: Elements of structural geology:Strike, dip, outcrop, plunge Problems on Strike,Dip Calculation– Study of folds, faults, joints, unconformities, Classification of folds, faults and joints. and their importancein Civil Engineering works.

Learning outcomes:
At the end of this unit the student will be able to

- **Understand** the importance of mineralogy
- **Gain** elementary knowledge on chemical and optical properties of minerals
- **Depict** the structural geology and their classifications

UNIT - IV **12 Periods**

Geophysical Exploration: Electrical, Seismic, Gravity and Magnetic methods. Principle of Resistivity method and configurations. Principles of Seismic refraction and reflections methods.

Geological Applications in Civil Engineering: Geological investigations for Civil Engineering Projects. Favourable Geological considerations for construction of Dams, Reservoir, Tunnels and Road Cuttings. Underground water in relation to Engineering Works.

Learning outcomes:
At the end of this unit the student will be able to

- **Conduct** geophysical exploration methods for sub-surface exploration.
- **Understand** the importance of Geological applications in civil engineering

UNIT - V **12 Periods**

Earthquakes: Terminology, Causes and effects, Classification, Earthquake waves, Seismograph, Locating Epicenter, Determination of depth of focus, Intensity, Magnitude, Mercalli & Richter scales, Prediction, Effects, Seismic belts, Shield areas – Seismic zones of India – Civil Engineering considerations in seismic areas – Precautions of building constructions in seismic areas. Safety measures for buildings and dams – Reservoir induced seismicity.

Landslides: Causes, effects, methods of mitigating impact of landslides.

Tsunamis: Meaning of Tsunami, causes & Effects of Tsunami, warning and mitigation.

Tunneling: Effects of Tunneling and its purpose and lining of Tunnels. The influence of geology on successful Tunneling.

Learning outcomes:
At the end of this unit the student will be able to

- **Understand** the concept of earthquakes, Landslides, Tsunamis & Tunneling.
- **Classify** the earthquake zones based seismic activity

TEXT BOOKS

1. **D.Venkata Reddy "***Engineering Geology"* Vikas Publishing House Pvt Ltd. 2011.
2. **N.ChennaKesavulu** –*Text book of Engineering Geology"* MacMillan India Ltd, Hyderabad, 2014

REFERENCES

1. **SubinoyGangopadhyay** –*Engineering Geology"* Oxford University Press. 2013.
2. **F.G. Bell** –*Fundamental of Engineering Geology*‖ Butterworth Publications, New Delhi, 1992.
3. **David George Price** *Engineering Geology Principles and Practice* Springer, 2009.
4. **KVGK Gokhale** *"Principles of Engineering Geology*‖ B.S.Publications-2005
5. **Parbin Singh, K Kataria& Sons** *Engineering and General Geology*, New Delhi, 2009
6. **P.C. Varghese** *"Engineering Geology for Civil Engineers"*, PHI learning pvt. Ltd., 2012Relevant NPTEL Courses.

COMMUNICATIVE ENGLISH LAB

ENG LAB **Credits:1.5**

Instruction : 3 periods Sessional Marks:50

End Exam : 3 Hours End Exam Marks:50

Prerequisites: Basic English Grammar

Course Objectives:

6. To give idea about phonetics, linguistics and LSRW skills
7. To develop conversational skills among the students
8. To introduce different accents of English language through presentations
9. 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

16.	Understand various linguistic, phonetic and communicative aspects L2
17.	Apply general conversational activities in different socio-cultural contexts with logical thinking. L3
18.	Analyze cultural diversity of several nations' languages through presentations. L4
19.	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

CIVIL ENGINEERING WORKSHOP

23CE3201 **Credits: 1.5**

Instruction: 3 Practicals / week **Sessional Marks: 50**

End Exam: 3 Hours **End Exam Marks: 50**

Course Objective:

1. To develop skill to use basic surveying equipments
2. To acquire hands on experience in testing of building materials

Course Outcomes:

1. Identify the applications of modern surveying equipments, quality of building materials, types and structures of rocks through testing.
2. Interpret the obtained results with IS 10500:2012 and write effective report.

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	3		3					3	3			2	2	
	2	2	3		3					3	3			2	2	

LIST OF EXPERIMENTS

1. Ranging – offsets - chainage
2. To find the area of an irregular polygon using chain by using horizontal measurements
3. Determination of bearings and included angles with prismatic compass.
4. Estimation of quantity of bricks, concrete, wood, paint for the given single room building
5. Masonry work: Hands on practice work for different types of bonds in brick masonry
6. Setting out of building : The student is required to set out a building (Single room only) as per the given building plan using tape and cross staff
7. Identification of rock / ore forming minerals
8. Identification of Rocks – Igneous, Sedimentary, Metamorphic rocks
9. Finding the discharge velocity in a water pipe line and find density of water
10. Computation of centre of gravity and moment of inertial of (i) I-section and (ii) Channel section.

FOR DEMONSTRATION

11. Demonstration on usage of chain
12. Demonstration on various Building materials used in construction
13. Identification of quality of cement through physical tests
14. Identification of quality of brick through physical tests
15. Identification of soil based on their physical properties
16. Demonstration on Installation of simple sanitary fittings and fixtures like Tap, T-joint, Elbow, bend, threading etc.
17. Demonstration on Automatic weather station for measuring different climatic parameters like Temperature, humidity, rainfall, evaporation etc.,
18. Welding (arc welding and gas welding)

REFERENCES

▪ “Laboratory Manual for Basic Civil Engineering Workshop”, compiled by the Department of Civil Engineering

ENVIRONMENTAL SCIENCE

With effect from 2023-24

Mandatory (Non Credit) course for all branches

Course Code- Category: 23MC0102 **Credits:0**

Lecture hours : 3 per week Sessional Marks:50

Prerequisites : +1 & +2

COURSE OBJECTIVES:

Inculcating in students the awareness towards importance about Environmental science Understand the importance natural resources, Structure, and functions of an ecosystem Inducing knowledge on Sources, effects, and methods to reduce environmental pollution 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.No.	Statement
CO-1	Identify the characteristics of various natural resources and can implement the conservation practices
CO-2	Realize the importance of Ecosystem and Biodiversity for maintaining ecological balance
CO-3	Classify, analyze various pollutants and can develop methods for solving problems related to environment
CO-4	Implement the environmental laws or defend issuesby getting awareness on legal aspects related to environmental issues
CO-5	Promote awareness on local environmental issues by participating in group activities, seminars, taking project work

CO-PO-PSOMapping

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

UNIT - I INTRODUCTION TO ENVIRONMENT ANDNATURALRESOURCES

8Periods

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

Natural Resources: Renewable and Non-Renewableresources-Forestresources-useandoverexploitation,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 Conflicts (Case studies).

UNIT- II
ECOSYSTEM &BIODIVERSITY

8Periods

Ecosystem: Conceptofanecosystem-structureandfunctionofanecosystemFoodchains,foodwebsandecological pyramids, Energy flow in an ecosystem, Ecosystem regulation, Ecological succession.

Biodiversity: Definition,types,IndiaasaMegadiversityNation,Valuesofbio diversity,Hotspotsofbiodiversity, Threats to biodiversity, Endangered and endemic species, Conservation of biodiversity.

Activities:

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

UNIT -III
ENVIRONMETAL POLLUTION ANDWASTEMANAGEMENT

8Periods

Pollution: Sources, effects and control measures of Air pollution, Noise Pollution, Water Pollution, Soil Pollution, 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
SOCIALISSUESANDENVIRONMENTALLEGISLATIONS 8Periods

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 presentations), Environmental Legislation (Awareness Campaign).

UNIT- V
HUMAN POPULATION ANDTHEENVIRONMENT 5Periods

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

FIELD WORK/PROJECT: Visit to a local area to document environmental problem. Prepare a record or presentation and to be discussed in classroom. Certificate soft copy will be provided to student.

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

Prescribed Book

1. **Anubha Kaushik &C.P.Kaushik**, "*Perspertives of Environmental Studies"* by 5thedition New AgeInternational Publications,2015.
2. **Palaniswamy**- "*Environmental Studies"*, 2ndedition, Pearson education2015.

Reference Books

1. **S. Deswal, A. Deswal**, "*Basic course in Environmental studies"*, 2ndedition,

Dhanpatrai Publications,2008.