

Course Structure and Syllabus for
B. Tech.
CIVIL ENGINEERING (CE)
(Applicable for batches admitted from 2023-24)



Department of Civil Engineering

DHANEKULA INSTITUTE OF ENGINEERING AND TECHNOLOGY

(An Autonomous, NAAC Accredited ISO 9001-2015 Certified Institution)

(Approved by AICTE, Affiliated to JNTUK, Kakinada)

Ganguru, Vijayawada, Andhra Pradesh - 521139, INDIA.

www.diet.ac.in

DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY

Department of Civil Engineering

VISION – MISSION – PEOs

Institute Vision	Pioneering Professional Education through Quality
Institute Mission	<p>Providing Quality Education through state-of-art infrastructure, laboratories and committed staff.</p> <p>Moulding Students as proficient, competent, and socially responsible engineering personnel with ingenious intellect.</p> <p>Involving faculty members and students in research and development works for betterment of society.</p>
Department Vision	To become a pioneering center of learning and research in Civil Engineering
Department Mission	<p>Providing high quality education in an atmosphere of innovation and critical thinking.</p> <p>An integrated development of Civil Engineering Professionals Possessing Technical & Managerial skills, Environmental, Ethical and Human values.</p> <p>Inculcating research and consultancy culture by involving faculty and students.</p>
Program Educational Objectives(PEOs)	<p>PEO 1: Domain Knowledge Graduates will have the fundamental knowledge of mathematics, science, economics and computing and in-depth knowledge in Civil Engineering concepts through theoretical, laboratory and project based experiences so as to design, develop and solve engineering problems.</p> <p>PEO 2: Employment & Higher Studies Graduates will succeed in their chosen engineering careers with sustainable development in their profession and have the ability to pursue advanced degrees in engineering and other fields.</p> <p>PEO 3: Professional Citizenship Graduates will have ability to organize and Communicate effectively in multidisciplinary engineering projects through life long learning, practice ethics with a sense of social responsibility.</p>

DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY

Department of Civil Engineering

POs/PSOs

PROGRAM OUTCOMES(POs)

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, review 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 responsibilities relevant 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 (PSOs)

PSO1: Knowledge of contemporary issues in the civil engineering industry to solve societal issues.

PSO2: Qualify in competitive examinations for higher education and employment.

B.Tech (CE) - COURSE STRUCTURE – DIET23
(Applicable from the academic year 2023-24 onwards)

INDUCTION PROGRAMME

S.No.	Course Name	Category	L-T-P-C
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counselling	MC	2-0-2-0
3	Orientation to all branches -- career options, tools, etc.	MC	3-0-0-0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2-0-3-0
5	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-1-2-0
8	Human Values & Professional Ethics	MC	3-0-0-0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10	Concepts of Programming	ES	2-0-2-0

B.Tech. – I Year I Semester

S.No.	Category	Title	L/D	T	P	Credits
1	BS&H	Communicative English	2	0	0	2
2	BS&H	Engineering Chemistry	3	0	0	3
3	BS&H	Linear Algebra & Calculus	3	0	0	3
4	Engineering Science	Basic Civil & Mechanical Engineering	3	0	0	3
5	Engineering Science	Introduction to Programming	3	0	0	3
6	BS&H	Communicative English Lab	0	0	2	1
7	BS&H	Engineering Chemistry Lab	0	0	2	1
8	Engineering Science	Engineering Workshop	0	0	3	1.5
9	Engineering Science	Computer Programming Lab	0	0	3	1.5
10	BS&H	Health and wellness, Yoga and Sports	-	-	1	0.5
Total			14	00	11	19.5

B.Tech. – I Year II Semester

S.No.	Category	Title	L/D	T	P	Credits
1	BS&H	Engineering Physics	3	0	0	3
2	BS & H	Differential Equations & Vector Calculus	3	0	0	3
3	Engineering Science	Basic Electrical and Electronics Engineering	3	0	0	3
4	Engineering Science	Engineering Graphics	1	0	4	3
5	Engineering Science	IT Workshop	0	0	2	1
6	Professional Core	Engineering Mechanics	3	0	0	3
7	BS&H	Engineering Physics Lab	0	0	2	1
8	Engineering Science	Electrical and Electronics Engineering Workshop	0	0	3	1.5
9	Professional Core	Engineering Mechanics and Building Practices Lab	0	0	3	1.5
10	BS&H	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Total			13	00	15	20.5

COMMUNICATIVE ENGLISH

Course Category:	BS	Credits: 2			
Course Type:	Theory	Lecture-Tutorial-Practice:	2	0	0
Prerequisites	Basic reading skills	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Employ suitable strategies for skimming and scanning to get a general idea of a text and locate specific information	Affective
CO2	Apply grammar rules to form sentences effectively	Affective
CO3	Use correct word forms to communicate effectively with enriching vocabulary	Affective
CO4	Recognize the theme of the given text and summarize and interpret the information	Affective
CO5	Report the information effectively in different formats using good writability	Affective

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								3	3	3				3
CO2								3	3	3				3
CO3								3	3	3				3
CO4								3	3	3				3
CO5								3	3	3				3

COURSE CONTENT:

UNIT-1: Lesson: **HUMAN VALUES: Gift of Magi** (Short Story)

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT-2: Lesson: NATURE: The Brook by Alfred Tennyson (Poem)

Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks. Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Structure of a paragraph - Paragraph writing (specific topics)

Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.

Vocabulary: Homonyms, Homophones, Homographs.

UNIT-3: Lesson: BIOGRAPHY: Elon Musk

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. Writing: Summarizing, Note-making, paraphrasing

Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations

Vocabulary: Compound words, Collocations

UNIT-4: Lesson: INSPIRATION: The Toys of Peace by Saki

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. Writing:

Letter Writing: Official Letters, Resume,E-mail writing,Cover letter,SOP

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargons

UNIT-5: Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts

Reading: Reading comprehension. Writing: Writing structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Vocabulary: Technical Jargons

TEXT BOOKS:

1. Pathfinder: Communicative English for Undergraduate Students, 1 st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

REFERENCE BOOKS:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020 Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
2. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019
3. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. <https://dictionary.cambridge.org/grammar/british-grammar/>
3. www.eslpod.com/index.html
4. <https://www.learngrammar.net/>
5. <https://english4today.com/english-grammar-online-with-quizzes/>
6. <https://www.talkenglish.com/grammar/grammar.aspx>

VOCABULARY

1. <https://www.youtube.com/c/DailyVideoVocabulary/videos>
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

ENGINEERING CHEMISTRY

Course Category:	BS/ES/PC/PE/OE/MC/SC	Credits : 3			
Course Type:	Theory / Tutorial /Practical	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Basic concepts of chemistry	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No	Course Outcome Description	K - Level
CO1	Select the appropriate method of purification and softening by considering impurities or hardness present in water.	Applying
CO2	Describe the working of primary cells, and secondary cells and recognize control methods for standard types of corrosion.	Applying
CO3	Explain different types of polymers, applications, analysis of solid, liquid, alternative fuels and the calculation of calorific value	Applying
CO4	Elucidate the constituents, classification, functions, properties, and applications of modern engineering materials (composites, refractories, lubricants and building materials)	Applying
CO5	Summarize the concepts, preparation, and applications of colloids, nano metals, metal oxides and their stabilizing agents	Applying

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO1	PSO2
CO1	3													
CO2	3													
CO3	3													
CO4	3													
CO5	3													

COURSE CONTENT:

UNIT I Water Technology

Soft and hardwater, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.

UNIT II Electrochemistry and Applications

Electrodes –electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium ion batteries-working principle of the batteries including cell reactions; Fuel cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

UNIT III Polymers and Fuel Chemistry

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization.

Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of poly styrene.

PVC Nylon 6,6 and Bakelite.

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers.

Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of

petroleum, Octane and Cetane number- alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.

UNIT IV Modern Engineering Materials

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractories- Classification, Properties, Factors affecting the refractory materials and Applications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils –

Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials- Portland Cement, constituents, Setting and Hardening of cement.

UNIT V Surface Chemistry and Nanomaterials

Surface Chemistry- Introduction, micelle formation Colloids-Introduction, synthesis of colloids (Braggs Method), stabilization of colloids by stabilizing agents

Nanometals and Nanometal Oxides-introduction, chemical and biological methods of preparation of nanometals and metal oxides, stabilization of nanomaterials by stabilizing agents Adsorption Isotherm-Freundlich and Longmuir, BET equation (no derivation)

Applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

TEXT BOOKS:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

REFERENCE BOOKS:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth- Heineman, 1992.
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

E-RESOURCES/DIGITAL MATERIAL:

- (a) <https://moodle.net>
- (b) <https://libguides.reading.ac.uk/chemistry/e-resources>

LINEAR ALGEBRA AND CALCULUS

Course Category:	BS	Credits: 3			
Course Type:	Theory / Tutorial	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Basics of Matrices, Differentiation & Integration. Convergence of a Series.	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Objectives: To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Test the Linear system's consistency and determine its solution.	4-Analyzing
CO2	Apply eigen values and eigen vectors to reduce a quadratic form to its canonical form.	3-Applying
CO3	Apply mean value theorems to obtain series expansions of single variable functions.	3-Applying
CO4	Utilize partial differentiation in optimizing multi variable functions.	3-Applying
CO5	Evaluate multiple integrals and find area / volume of bounded regions.	5-Evaluating

Note: K-Level is defined From Blooms Taxonomy

COURSE CONTENT:

UNIT-1: Matrices:

Rank of a matrix by echelon form, normal form. Cauchy–Binet formula (without proof). Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

UNIT-2: Eigen values, Eigen Vectors and Orthogonal Transformation:

Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal transformation.

UNIT-3: Calculus

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof), Problems and applications on the above theorems.

UNIT-4: Partial differentiation and Applications (Multi variable Calculus):

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT-5: Multiple integrals (Multi variable Calculus):

Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXT BOOKS:

[1] Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition

[2] Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCE BOOKS:

- (i) Engineering Mathematics-I (Linear Algebra and Calculus) by T.K.V. Iyengar et.al., S Chand and Company Ltd
- (ii) Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
- (iii) Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
- (iv) Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
- (v) Advanced Engineering Mathematics, Michael Greenberg, Pearson publishers, 9th edition.
- (vi) Higher Engineering Mathematics, H. K. Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021)

E-RESOURCES/DIGITAL MATERIAL:

- (a) <http://www.nptelvideos.com/mathematics/>
- (b) <https://digimat.in/cgi-bin/search.cgi>

BASIC CIVIL & MECHANICAL ENGINEERING

Course Category:	Engineering Science (ES)	Credits : 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	-	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After successful completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Understand various disciplines of Civil Engineering including the basic construction materials and building elements.	K-2
CO2	Interpret the basic concepts of surveying and types and applications of soils, foundations and geosynthetics.	K-2
CO3	Realize the importance of Transportation in nation's economy and that of Water Storage and its conservation.	K-2
CO4	Identify the scope and importance of Mechanical Engineering in different sectors and industries	K-2
CO5	Understand the different manufacturing processes and explain the basics of thermal engineering and its applications	K-2
CO6	Describe the working of different mechanical power transmission systems and power plants and basics of robotics and its applications.	K-2

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate,3 – High)

CO No.	PO1	PO	PO	PO4	PO	PO6	PO7	PO	PO	PO	PO	PO	PSO	PSO
CO1	3	-	-	-	-	2	-	2	-	-	-	-	2	2
CO2	3	2	-	-	-	2	-	2	-	-	-	-	2	2
CO3	3	-	-	-	-	3	2	2	-	-	-	-	2	2
CO4	3	2	-	-	-	-	-	-	-	-	-	2	3	2
CO5	3	2	-	-	-	-	-	-	-	-	-	2	3	2
CO6	3	2	-	-	-	-	-	-	-	-	-	2	3	2

COURSE CONTENT:

UNIT-1:

Basics of Civil Engineering: Role of Civil Engineers in society- Various disciplines of Civil Engineering- Structural Engineering, Geotechnical Engineering, Transportation Engineering, Hydraulics and Water Resources Engineering, Environmental Engineering (Scope of each discipline) - Building Construction and Planning: Construction Materials–Cement, Aggregates, Bricks, Cement concrete and Steel (physical properties, classification, and uses/applications only) – list of building elements.

UNIT-2:

Surveying: Objectives of Surveying - Horizontal Measurements - Angular Measurements- Introduction to Bearings - Levelling instruments used for levelling - Contour mapping.

Geotechnical Engineering: Soils (types, origin and distribution) - Foundations and Geosynthetics (types and their applications).

UNIT-3:

Transportation Engineering Importance of Transportation in Nation's economic development - Types of Highway Pavements - difference between Flexible and Rigid Pavements. Introduction to Harbours, Tunnels, Airports, and Railways (functions and components only)

Water Resources and Environmental Engineering: Introduction, Sources of water - Quality of water - Specifications - Introduction to Hydrology – Rainwater Harvesting - Water Storage and Conveyance Structures (introduction to Dams and Reservoirs - purpose and classification according to use).

UNIT-4:

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society-Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT-5:

Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – Working principle of a boiler IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT-6:

Power plants – Working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.)

TEXT BOOKS:

- [1]. Basic Civil Engineering, M.S. Palanisamy, Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
- [2]. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

REFERENCE BOOKS:

1. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
2. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.
3. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
4. Geotechnical Engineering, C. Venkataramaiah, New Age Publishers, 2021, 7th Edition.
5. Irrigation and Water Power Engineering - Dr. B. C. Punmia, Dr. Pande B.B. Lal, Er. A.K. Jain, Laxmi Publications, 2021, 17th Edition.

6. Highway Engineering, S.K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
7. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.
8. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.
9. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications
10. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I
11. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
12. Basic Civil Engineering, Sathesh Gopi, Pearson Publications, 2009, First Edition.
13. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
14. A text book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.

E-RESOURCES/DIGITAL MATERIAL:

- a) <https://archive.nptel.ac.in/courses/105/106/105106201/>
- b) https://onlinecourses.nptel.ac.in/noc23_ce80/preview

COURSE CONTENT:

UNIT-1:

Introduction to Programming Languages, Basics of a Computer Program-Algorithms, flowcharts (Using DiaTool), pseudo code, Introduction to Compilation and Execution, Primitive Data Types, Variables and Constants, Basic Input and Output, Operators, Type Conversion and Casting, formatted IO, Problem solving techniques: Algorithmic approach, Characteristics of algorithm, Example Programs

UNIT-2:

Control Structures: Simple sequential programs, Conditional Statements (if, if-else, if else ladder, Nested if, switch), Nesting, Loops (for, while, do-while), Break and Continue, Example Programs.

UNIT-3:

Arrays and Strings: Arrays indexing, Array Declaration and Initialization, programs with array of integers, two dimensional arrays, Introduction to Strings, String handling functions, Example Programs.

UNIT-4:

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, Dynamic Memory Allocation functions, User-defined data types-Structures and Unions, Example Programs.

UNIT-5:

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, Recursion, modifying parameters inside functions using pointers, Arrays and Structures as parameters. Storage Class Modifiers, File Handling- Creation, Opening Modes, File IO

Textbooks:

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition, 2011.
2. "The C Programming Language", Brian W.Kernighan and Dennis M.Ritchie, Prentice-Hall, 2015.
3. Schism's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996.
4. Let us C , Yaswanth Kanetkar, 16th Edition, BPB Publication, 2020.

5. Programming in ANSI C, McGraw Hill, seventh edition by E.Balagurusamy .2017

Reference Books:

1. Programming in C, Reema The raja, Oxford,2016,2nd edition
2. Programming In C, Ashok Kamthane, Second Edition, Pearson Publication, 2013
3. Problem solving using C , K Venugopal,3^d Edition, TMG Publication,2015
4. Anil B. Chaudhuri, “Flowchart and Algorithm Basics: The Art of Programming”, Mercury Learning & Information, 2020.
5. Paul J. Dietel and Harvey M. Deitel, “C: How to Program”, Prentice Hall, 8th edition (Jan 19, 2021)

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc21_cs01/preview

Websites:

- <http://www.c4learn.com/>
- <http://www.geeksforgeeks.org/c/>
- <http://nptel.ac.in/courses/122104019/>
- <http://www.learn-c.org/>
- <https://www.tutorialspoint.com/cprogramming/>

COMMUNICATIVE ENGLISH LAB

Course Category:	BS	Credits: 1			
Course Type:	Lab	Lecture-Tutorial-Practice:	0	0	2
Prerequisites	Basic understanding of LSRW Skills	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Identify and pronounce consonants and vowel sounds as per the International Phonetic Alphabet	Cognitive
CO2	Speak fluently by practicing accent, rhythm, and intonation	Affective
CO3	Interact with others confidently on the phone or in person by using appropriate expressions	Psychomotor
CO4	Make oral presentations on different topics - individually or in groups with confidence, clarity and conviction.	Psychomotor

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO1	PSO2
CO1							3	3	3				3
CO2							3	3	3				3
CO3							3	3	3				3
CO4							3	3	3				3

COURSE CONTENT:

- 1 Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. Self-Introduction, Introducing others, Non-verbal communication
6. Group Discussions-methods & practice
7. Debates - Methods & Practice
8. PPT Presentations
9. Poster Presentation
10. Interviews Skills

Suggested Software: • Walden Infotec

- Young India Films

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. J. Sethi & P.V. Dhamija. A Course in Phonetics and Spoken English, (2nd Ed), Kindle, 2013

Web Resources: Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. <https://www.britishcouncil.in/english/online>
5. <http://www.letstalkpodcast.com/>
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. <https://www.youtube.com/c/ArnelsEverydayEnglish/featured>

8. <https://www.youtube.com/c/engvidAdam/featured>
9. <https://www.youtube.com/c/EnglishClass101/featured>
10. <https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists>
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. <https://www.youtube.com/user/letstalkaccent/videos>
2. <https://www.youtube.com/c/EngLanguageClub/featured>
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

ENGINEERING CHEMISTRY LAB

Course Category:	BS/ES/PC/PE/OE/MC/SC	Credits :1.5			
Course Type:	Theory / Tutorial /Practical	Lecture-Tutorial-Practice:	0	0	3
Prerequisites	Basic Concepts of Chemistry Lab	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of the course, the student will be able to:		
CO No	Course Outcome Description	K - Level
CO1	Handle Colorimeter, P ^H Meter, viscometer, conductivity meter, and Oven for analysis of coal and materials using small quantities involved for quick and accurate results.	Applying
CO2	Carry out acid-base, complexometric, and redox titrations.	Applying
CO3	Prepare advanced materials like Bakelite, nanomaterials	Applying

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate,3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								3					
CO2	3								3					
CO3	3								3					
CO4	3								3					
CO5	3								3					

COURSE CONTENT:

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method
3. Determination of Strength of an acid in Pb-Acid battery
4. Preparation of a polymer (Bakelite)
5. Determination of percentage of Iron in Cement sample by colorimetry
6. Estimation of Calcium in port land Cement
7. Preparation of nanomaterials by precipitation method.
8. Adsorption of acetic acid by charcoal
9. Determination of percentage Moisture content in a coal sample
10. Determination of Viscosity of lubricating oil by Redwood Viscometer 1
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
12. Determination of Calorific value of gases by Junker's gas Calorimeter.
13. Estimation of Ferrous Iron by Dichrometry.
14. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH .
15. Estimation of calcium carbonate content in toothpaste.
16. Determination of the concentration of acid in soft drinks (pH-metry method).
17. Conductometric titration of strong acid vs. strong base

Note: Of the above experiments at-least 10 assessment experiments should be completed in a semester.

TEXT BOOKS:

[1]A Textbook of Quantitative Analysis, Arthur J. Vogel.

ENGINEERING WORKSHOP

CourseCategory:	Engineering Science (ES)	Credits: 1.5			
Course Type:	Practical	Lecture-Tutorial-Practice:	0	0	3
Prerequisites	-	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Perform operations in carpentry, fitting, plumbing with appropriate tools	3
CO2	Develop prototypes with sheet metals	3
CO3	Perform electrical connections required for house wiring	3
CO4	design the patterns and core boxes for metal casting processes	3
CO5	Understand Arc Welding and Gas welding equipment for the fabrication of welded joints	3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	3	3	2	-	2	3	2	-
CO2	3	2	-	-	-	-	-	3	3	2	-	2	3	2	-
CO3	3	2	-	-	-	-	-	3	3	2	-	2	3	2	-
CO4	3	2	-	-	-	-	-	3	3	2	-	2	3	2	-
CO5	3	2	-	-	-	-	-	3	3	2	-	2	3	2	-

COURSE CONTENT:

1. **Demonstration:** Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
 - a. Half – Lap joint
 - b. Mortise and Tenon joint
 - c. Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working:** Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.

- a. Tapered tray
 - b. Conical funnel
 - c. Elbow pipe
 - d. Brazing
- 4. Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
- a. V-fit
 - b. Dovetail fit
 - c. Semi-circular fit
 - d. Bicycle tire puncture and change of two-wheeler tyre
- 5. Electrical Wiring:** Familiarity with different types of basic electrical circuits and make the following connections.
- a. Parallel and series
 - b. Two-way switch
 - c. Godown lighting
 - d. Tube light
 - e. Three phase motor
 - f. Soldering of wires
- 6. Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
- 7. Welding Shop:** Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
- 8. Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.
9. Basic repairs of Two-wheeler vehicle – Demonstration of working of two-wheeler vehicle and its repairs.
10. **3D Printing** - Demonstration on 3D Printing

Textbooks:

- [1]. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published, 2019.
Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
- [2]. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.

E-Resources:

1. <https://archive.nptel.ac.in/courses/112/107/112107219/>

COMPUTER PROGRAMMING LAB

Course Category:	Engineering Science (ES)	Credits: 1.5			
Course Type:	Practical	Lecture-Tutorial-Practice:	0	0	3
Prerequisites	Basics Mathematics, Logical thinking and basics of Computers	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Solve simple programs using basic C programming concepts	3
CO2	Develop simple programs using control statements	3
CO3	Build program solutions using arrays and strings	3
CO4	Apply pointers concepts in programming	3
CO5	Apply structure and union, files concepts to use memory in programs.	3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	3	-	-	-	3	-	-	3	3	3
CO2	3	-	-	-	3	-	-	-	3	-	-	3	3	3
CO3	3	-	-	-	3	-	-	-	3	-	-	3	3	3
CO4	3	-	-	-	3	-	-	-	3	-	-	3	3	3
CO5	3	-	-	-	3	-	-	-	3	-	-	3	3	3

COURSE CONTENT:

Exercise 1: Familiarization with programming environment

- i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- ii) Exposure to Turbo C, gcc
- iii) Writing simple programs using printf(),scanf()

Exercise 2: Converting algorithms/flowcharts into C Source code.

- i) Sum and average of 3 numbers

- ii) Conversion of Fahrenheit to Celsius and vice versa
- iii) Simple interest calculation

Exercise 3: Simple computational problems using arithmetic expressions.

- i) Finding the square root of a given number
- ii) Finding compound interest
- iii) Area of a triangle using heron's formulae
- iv) Distance travelled by an object.

Exercise 4: Simple computational problems using the operator' precedence and associativity.

- i) Evaluate the following expressions.
 - a. $A+B*C+(D*E)+F*G$
 - b. $A/B*C-B+A*D/3$
 - c. $A+++B---A$
 - d. $J= (i++) ++i$
- ii) Find the maximum of three numbers using conditional operator.
- iii) Take marks of 5 subjects in integers, and find the total, average in float.

Exercise 5: Problems using control statements.

- i) Write a C program to find the max and min of four numbers using if-else.
- ii) Write a C program to generate electricity bill.
- iii) Find the roots of the quadratic equation.
- iv) Write a C program to simulate a calculator using switch case.
- v) Write a C program to find the given year is a leap year or not.

Exercise 6: Problems using control statements.

- i) Find the factorial of given number using any loop.
- ii) Find the given number is a prime or not.
- iii) Compute sine and cos series
- iv) Checking a number palindrome
- v) Construct a pyramid of numbers.

Exercise 7: Using arrays.

- i) Find the min and max of a 1-D integer array.
- ii) Perform linear search on 1D array.
- iii) The reverse of a 1D integer array
- iv) Find 2's complement of the given binary number.
- v) Eliminate duplicate elements in an array.

Exercise 8: arrays and strings

- i) Addition of two matrices
- ii) Multiplication two matrices
- iii) Sort array elements using bubble sort.
- iv) Concatenate two strings without built-in functions.
- v) Reverse a string using built-in and without built-in string functions.

Exercise 9: Pointers

- i) Demonstrate dynamic memory allocation functions with example program.

Exercise 10: Structures and union

- i) Write a C program to find the total, average of n students using structures.
- ii) Write a C program to illustrate Union.

Exercise 11: Using functions.

- i) Write a C function to calculate NCR value.
- ii) Write a C function to find the length of a string.
- iii) Write a C function to transpose of a matrix.

Exercise 12: Using Recursion Function

- i) Write a recursive function to generate Fibonacci series.
- ii) Write a recursive function to find the LCM of two numbers.
- iii) Write a recursive function to find the factorial of a number.

Exercise 13: Simple functions using Call by reference, Dangling pointers.

- i) Write a C program to swap two numbers using call by reference.
- ii) Demonstrate Dangling pointer problem using a C program.
- iii) Write a C program to copy one string into another using pointer.
- iv) Write a C program to find no of lowercase, upper case, digits, and other characters using pointers.

Exercise 14: File handling

- i) Write a C program to write and read text into a file.
- ii) Copy the contents of one file to another file.
- iii) Find no. of lines, words, and characters in a file.

TEXT BOOKS:

1. Programming in ANSI C, McGrawHill, seventh edition by E.Balagurusamy, 2017
2. Programming in C, Reema Thareja, Second Edition, OXFORD, 2016.
3. How to solve it by Computer, R. G. Dromey, and Pearson Education.
4. Let us C, Yaswanth Kanetkar, 17th Edition, BPB Publication,2020.

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India, Second Edition, Pearson Education, 2015.
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE,2011
3. Programming In C, Ashok Kamthane, Second Edition, Pearson Publication,2013
4. Problem solving using C, K Venugopal,3'd Edition, TMG Publication,2015
5. Anil B. Chaudhuri, "Flowchart and Algorithm Basics: The Art of Programming", Mercury Learning & Information, 2020.
6. Paul J. Dietel and Harvey M. Deitel, "C: How to Program", Prentice Hall, 8th edition (Jan 19, 2021)

E-RESOURCES/DIGITAL MATERIAL:

1. <https://www.geeksforgeeks.org/c-programming-examples/>
2. <https://www.studytonight.com/c/programs/>
3. <http://www.w3schools.com/>
4. <http://www.learn-c.org/>
5. <https://www.tutorialsyoint.com/cprogramming/>
6. <https://www.hackerrank.com/>
7. <https://www.codechef.com/>
8. <https://www.topcoder.com/>

HEALTH AND WELLNESS, YOGA AND SPORTS

Lecture – Tutorial:	0	Internal Marks:	10
Credits:	0.5	External Marks:	90
Prerequisites:			
Course Objectives : The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.			
Course Outcomes : At the end of the course students will be able to:			
CO1	Understand the importance of yoga and sports for Physical fitness and sound health.		
CO2	Demonstrate an understanding of health-related fitness components.		
CO3	Compare and contrast various activities that help enhance their health.		
CO4	Assess current personal fitness levels.		
CO5	Develop Positive Personality.		

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

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

UNIT –I : Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

- i) Organizing health awareness programmes in community
- ii) Preparation of health profile

Preparation of chart for balance diet for all age groups

UNIT –II : Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT- III : Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

- i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
Practicing general and specific warm up, aerobics
- ii) Practicing cardio respiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCE BOOKS:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J. Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc.2014

COURSE CONTENT:

UNIT-1: Wave Optics

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings, Determination of wavelength and refractive index. Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT-2: Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

UNIT-3: Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - Frequency dependence of polarization – General applications of dielectric materials

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT-4: Quantum Mechanics and Free electron Theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well. Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical

conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

UNIT-5: Semiconductors

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein’s equation – Hall effect and its applications.

TEXT BOOKS:

- [1] A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.
- [2] Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)
- [3] Applied Physics- Dr. D. Tirupathi Naidu, M. Veeranjanyulu- VGS Techno Series, 2021.

REFERENCE BOOKS:

- (i) Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.
- (ii) Engineering Physics-P. K. Palanisamy, SCITECH publications, 2014.
- (iii) Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
- (iv) Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press. 2010.
- (v) Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

E-RESOURCES/DIGITAL MATERIAL:

<https://www.loc.gov/rr/scitech/selected-internet/physics.html>

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Course Category:	BS	Credits: 3			
Course Type:	Theory / Tutorial	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Basics of Differentiation,	Continuous Evaluation	30M		
	Integration &	Semester End Evaluation	70M		
	Vector Algebra	Total Marks	100M		

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Solve differential equations of first order and first degree and apply to various engineering fields.	3-Applying
CO2	Solve linear differential equations of higher order with constant coefficients and apply to various engineering fields.	3-Applying
CO3	Solve linear partial differential equations.	3-Applying
CO4	Find gradient, divergence and curl of point functions and apply gradient to find directional derivative.	3-Applying
CO5	Apply vector integral theorems to find work done and flux.	3-Applying

Note: K-Level is defined From Blooms Taxonomy

COURSE CONTENT:

UNIT-1: Differential equations of first order and first degree

Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form.

Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

UNIT-2: Linear differential equations of higher order (Constant coefficients)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral (of e^{ax} , $\sin ax$, $\cos ax$, x^m , $e^{ax}V(x)$), Wronskian, Method of variation of parameters. Simultaneous linear equations. Applications: L-C-R Circuit, Simple Harmonic motion.

UNIT-3: Partial differential equations

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients with the RHS of the forms e^{ax+by} , $\sin(ax + by)$, $\cos(ax + by)$, $x^m y^n$.

UNIT-4: Vector differentiation

Scalar and vector point functions, vector operator Del, Del applied to scalar point functions - Gradient - Applications of Gradient - Directional derivative, Del applied to vector point functions -Divergence and Curl, vector identities.

UNIT-5: Vector integration

Line integral-circulation-work done, Surface integral-flux, Green's theorem in the plane(without proof), Stoke's theorem (without proof), Volume integral, Divergence theorem (without proof) and related problems.

TEXT BOOKS:

- [1] Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition.
- [2] Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCE BOOKS:

- (vii) Engineering Mathematics-II (Differential Equations and Vector Calculus) by T.K.V. Iyengar et.al., S Chand and Company Ltd.
- (viii) Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
- (ix) Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
- (x) Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
- (xi) Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
- (xii) Higher Engineering Mathematics, B. V. Ramana, McGraw Hill Education, 2017.

E-RESOURCES/DIGITAL MATERIAL:

- (a) <http://www.nptelvideos.com/mathematics/>
- (b) <https://digimat.in/cgi-bin/search.cgi>

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Course Objectives

To expose to the field of electrical & electronics engineering, laws and principles of electrical/electronic engineering and to acquire fundamental knowledge in the relevant field.

Course Outcomes: After the completion of the course students will be able to

CO1. Describe fundamental laws, operating principles of motors/generators, MC/MI instruments (L2)

CO2. Demonstrate the working of electrical machines, measuring instruments and power generation stations. (L2)

CO3. Apply mathematical tools and fundamental concepts to derive various equations related to electrical circuits and machines. (L3)

CO4. Calculate electrical load and electricity bill of residential and commercial buildings. (L4)

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3												
CO2	3	3												
CO3	3	3												
CO4	3	2												
CO5	3	3												

COURSE CONTENT:

UNIT I DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT II Machines and Measuring Instruments

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

UNIT III Energy Resources, Electricity Bill & Safety Measures

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of “unit” used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Textbooks:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhattacharya, Person Publications, 2018, Second Edition.

Web Resources:

1. <https://nptel.ac.in/courses/108105053>
2. <https://nptel.ac.in/courses/108108076>

PART B: BASIC ELECTRONICS ENGINEERING

COURSE OBJECTIVES:

- To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

UNIT I SEMICONDUCTOR DEVICES

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE.

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator.

Amplifiers: Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, and XOR.

Simple combinational circuits—Half and Full Adders. Introduction to sequential circuits, Flip flops.

Textbooks:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

Reference Books:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.

2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

End examination pattern:

- i) Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.
- ii) In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1 mark.
- iii) In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
- iv) The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

ENGINEERING GRAPHICS

Course Category:	Engineering Science (ES)	Credits : 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	1	0	4
Prerequisites	Basic mathematics	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Understand the principles of engineering drawing, including engineering curves, scales.	3
CO2	Draw orthographic projections of the points and projections of lines inclined to one principal plane & inclined to both the planes	3
CO3	Draw Orthographic projections of planes, solids (simple position and inclined to both the planes)	3
CO4	Explain principles behind development of surfaces and Sections of solids in simple position only.	3
CO5	Draw orthographic and isometric views of different parts.	3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	3	-	2	2	2	2
CO2	3	2	2	-	-	-	-	-	-	3	-	2	2	2	2
CO3	3	2	2	-	-	-	-	-	-	3	-	2	2	2	2
CO4	3	2	2	-	-	-	-	-	-	3	-	2	2	2	2
CO5	3	2	2	-	3	-	-	-	-	3	-	2	2	2	2

COURSE CONTENT:

UNIT I

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: construction of ellipse, parabola and hyperbola by general method, Cycloids, Involute, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

UNIT II

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT III

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane, Projection of Solids with axis inclined to one reference plane.

UNIT IV

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

UNIT V

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views for simple solids.

Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).

TEXT BOOKS:

[1]. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

REFERENCE BOOKS:

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc, 2009.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

E-RESOURCES/DIGITAL MATERIAL:

- a) <https://nptel.ac.in/courses/112103019>
- b) <https://archive.nptel.ac.in/courses/112/102/112102304/>

COURSE CONTENT:

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also, students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with Aviva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMware) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.

Task5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMware) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva.

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally, students should demonstrate, to the instructor, how to access the websites and email. If there are no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task2: Web Browsers, Surfing the Web: Students customize their web browsers with the Leprosy settings, bookmarks, search toolbars and popup blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task3: Search Engines& Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active downloads to avoid viruses and/or worms.

Latex and Word

Task 1 – Word Orientation: The mentor needs to give an overview of Latex and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of Latex and MS office equivalents (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word–

Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered: -Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered: -Formatting Styles, inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task4: Creating a Newsletter: Features to be covered: -Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL

Excel Orientation: The mentor needs state the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel–Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, autofill, Formatting Text

Task 2: Calculating GPA -. Features to be covered: - Cell Referencing, Formulae in excel –average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

POWERPOINT

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, WordArt, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotted, notes etc.), and Inserting–Background, textures, Design Templates, Hidden slides.

AI TOOLS –ChatGPT

Task1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing in complete sentences to see how the model completes them.

- Ex: Prompt: "Your area knowledge able AI. Please answer the following question: What is the capital of France?"

Task2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of ascend, and let the model generate their list of the content. This can be a fun way to brainstorm creative ideas.

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating up wards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

TEXTBOOKS:

1. Computer Fundamentals, Anita Goal, Pearson India Education,2017
2. Introduction to PC Hardware Trouble Shooting Made Easy, Mike Meyers, McGraw Hill Education, 2017

REFERENCE BOOKS:

1. Comdex Information Technology course toolkit, VikasGupta, WILEY Dreamtech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dreamtech,2013,3rd edition
3. Introduction to Information Technology, IITL Education Solutions limited, Pearson Education,2012, 2ndedition.
4. PC Hardware-A Handbook, Kate J.Chase, PHI(Microsoft), 2004
5. LaTeX Companion, Leslie Lamport, PHI/Pearson. 2nd Edition.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme. – CISCO Press, Pearson Education,3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan–CISCO Press, Pearson Education,3rdedition

ENGINEERING MECHANICS
(Common to Mechanical & Civil Engineering)

Course Category:	Professional Core (PC)	Credits : 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	-	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Compute resultant of a forces in planer & spatial systems. Find out the Friction force in different cases	3
CO2	Analyze planar, spatial force systems with and without friction under static equilibrium by analytical & graphical method	3
CO3	locate centroid, center of gravity and mass moment of inertia of composite areas and composite bodies respectively	3
CO4	Analyze motion of particles and rigid bodies and apply the principles of motion, work energy and impulse momentum	3
CO5	Solve the problems involving the translational and rotational motion of rigid bodies	3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	-	-	-	-	-	-	2	3	3	-
CO2	3	3	3	3	-	2	-	-	-	-	-	2	3	3	-
CO3	3	3	3	3	-	2	-	-	-	-	-	2	3	3	-
CO4	3	3	3	3	-	2	-	-	-	-	-	2	3	3	-
CO5	3	3	3	3	-	2	-	-	-	-	-	2	3	3	-

COURSE CONTENT:

UNIT I

Introduction to Engineering Mechanics– Basic Concepts. Scope and Applications

Systems of Forces: Coplanar Concurrent Forces– Components in Space–Resultant–Moment of Force and its Application –Couples and Resultant of Force Systems.

Friction: Introduction, limiting friction and impending motion, Coulomb’s laws of dry friction, coefficient of friction, Cone of Static friction.

UNIT II

Equilibrium of Systems of Forces: Free Body Diagrams, Lami’s Theorem, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses. Principle of virtual work with simple examples

UNIT III

Centroid: Centroids of simple figures (from basic principles)–Centroids of Composite Figures.

Centre of Gravity: Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems

Area Moments of Inertia: Definition– Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.

UNIT IV

Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics –D’Alembert’s Principle - Work Energy method and applications to particle motion-Impulse Momentum method.

UNIT V

Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.

TEXT BOOKS:

- [1].Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., , McGraw Hill Education 2017. 5th Edition.
- [2].Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli , University press. 2020. First Edition.
- [3]. A Textbook of Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.

REFERENCE BOOKS:

1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill Education. 2017. First Edition.
2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI, 2002. 4th Edition.
3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L. G. Kraige., John Wiley, 2008. 6th Edition.
4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press, 2014. Second Edition
5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc., New Delhi, 2022, 14th Edition
6. Engineering Mechanics, Volume 2. Engineering Mechanics, Ferdinand Leon Singer ; Author, Ferdinand Leon Singer ; Edition, 2.
7. Vector Mechanics for Engineers : Statics. Boston, Beer, Ferdinand P. (Ferdinand Pierre), 1915-2003, McGraw-Hill, 2004.

E-RESOURCES/DIGITAL MATERIAL:

- a) <https://archive.nptel.ac.in/courses/112/106/112106286/>

ENGINEERING PHYSICS LAB

Course Category:	BS	Credits: 1			
Course Type:	Practical	Lecture-Tutorial-Practice:	0	0	2
Prerequisites	Basic concepts of Physics and units of physical parameters	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Examine the physical properties of light using interference, diffraction and polarization phenomena.	Applying
CO2	Determine the acceleration due to gravity and rigidity modulus of the material by pendulum methods.	Applying
CO3	Measure the frequency response by resonance using electrical method.	Applying
CO4	Demonstrate the magnetic and dielectric behaviour of materials	Applying
CO5	Analyze the characteristics of semiconducting materials	Applying

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3				3					
CO2	3				3				3					
CO3	3				3				3					
CO4	3				3				3					
CO5	3				3				3					

COURSE CONTENT:

List of Engineering Physics Experiments

1. Determination of radius of curvature of given plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Determination of acceleration due to gravity and radius of gyration by using compound pendulum.
4. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
5. Determination of frequency of electrically maintained tuning fork by Melde's experiment.
6. Determination of dielectric constant using charging and discharging method.
7. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
8. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
9. Determination of energy gap of a semiconductor using p-n junction diode
10. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

Additional Experiments:

11. Study frequency response of a LCR series resonance circuit.
12. Study the V-I characteristics of P-N junction diode.

References:

- A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

E-RESOURCES/DIGITAL MATERIAL

Web Resources

- www.vlab.co.in
- <https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc. Provide some exercises so that hardware tools and instruments are learned to be used by the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter. Provide some exercises so that measuring instruments are learned to be used by the students.

Components:

1. Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
2. Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART A: ELECTRICAL ENGINEERING LAB**List of experiments:**

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

Reference Books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Note: Minimum Six Experiments to be performed.

ENGINEERING MECHANICS & BUILDING PRACTICES LAB

(for Civil Engineering only)

Course Category:	Professional Core	Credits : 1.5			
Course Type:	Practical	Lecture-Tutorial-Practice:	0	0	3
Prerequisites	Engineering Mechanics	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Evaluate coefficient of friction between two different surfaces and between inclined plane and roller.	K-5
CO2	Verify Law of Parallelogram of Forces and Law of Moment using force polygon and bell crank lever.	K-3
CO3	Determine center of gravity of different configurations.	K-3
CO4	Understand principles of Non-destructive testing, assessment procedures and quality testing.	K-2
CO5	Exposure to safety practices in construction industry.	K-1

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate,3 – High)

CO No.	PO1	PO 2	PO 3	PO4	PO 5	PO6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	3
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	3
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	3
CO4	3	-	-	-	-	3	-	-	-	-	-	-	3	3
CO5	3	-	-	-	-	3	-	-	-	3	-	-	3	3

COURSE CONTENT:

Week-1:

1. Study of various tools used in building construction.

Week-2:

2. Forces in pin-jointed trusses.

Week-3:

3. Experimental proof of Lami's theorem.

Week-4:

4. Verification of Law of Parallelogram of Forces.

Week-5:

5. Determination of center of gravity of different shapes of plane lamina.

Week-6:

6. Determination of coefficient of Static and Rolling friction.

Week-7:

7. Verification of Law of Moment using rotating disc apparatus and bell crank lever.

Week-8:

8. Study of alternate materials: M-sand, Flyash, Sea sand etc.

Week-9:

9. Demonstration of non-destructive testing using rebound hammer and UPV apparatus.

Week-10:

10. Safety practices in building construction industry.

Week11:

11. Study of plumbing in buildings.

Week12:

12. Field visit to understand quality testing – report.

TEXT BOOKS:

[1] Engineering Mechanics Lab Manual by Dr. A. K. Gupta, Mohit Bhoot, Scientific Publishers (India)., 2015.

REFERENCE BOOKS:

(i) Safety Management in Construction – Principles and Practice by S. K. Bhattacharjee., Khanna Publishers., 2011.

NSS/NCC/ Scouts & Guides/Community Service

Lecture – Tutorial:	0	Internal Marks:	10
Credits:	0.5	External Marks:	90
Prerequisites:			
Course Objectives: The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.			
Course Outcomes : At the end of the course students will be able to:			
CO1	Understand the importance of discipline, character and service motto.		
CO2	Solve some societal issues by applying acquired knowledge, facts, and techniques.		
CO3	Explore human relationships by analyzing social problems.		
CO4	Determine to extend their help for the fellow beings and downtrodden people.		
CO5	Develop leadership skills and civic responsibilities.		

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)												
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1												
CO2												
CO3												
CO4												
CO5												

<p>UNIT –I : Orientation</p> <p>General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.</p> <p>Activities:</p> <ol style="list-style-type: none"> i) Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills ii) Conducting orientations programs for the students –future plans-activities-releasing road map etc.
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- iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
- iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT –II : Nature &

Care Activities:

- i) Best out of waste competition.
- ii) Poster and signs making competition to spread environmental awareness.
- iii) Recycling and environmental pollution article writing competition.
- iv) Organising Zero-waste day.
- v) Digital Environmental awareness activity via various social media platforms.
- vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
- vii) Write a summary on any book related to environmental issues.

UNIT- III : Community

Service Activities:

- i) Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media-authorities- experts-etc.
- ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
- iii) Conducting consumer Awareness. Explaining various legal provisions etc.
- iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
- v) Any other programmes in collaboration with local charities, NGOs etc.

REFERENCE BOOKS:

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme* Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. *Red Book - National Cadet Corps – Standing Instructions* Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., “Introduction to Environmental Engineering”, McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. “Introduction to Environmental Engineering and Science”, Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

w.e.f. 2024-25

D23

B. Tech.
CIVIL ENGINEERING
(B.Tech 2nd Year Syllabus)

Department of Civil Engineering
(B. Tech. CE Programme)



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Ganguru, Vijayawada
Andhra Pradesh - 521139,
INDIA.

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DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

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INSTITUTE MISSION

- Providing Quality Education through state-of-art infrastructure, laboratories and committed staff.
- Moulding Students as proficient, competent, and socially responsible engineering personnel with ingenious intellect.
- Involving faculty members and students in research and development works for betterment of society.

DEPARTMENT VISION

- To become a pioneering center of learning and research in Civil Engineering

DEPARTMENT MISSION

- Providing high quality education in an atmosphere of innovation and critical thinking.
- An integrated development of Civil Engineering Professionals Possessing Technical & Managerial skills, Environmental, Ethical and Human values.
- Inculcating research and consultancy culture by involving faculty and students.

DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

PEO's – PSO's

PROGRAM EDUCATIONAL OBJECTIVES(PEOs)

- **PEO 1: Domain Knowledge**

Graduates will have the fundamental knowledge of mathematics, science, economics and computing and in-depth knowledge in Civil Engineering concepts through theoretical, laboratory and project based experiences so as to design, develop and solve engineering problems.

- **PEO 2: Employment & Higher Studies**

Graduates will succeed in their chosen engineering careers with sustainable development in their profession and have the ability to pursue advanced degrees in engineering and other fields

- **PEO 3: Professional Citizenship**

Graduates will have ability to organize and Communicate effectively in multidisciplinary engineering projects through lifelong learning, practice ethics with a sense of social responsibility.

PROGRAM SPECIFIC OUTCOMES (PSOS)

- **PSO1: Knowledge of contemporary issues in the civil engineering industry to solve societal issues.**

- **PSO2: Qualify in competitive examinations for higher education and employment.**

DEPARTMENT OF CIVIL ENGINEERING

D23 (Autonomous) II Year Course Structure

B.Tech. – II Year I Semester

S.No.	Category	Title	L/D	T	P	Credits
1	BS	Numerical Methods and Transform Techniques	3	0	0	3
2	HSMC	Universal Human Values–2 Understanding Harmony & Ethical Human Conduct	2	1	0	3
3	Engineering Science	Surveying	3	0	0	3
4	Professional Core	Strength of Materials	3	0	0	3
5	Professional Core	Fluid Mechanics	3	0	0	3
6	Professional Core	Surveying Lab	0	0	3	1.5
7	Professional Core	Strength of Materials Lab	0	0	3	1.5
8	Skill Enhancement Course	Building Planning and Drawing/Other Relevant Courses	0	1	2	2
Total			14	2	8	20
9	Audit Course	Environmental Science	2	0	0	-

B.Tech.–II Year II Semester

S.No.	Category	Title	L/D	T	P	Credits
1	Management Course-I	Managerial Economics and Financial Analysis	2	0	0	2
2	Engineering Science / Basic Science	Engineering Geology	3	0	0	3
3	Professional Core	Concrete Technology	3	0	0	3
4	Professional Core	Structural Analysis	3	0	0	3
5	Professional Core	Hydraulics & Hydraulic Machinery	3	0	0	3
6	Professional Core	Concrete Technology Lab	0	0	3	1.5
7	Professional Core	Engineering Geology lab	0	0	3	1.5
8	Skill Enhancement course	Remote Sensing & Geographical Information Systems	0	1	2	2
9	Engineering Science	Design Thinking & Innovation/ NPTEL/ SWAYAM/ MOOCS	1	0	2	2
Total			15	1	10	21
10	Mandatory course	Building materials and Construction	3	0	0	-
Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation						



NUMERICAL TECHNIQUES AND STATISTICAL METHODS

Course Code:

Course Category:	Basic Science (BS&H)	Credits: 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Basics of calculus, basic probability concepts	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

After successful completion of course, the student will be able to:

CO No:	Course Outcome Description	K - Level
CO1	Apply iterative methods to solve algebraic equation and transcendental equations. Interpolate data using various interpolating techniques	K-3
CO2	Apply numerical techniques to find derivatives/ to find definite integral /to solve initial value problem of first order-first degree ODE.	K-3
CO3	Apply discrete and continuous probability distributions.	K-3
CO4	Apply Sampling techniques to get estimates of the population	K-3
CO5	Test the hypothesis based on small and large sample tests.	K-3

Course Outcomes:

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate,3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO2	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO3	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO4	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO5	3	3	-	-	-	-	-	-	-	-	-	3	-	3

COURSE CONTENT:

UNIT – 1: Iterative Methods:

Introduction – Solutions of algebraic and transcendental equations: Bisection method – Secant method – Method of false position – Iteration method – Newton-Raphson method (One variable and simultaneous Equations)

Interpolation: Newton’s forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange’s interpolation formula

UNIT – 2: Numerical integration, Solution of ordinary differential equations with initial conditions:

Trapezoidal rule– Simpson’s $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rule– Solution of initial value problems by Taylor’s series– Picard’s method of successive approximations– Euler’s method –Runge- Kutta method (second and fourth order) – Milne’s Predictor and Corrector Method.

UNIT – 3: Probability and Distributions:

Baye’s theorem – Random variables – Discrete and Continuous random variables – Distribution functions – Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

UNIT – 4: Sampling Theory:

Introduction – Population and Samples – Sampling distribution of Means and Variance (definition only)–Central limit theorem (without proof)–Introduction to t, χ^2 and F-distributions- point and interval estimations – maximum error of estimate.

UNIT – 5: Tests of Hypothesis:

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance– One tail and two-tail tests – Test of significance for large samples and Small Samples: Single and difference means – Single and two proportions – Student’s t-test, F-test, χ^2 -test.

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. Miller and Freund’s, Probability and Statistics for Engineers, 7/e, Pearson, 2008.

Reference Books:

1. Steven C. Chapra, Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education.
2. M. K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
3. Lawrence Turyn, Advanced Engineering Mathematics, CRC Press.
4. S. C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.
5. Shron L. Myers, Keying Ye, Ronald E Walpole, Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
6. Jay I. Devore, Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.

**UNIVERSAL HUMAN VALUES –2 UNDERSTANDING HARMONY
AND ETHICAL HUMAN CONDUCT**

Course Code:

Course Category:	Human Science (HSMC)	Credits: 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	2	1	0
Prerequisites	-	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After successful completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Aspire continuous happiness and prosperity	K- 2
CO2	Explore harmony in the human being, the co-existence of self and body.	K- 2
CO3	Develop competence and value human-human relationship.	K-2
CO4	Perceive harmony at all levels of existence.	K-2
CO5	Validate definitiveness of ethical human conduct	K-2

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	3	3	3	3	-	-	-	-	-
CO2	-	-	-	-	-	3	3	3	3	-	-	-	-	-
CO3	-	-	-	-	-	3	3	3	3	-	-	-	-	-
CO4	-	-	-	-	-	3	3	3	3	-	-	-	-	-
CO5	-	-	-	-	-	3	3	3	3	-	-	-	-	-

COURSE CONTENT:

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1- hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT 1 Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the

Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: self-exploration as the Process for Value Education

Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT 2 Harmony in the Human Being (6 lectures and 3 tutorials for practice session)

Lecture 7: Understanding Human being as the Co-existence of the self and the body.

Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.

Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self

Lecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT 3 Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT 4 Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)

Lecture 19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature

Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature

Lecture 21: Realizing Existence as Co-existence at All Levels

Lecture 22: The Holistic Perception of Harmony in Existence

Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.

UNIT 5 Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values

Lecture 24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education

Lecture 27: Holistic Technologies, Production Systems and Management

Models-Typical Case Studies

Lecture 28: Strategies for Transition towards Value-based Life and Profession

Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I – Introduction to Value Education

PS1 Sharing about Oneself

PS2 Exploring Human Consciousness

PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being PS4 Exploring the difference of Needs of self and body

PS5 Exploring Sources of Imagination in the self

PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence) PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self- exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

READINGS:

Textbook and Teachers Manual

a. The Textbook

R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria, Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

1. *Jeevan Vidya: Ek Parichaya*, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. *Human Values*, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. *The Story of Stuff* (Book).
4. *The Story of My Experiments with Truth* - by Mohandas Karamchand Gandhi
5. *Small is Beautiful* - E. F Schumacher.
6. *Slow is Beautiful* - Cecile Andrews
7. *Economy of Permanence* - J C Kumarappa
8. *Bharat Mein Angreji Raj* – Pandit Sunderlal
9. *Rediscovering India* - by Dharampal
10. *Hind Swaraj or Indian Home Rule* - by Mohandas K. Gandhi
11. *India Wins Freedom* - Maulana Abdul Kalam Azad
12. *Vivekananda* - Romain Rolland (English)
13. *Gandhi* - Romain Rolland (English)

E-Resources:

1. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf>
2. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf>
3. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf>
4. <https://fdp-si.aicte-india.org/UHV%20I%20Teaching%20Material/D3-S2%20Respect%20July%202023.pdf>
5. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf>
6. <https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf>
7. <https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf>
8. <https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385>
https://onlinecourses.swayam2.ac.in/aic22_ge23/preview



SURVEYING
Course Code:

Course Category:	ES(Engineering Science)	Credits: 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Engineering Mathematics	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Apply the principle and methods of surveying for linear and angular measurements.	K-3
CO2	Apply surveying principles to determine areas and volumes	K-3
CO3	Measuring of horizontal and vertical- distances and angles	K-4
CO4	Setting out curves and using modern surveying equipments	K-3
CO5	Understand the basics of Photogrammetry Surveying	K-2

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	2	3	-	-	-	-	-	-	-	3	3
CO2	3	3	-	2	3	-	-	-	-	-	-	-	3	3
CO3	3	3	-	2	3	-	-	-	-	-	-	-	3	3
CO4	3	3	-	3	3	-	-	-	-	-	-	-	3	3
CO5	3	3	-	3	2	-	-	-	-	-	-	-	3	3

COURSE CONTENT:

UNIT-1:

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Surveying accessories. Introduction to Plane table surveying.

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections.

Compass Surveying- Introduction, Types, Bearings, included angles, Local Attraction, Magnetic Declination, and dip –systems and W.C.B and Q.B systems of locating bearings.

UNIT-2:

Leveling- Introduction, Types of levels, methods of levelling, and Determination of levels, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, methods of contour surveying.

Areas - Determination of areas consisting of irregular boundary.

Volumes -Determination of volume of earth work in cutting and embankments for level section, capacity of reservoirs.

UNIT-3:

Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical leveling when base is accessible and inaccessible. Introduction to Tacheometric Surveying.

Traversing: Methods of traversing, traverse computations and adjustments.

UNIT-4:

Curves: Types of curves and their necessity, elements of simple, compound, reverse curves.

Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total station- advantages and Applications. Introduction to Global Positioning System. Introduction to Drone survey and LiDARSurvey (Light Detection And Ranging).

UNIT-5:

Photogrammetry Surveying:

Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo-plotting instruments.

Text Books:

1. Surveying (Vol – 1), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -Laxmi Publications (P) Ltd., New Delhi, 18th edition 2024.
2. Surveying (Vol – 2), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -Laxmi Publications (P) Ltd., New Delhi 17th 2022.
3. Surveying (Vol 1, 2 & 3), by Arora K R, Standard Book House, Delhi. Edition: 12th, 2015.

Reference Books:

1. Surveying (Vol – 1 & 2) by Duggal S K, Tata McGraw Hill Publishing Co.Ltd. New Delhi, 5th edition, 2019.
2. Surveying (Vol – 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -Laxmi Publications (P) Ltd., New Delhi 16th 2023.
3. Plane Surveying and Higher Surveying by Chandra A M, New age International Pvt. Ltd., Publishers, New Delhi, 3rd Edition, 2015.
4. Surveying and Levelling by N.Basak Tata McGraw Hill Publishing Co. Ltd. New Delhi, 4th edition, 2014.
5. Textbook of Surveying by C Venkatramaiah , Universities Press 1st Edition, 2011.



STRENGTH OF MATERIALS

Course Code:

Course Category:	Professional Core(PC)	Credits: 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Engineering Mechanics	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Understand stress and strain at a particular cross-section.	K-2
CO2	Determine SF and BM profile along beam with various loading conditions.	K-3
CO3	Determine bending stress and shear stress at a beam section when the beam subjected to bending.	K-3
CO4	Analyze the deflections due to various loading conditions.	K-4
CO5	Solves crippling load on column using Euler's crippling load theory, principal stresses.	K-4

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO4	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	3

COURSE CONTENT:

UNIT-1:

Simple Stresses and Strains: Elasticity and plasticity — Types of stresses and strains — Hooke's law — Factor of safety, Poisson's ratio - Relationship between Elastic constants — Bars of varying section — stresses in composite bars.

UNIT — 2:

Shear Force and Bending Moment: Definition of beam — Types of beams — Concept of shear force and bending moment — Point of contra flexure — Relation between S.F., B.M and rate of loading at a section of a beam; S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.

UNIT — 3:

Flexural and Shear Stresses:

Flexural Stresses: Theory of simple bending — Assumptions — Derivation of bending equation, Neutral axis — Determination of bending stresses — section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections — Design of simple beams

Shear Stresses: Derivation of formula — Shear stress distribution across various beam sections like rectangular, circular, I, T Angle sections.

Torsion – circular shafts only.

UNIT — 4:

Deflection of Beams: Double integration and Macaulay's methods — Determination of slope and deflection for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads. Mohr's theorems — Moment area method — application to simple cases of cantilever.

UNIT — 5:

Introduction – Classification of columns – Axially loaded compression members – Euler's crippling load theory – Derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Eccentric loading and Secant formula.

Complex Stresses: Stresses on oblique planes – Materials subjected to combined direct and shear stresses – Principal planes and principal stresses – Mohr's circle.

Thin cylinders: Thin cylinders under internal pressure – Hoop stress – longitudinal stress.

TEXTBOOKS:

1. Strength of Materials by R. K. Bansal, Lakshmi Publications, 16th Edition, 2022.
2. Strength of Materials by S. Ramamrutham, Dhanpat Rai Publishing Company Pvt. Ltd., 16th edition.

REFERENCES:

1. Strength of Materials by B. S. Basavarajaiah and P. Mahadevappa, Universities Press 3rd Edition, 2010
2. Strength of Materials by J.K. Gupta and S.K. Gupta, Cengage publications 2nd edition, 2024
3. Advanced Mechanics of Solids, L.S Srinath, McGraw Hill Education, 2017, 3rd Edition
4. Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, NewDelhi 7th edition 2022.



FLUID MECHANICS

Course Code:

Course Category:	Professional Core(PC)	Credits: 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Engineering Physics	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Understand the properties of Fluids	K-2
CO2	Apply the laws of fluid statics and concepts of buoyancy	K-3
CO3	Understand the fundamentals of fluid kinematics and differentiate types of fluid flows.	K-2
CO4	Apply the Principle of conservation of energy for flow measurement.	K-3
CO5	Analyse the losses in pipes and discharge through pipe network.	K-4

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	2	-	-	2	-	2	2	3	2
CO2	3	3	-	-	-	2	-	-	3	-	3	3	3	2
CO3	3	2	-	-	-	3	-	-	2	-	2	2	3	2
CO4	3	2	-	-	-	2	-	-	2	-	2	2	3	2
CO5	3	3	-	-	-	2	-	-	3	-	3	3	3	2

COURSE CONTENT:

UNIT-1:

Properties of fluid Basic concepts and definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; Variation of viscosity with temperature, Newton law of viscosity; Vapor pressure, Boiling point, Surface tension, Capillarity, Bulk modulus of elasticity, Compressibility.

UNIT — 2:

Hydrostatics: Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Hydrostatic pressure and force: horizontal, vertical and inclined surfaces, Buoyancy and stability of floating bodies.

Pressure measurements: Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. Pressure gauges.

UNIT — 3:

Fluid kinematics:

Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three - Dimensional continuity equations in Cartesian coordinates.

UNIT — 4:

Fluid Dynamics: Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – Derivation; Energy Principle; Practical applications of Bernoulli's equation, Momentum principle

Flow measurements in pipes: Venturimeter, orifice meter and Pitot tube Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced.

UNIT-5:

Analysis Of Pipe Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length – Pipes in Parallel and Series.

Dimensionless Numbers: Definitions of Reynolds Number, Froude Number, Mach number, Weber Number and Euler

TEXT BOOKS:

1. P. N. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House 22nd Edition
2. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.

REFERENCE BOOKS:

1. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill, 2nd edition 2018.
2. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
3. Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9th edition ,2022.

4. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
5. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, S Chakraborty Tata McGraw Hill, 3rd edition 2011

E-RESOURCES/DIGITAL MATERIAL:

<https://archive.nptel.ac.in/courses/112/105/112105269/>

<https://nptel.ac.in/courses/112104118>

<https://nptel.ac.in/courses/105103192>



SURVEYING LAB

Course Code:

Course Category:	ES(Engineering Science)	Credits: 1.5			
Course Type:	Practical	Lecture-Tutorial-Practice:	0	0	3
Prerequisites	Engineering Mathematics	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Handle various linear and angular measuring instruments	K-3
CO2	Measure the linear and angular measurements	K-3
CO3	Calculate the area and volume by interpreting the data obtained from surveying activities	K-3
CO4	Handle modern equipment such as total station	K-3
CO5	Prepare field notes from survey data	K-3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	2	2	-	-	-	3	2	2	2	2	2
CO2	2	2	-	2	2	-	-	-	3	3	3	2	2	2
CO3	2	2	-	2	2	-	-	-	3	2	2	2	2	2
CO4	2	2	-	-	3	-	-	-	3	2	2	2	2	2
CO5	2	2	-	-	-	-	-	-	3	2	2	2	2	2

List of Field Works:

1. Chain survey of road profile with offsets in case of road widening.
2. Determination of distance between two inaccessible points by using compass.
3. Plane table survey; finding the area of a given boundary by the method of Radiation
4. Fly levelling : Height of the instrument method (differential leveling)
5. Fly levelling: rise and fall method.
6. Theodolite survey: determining the horizontal and vertical angles by the method of repetition method
7. Theodolite survey: finding the distance between two in accessible points.
8. Theodolite survey: finding the height of far object.
9. Determination of area perimeter using total station.
10. Determination of distance between two inaccessible points by using total station.
11. Setting out a curve
12. Determining the levels of contours



STRENGTH OF MATERIALS LAB

Course Code:

Course Category:	ES(Engineering Science)	Credits: 1.5			
Course Type:	Practical	Lecture-Tutorial-Practice:	0	0	3
Prerequisites	Engineering Mechanics	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Conduct tensile strength test and draw stress-strain diagrams for ductile metal	K-3
CO2	Perform bending test and determine load-deflection curve of steel/wood	K-3
CO3	Able to conduct torsion test and determine torsion parameters	K-3
CO4	Perform hardness, impact and shear strength tests and calculate hardness numbers, impact and shear strengths	K-3
CO5	Able to conduct tests on closely coiled and open coiled springs and calculate deflections	K-3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO4	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	3

LIST OF EXPERIMENTS :

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test.
6. Hardness test.
7. Compression test on Open coiled springs
8. Tension test on Closely coiled springs
9. Compression test on wood/ concrete
10. Izod / Charpy Impact test on metals
11. Shear test on metals
12. Use of electrical resistance strain gauges.
13. Continuous beam – deflection test.



BUILDING PLANNING AND DRAWING

Course Code:

Course Category:	SEC (Skill Enhancement Course)	Credits: 1.5			
Course Type:	Tutorial /Practical	Lecture-Tutorial-Practice:	0	1	2
Prerequisites	Engineering Graphics	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Plan various buildings as per the building by-laws.	K-1
CO2	Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.	K-2
CO3	Sketch signs and bonds	K-3
CO4	Sketch different building units	K-3
CO5	Learn the skills of drawing building elements and plan the buildings as per requirements.	K-3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	3	-	-	3	3
CO2	3	-	-	-	-	-	-	-	-	3	-	-	3	3
CO3	3	-	-	-	-	-	-	-	-	3	-	-	3	3
CO4	3	-	-	-	-	-	-	-	-	3	-	-	3	3
CO5	3	-	-	-	-	-	-	-	-	3	-	-	3	3

Syllabus:

1. Detailing & Drawing of Sign Conventions.
2. Detailing & Drawing of English Bond& Flemish Bond
3. Detailing & Drawing of Doors.
4. Detailing & Drawing of Windows.
5. Detailing & Drawing of Ventilators &Roofs.
6. Detailing & Drawing of Dog-legged staircase.
7. Drawing of Line Diagram of Residential Buildings by using Building Bye- Laws.
8. Drawing of Plan, Elevation & Section from line diagram for a single Storey Building.
9. Drawing of Plan, Elevation & Section for Hospital Building.
10. Drawing of Plan, Elevation & Section for Industrial Building.

Text Books:

1. Planning, designing and Scheduling, Gurcharan Singh and Jagdish Singh
2. Building planning and drawing by M. Chakraborti.
3. Building drawing, M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, New Delhi.

Reference Books:

1. National Building Code 2016 (Volume- I & II).
2. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, New Delhi.
3. Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers, NewDelhi.
4. Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi, and Chennai
5. Building Materials and Construction, G. C Saha and Joy Gopal Jana, McGrawHill Education (P)India Ltd. New Delhi.

ENVIRONMENTAL SCIENCE

Course Code:

Course Category:	Audit Course	Credits: 0			
Course Type:	Theory	Lecture-Tutorial-Practice:	2	0	0
Prerequisites	Science	Continuous Evaluation	30M		
		Semester End Evaluation	-		
		Total Marks	-		

Course Outcomes:

After Successful Completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Identify the multidisciplinary nature of environmental studies and various renewable and non-renewable resources.	K-1
CO2	Understand flow and bio-geo-chemical cycles and ecological pyramids.	K-2
CO3	Understand various causes of pollution and solid waste management and related preventive measures.	K-2
CO4	Understand the concepts of rain water harvesting, watershed management, ozone layer depletion, and waste land reclamation.	K-3
CO5	Predict population explosion, value education, and welfare programs.	K-3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO3	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO4	-	3	-	-	-	-	-	-	-	-	-	-	3	3
CO5	-	3	-	-	-	-	-	-	-	-	-	-	3	3

COURSE CONTENT:

UNIT-1

Multidisciplinary Nature of Environmental Studies: – Definition, Scope, and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable resources–Natural resources and associated problems – Forest resources – Use and over-exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people –Water resources – Use and over utilization of surface and groundwater – Floods, drought, conflicts over water, dams–

benefits and problems–Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies–Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.–Energy resources:

UNIT–2

Ecosystems: Concept to fan ecosystem. –Structure and function of an ecosystem–Producers, consumers, and decomposers– Energy flow in the ecosystem– Ecological succession – Foodchains,foodwebs,andecologicalpyramids–

Introduction,types,characteristicfeatures,structure,andfunctionofthefollowingecosystem:

- a. Forest ecosystem.
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation: Introduction Definition: genetic, species, and ecosystem diversity–Bio-geographical classification of India–Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity –Threats to biodiversity: habitat loss, poaching of wild life, man-wild life conflicts– Endangered and endemic species of India –Conservation of bio diversity: In-situ and Ex-situ conservation of biodiversity.

UNIT–3

Environmental Pollution: Definition, Cause, effects and control measures of:

- a. Air Pollution.
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT–4

Social Issues and the Environment: From Unsustainable to Sustainable Development–Urban problems related to energy – Water conservation, rainwater harvesting, watershed management –Resettlement and rehabilitation of people; its problems and concerns. Case studies– Environmental ethics: Issues and possible solutions–Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wastelandreclamation.–Consumerismandwasteproducts.–EnvironmentProtectionAct. – Air (Prevention and Control of Pollution) Act. –Water (Prevention and Control ofPollution)Act– WildlifeProtectionAct–ForestConservationAct– Issuesinvolvedinenforcementofenvironmentallegislation–Publicawareness.

UNIT-5

Human Population And The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies. Field Work: Visit to a local area to document environmental assets River/forest grassland/ hill/ mountain – Visit to a local polluted site – Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hillslopes, etc..

Textbooks:

1. Text book of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, “Environmental Studies”, Pearson education
3. S.Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. K.Raghavan Nambiar, “Textbook of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd.

Reference Books:

1. Deeksha Dave and E.Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M.Anji Reddy, “Textbook of Environmental Sciences and Technology”, BS Publication.
3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J.Glynn Henry and Gary W.Heinke, “Environmental Sciences and Engineering”, Prentice Hall of India Private limited
5. G.R.Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House
Gilbert M.Masters and Wendell P.Ela, “Introduction to Environmental Engineering and Science, Prentice Hall of India Private limited.

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**Course Code:**

Course Category:	Humanity Social Science & Management Course(HSMC)	Credits: 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	2	1	0
Prerequisites	-	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After successful completion of course, the student will be able to:

CO No:	Course Outcome Description	K - Level
CO1	Understanding the concept of managerial economics, Demand function, and different demand forecasting methods.	K-2
CO2	Discuss the concepts of production function, economies of scale, optimum size of the firm, and cost & break-even analysis.	K-2
CO3	Describe market structure and pricing under varied market conditions, Classify the types of business organizations and business cycles.	K-2
CO4	Evaluate the projects by applying tools and techniques of capital budgeting to accept or reject the new projects in business.	K-3
CO5	Prepare financial statements for analysis by using accounting tools	K-3

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	3	3	3	3	-	-	-
CO2	-	-	-	-	-	-	-	3	3	3	3	-	-	-
CO3	-	-	-	-	-	-	-	3	3	3	3	-	-	-
CO4	-	-	-	-	-	-	-	3	3	3	3	-	-	-
CO5	-	-	-	-	-	-	-	3	3	3	3	-	-	-

COURSE CONTENT:**UNIT–1 Managerial Economics**

Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT–2 Production and Cost Analysis

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Isocosts, MRTS-Cobb-Douglas Production Function-Laws of Returns-Internal and External Economies of scale, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break - Even Analysis.

UNIT–3 Business Organizations and Markets

Introduction – Nature, meaning, significance, functions and advantages. Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies.

UNIT–4 Capital Budgeting

Introduction – Nature, meaning, significance, functions and advantages. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT–5 Financial Accounting and Analysis

Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis(Simple Problems) - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.

Reference Books:

1. Managerial Economics: Principles and Worldwide Applications, 9E (Adaptation) by Dominick Salvatore and Siddhartha Rastogi.

2. Managerial Economics: Principles and Worldwide Applications by Dominick Salvatore.

E-Resources:

1. <https://nptel.ac.in/courses/110101005>

Websites:

- <https://www.geeksforgeeks.org/principles-and-types-of-managerial-economics/>
- https://www.tutorialspoint.com/managerial_economics/index.htm



Course Category:	Engineering Science (ES)	Credits: 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Basics of Civil Engineering	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After successful completion of course, the student will be able to:

CO No:	Course Outcome Description	K - Level
CO1	Explain the importance of geology and geological agents on Earth surface and development process of a river	K-2
CO2	Identify the physical properties of Minerals and Rocks.	K-2
CO3	Recognize various secondary structures and their importance in civil engineering point of view.	K-2
CO4	Interpret the concept of Ground water, Earthquakes and landslides. and select suitable geophysical method required for identifying subsurface information and ground water potential.	K-3
CO5	Investigate the project location for geological factors relevant to dam construction, and categorize various types of dams, reservoirs, and tunnels along with their respective functions.	K-4

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	2	2	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	2	3	-	2	-	-	-	-	2	2	2
CO5	3	3	2	2	3	-	2	-	-	-	-	2	2	2

COURSE CONTENT:**UNIT-1:**

Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies, Weathering of rocks, Geological agents, weathering process of Rock, Development Process of Rivers.

UNIT-2:

Mineralogy And Petrology: Definitions of mineral and rock-Different methods of study of mineral and rock. Physical properties of minerals and rocks for megascopic study for the

following minerals and rocks. Common rock forming minerals: Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate

UNIT-3:

Structural Geology: Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

UNIT-4:

Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement.

Earthquakes and Land Slides: Terminology, Classification, causes and effects, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods

UNIT-5

Geology of Dams, Reservoirs and Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Life of Reservoirs. Purpose of Tunnelling, effects, Lining of Tunnels.

TEXT BOOKS:

[1]. Engineering Geology by N. ChennaKesavulu, Laxmi Publications . 2ndEdn 2014.

[2]. Engineering & General Geology by Parbin Singh Katson educational series 8th 2023

REFERENCE BOOKS:

1. Engineering Geology by SubinoyGangopadhyay Oxford University press 1st edition, 2012.

2. Engineering Geology by D. Venkat Reddy, Vikas Publishing, 2ndEdn , 2017,

3. Geology for Engineers and Environmental Society' Alan E Kehew, 3rd edn., 2013) Pearson publications.

4. 'Environmental Geology' (2013) K.S.Valdiya, 2nd ed., McGraw Hill Publications.

E-RESOURCES/WEB/ DIGITAL MATERIALS:

1.<http://nptel.iitm.ac.in/video.php?subjectId=105105106>

2.<http://nptel.iitm.ac.in/video.php?courseId=1055&p=1>

3.<http://nptel.iitm.ac.in/video.php?courseId=1055&p=3>

4.<http://nptel.iitm.ac.in/video.php?courseId=1055&p=4>

CONCRETE TECHNOLOGY

Course Code:

Course Category:	Professional Core (PC)	Credits: 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Basics of Civil Engineering	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After successful completion of course, the student will be able to:		
CO No:	Course Outcome Description	K - Level
CO1	Familiarise the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field.	K-2
CO2	Test the fresh concrete properties and the hardened concrete properties. Understand the basic concepts of concrete. Design the concrete mix by BIS method	K-4
CO3	Evaluate the ingredients of concrete through lab test results. realise the importance of quality of concrete.	K-5
CO4	Understand the behaviour of concrete in various environments.	K-2
CO5	Familiarize the basic concepts of special concrete and their production and applications	K-2

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	2	-	3	3	3
CO2	3	3	-	-	-	-	-	-	-	2	-	3	3	3
CO3	3	3	-	-	2	-	-	-	2	2	-	3	3	3
CO4	3	3	3	2	-	-	-	-	2	2	-	3	3	3
CO5	3	3	3	2	-	-	-	-	2	2	-	3	3	3

COURSE CONTENT:

UNIT-1:

CEMENTS: Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substances – Soundness – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates Maximum aggregate size- Quality of mixing water

UNIT-2:

FRESH CONCRETE: Steps in Manufacture of Concrete—proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete- Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete, Shotcrete.

UNIT-3:

HARDENED CONCRETE: Water / Cement ratio – Abram's Law – Gel/space ratio

Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete: Compression test – Tension test – Factors affecting strength – Flexure test – Splitting test – Non-destructive testing methods – Codal provisions for NDT.

UNIT-4:

ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage –types of shrinkage.

UNIT-5:

MIX DESIGN AND SPECIAL CONCRETES: Ready mixed concrete, Fibre reinforced concrete – Different types of fibres – Factors affecting properties of FRC, Light weight concrete and No fines concrete, High performance concrete – Self compacting concrete, Self healing concrete.

Factors in the choice of mix proportions –Quality control of concrete- Statistical methods- Acceptance Criteria-Concepts Proportioning of concrete mixes by ACI method and IS Code method.

TEXT BOOKS

1. Concrete Technology by M. S. Shetty. – S. Chand & Co.; 2004
2. Concrete Technology by M.L. Gambhir. – Tata Mc.Graw Hill Publishers, New Delhi 5th edition 2013.

References

- 1.Properties of Concrete by A.M. Neville – PEARSON – 4th edition
- 2.Concrete Microstructure, Properties of Materials by P.K. Mehta and Moterio. McGraw Hill 4th edition 2014
- 3.Concrete Technology, J.J. Brooks and A. M. Neville, Pearson, 2019, 2nd Edition.
- 4.Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi.
- 5.Concrete Technology by Job Thomas, Cengagae Publications, 1st edition, 2015



Course Category:	Professional Core (PC)	Credits: 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Strength of Materials	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After successful completion of course, the student will be able to:

CO No:	Course Outcome Description	K - Level
CO1	Apply energy theorems to analyze trusses	K-3
CO2	Analyze indeterminate structures by using Castigliano's-II theorem	K-4
CO3	Analysis of fixed and continuous beams	K-4
CO4	Analyze continuous beams and portal frames by using slope-deflection method	K-4
CO5	Analyze continuous beams and portal frames by using Moment – distribution method	K-4

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO4	3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	3

COURSE CONTENT:**UNIT – I**

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem
Deflections of simple beams and pin jointed trusses.

UNIT - II

ANALYSIS OF INDETERMINATE STRUCTURES: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies — Lack of fit- Castigliano's-II theorem.

UNIT - III

FIXED BEAMS & CONTINUOUS BEAMS : Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT - IV

SLOPE-DEFLECTION METHOD : Introduction-derivation of slope deflection equations-application to continuous beams with and without settlement of supports - Analysis of single bayportal frames without sway.

UNIT - V

MOMENT DISTRIBUTION METHOD : Introduction to moment distribution method-Application to continuous beams with and without settlement of supports-Analysis of single bay storey portal frames without sway.

Textbooks:

1. Analysis of Structures – Vol-I&II by V.N.Vazirani&M.M.Ratwani, Khanna Publications,New Delhi.
2. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers. 3rd edition 2017.
3. Structural Analysis by T.S. Thandavamoorthy, Oxford University Press, 2011

Reference Books:

1. Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, New Delhi.
2. Structural Analysis by Devdas Menon, Narosa Publishing House, 3rd Edition
3. Structural analysis by Aslam Kassimali Cengage publications 6th edition 2020.
4. Structural analysis Vol.I and II by Dr.R.Vaidyanathan and Dr.PPerumal– Laxmi publications. 3rd 2016
5. Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
6. Structural Analysis – D.S.Prakasarao -Univeristy press.



Course Category:	Professional Core (PC)	Credits: 3			
Course Type:	Theory	Lecture-Tutorial-Practice:	3	0	0
Prerequisites	Fluid Mechanics	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After successful completion of course, the student will be able to:

CO No:	Course Outcome Description	K - Level
CO1	Understand the characteristics of laminar and turbulent flows.	K-2
CO2	Apply the knowledge of fluid mechanics to address the uniform flow problems in open channels.	K-3
CO3	Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows.	K-3
CO4	Evaluate the performance of impact of jets on plates and design Pelton wheel, Francis and Kaplan turbine	K-5
CO5	Understand the principles, losses and its efficiencies of centrifugal pumps	K-2

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	2	-	-	-	-	2	-	3	3
CO2	3	3	-	-	-	3	-	-	-	-	3	-	3	3
CO3	3	3	-	-	-	3	-	-	-	-	3	-	3	3
CO4	3	3	-	-	-	3	-	-	-	-	3	-	3	3
CO5	3	2	-	-	-	2	-	-	-	-	2	-	3	3

COURSE CONTENT:**UNIT-1:**

Laminar & Turbulent flow in pipes: Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stokes law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody's diagram – Introduction to boundary layer theory.

UNIT-2:

Uniform flow in Open Channels: Open Channel Flow - Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Hydraulically efficient channel

sections: Rectangular, trapezoidal and triangular channels, Energy and Momentum correction factors

UNIT-3:

Non-Uniform flow in Open Channels: Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics- Energy dissipation.

UNIT-4:

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Velocity triangles at inlet and outlet - Work done and efficiency.

Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design - efficiency - Draft tube: theory - characteristic curves of hydraulic turbines. Cavitation: causes and effects.

UNIT-5:

Pumps: Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies.

TEXT BOOKS:

1. P. N. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House 2nd edition 2019
2. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024

REFERENCE BOOKS:

1. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill, 2nd edition 2018
2. Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9th edition, 2022.
3. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
4. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, S Chakraborty 3rd edition 2011

E-RESOURCES/DIGITAL MATERIAL:

<https://nptel.ac.in/courses/105105203> <https://archive.nptel.ac.in/courses/112/106/112106300/>
<https://archive.nptel.ac.in/courses/112/103/112103249/>



Course Category:	Professional Core (PC)	Credits: 1.5			
Course Type:	Practical	Lecture-Tutorial-Practice:	0	0	3
Prerequisites	Concrete Technology	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After successful completion of course, the student will be able to:

CO No:	Course Outcome Description	K - Level
CO1	Outline importance of testing cement and its properties	K-4
CO2	Assess different properties of Aggregates	K-4
CO3	Assess fresh concrete properties and their relevance to hardened concrete.	K-4
CO4	Assess hardened concrete properties	K-4

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	3	-	-	-	2	3	2	-	3	3	3
CO2	3	2	3	3	-	-	-	2	3	2	-	3	3	3
CO3	3	2	3	3	2	-	-	2	3	2	-	3	3	3
CO4	3	2	3	3	-	-	-	2	3	2	-	3	3	3
CO5	3	2	3	3	-	-	-	2	3	2	-	3	3	3

COURSE CONTENT:**1. Tests on Cement**

- Normal Consistency and Fineness of cement.
- Initial setting time and Final setting time of cement.
- Specific gravity and soundness of cement.
- Compressive strength of cement.

2. Tests on Fine Aggregates

- Grading and fineness modulus of Fine aggregate by sieve analysis. Specific gravity of fine aggregate.
- Water absorption and Bulking of sand.

3. Tests on Coarse Aggregates

- Grading of Coarse aggregate by sieve analysis.
- Specific gravity of coarse aggregate
- Water absorption of Coarse aggregates

4. Tests on fresh Concrete

- Workability of concrete by compaction factor method
- Workability of concrete by slump test
- Workability of concrete by Vee-bee test.

5. Tests on Hardened Concrete

- Compressive strength of cement concrete and Modulus of rupture Young's Modulus and Poisson's Ratio
- Split tensile strength of concrete.
- Non-Destructive testing on concrete. (Rebound hammer, Ultrasonic Pulse Velocity etc)



Course Category:	Professional Core (PC)	Credits: 1.5			
Course Type:	Practical	Lecture-Tutorial-Practice:	0	0	3
Prerequisites	Engineering Geology	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After successful completion of course, the student will be able to:

CO No:	Course Outcome Description	K - Level
CO1	Identify physical properties of Minerals	K-2
CO2	Recognize physical properties of Rocks	K-2
CO3	Appraise the profile and calculate the creek gradient and steep slopes of given geological maps	K-2
CO4	Interpret the strike and dip problems for a given simple structural Geology	K-3
CO5	Classify the soil by using bore hole data in ISC system	K-2

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	2	-	-	-	-	-	-	-	2	2	-
CO2	3	-	-	2	-	-	-	-	-	-	-	2	3	-
CO3	3	3	-	3	-	-	-	-	-	-	-	2	3	-
CO4	3	3	-	2	-	-	-	-	-	-	-	2	3	-
CO5	3	3	-	3	-	-	-	-	-	-	-	2	3	-

COURSE CONTENT:**LIST OF EXPERIMENTS**

1. Physical properties of minerals: Mega-scopic identification of
 - a. Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group, Augite, Hornblende & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum.
 - b. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, Chlorite, Galena, Pyralusite, Graphite and Bauxite.
2. Megascopic description and identification of rocks.
 - a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt.

b) Sedimentary rocks – Sand stone, Ferruginous sand stone, Lime stone, Shale, Laterite, Conglomerate.

c) Metamorphic rocks – Granite Gneiss, Quartzite Gneiss Slate, Muscovite & Biotite schist, Marble, Khondalite.

3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.

4. Simple Structural Geology problems.

5. Bore hole data.

6. Strength of the rock using laboratory tests.

7. Field work – To identify Minerals, Rocks, Geomorphology & Structural Geology.

LAB EXAMINATION PATTERN:

1. Description and identification of FOUR minerals

2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)

3. ONE Question on Interpretation of a Geological map along with a geological section.

4. TWO Questions on Simple strike and Dip problems.

5. Bore hole problems.

6. Project report on geology.

REFERENCES:

1. 'Applied Engineering Geology Practicals' by M T Mauthesha Reddy, New Age International Publishers, 2nd Edition.

2. 'Foundations of Engineering Geology' by Tony Waltham, Spon Press, 3rd edition, 2009.



Course Category:	Skill Enhancement Course (SEC)	Credits: 2			
Course Type:	Tutorial/Practical	Lecture-Tutorial-Practice:	0	1	2
Prerequisites	Engineering Physics	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After successful completion of course, the student will be able to:

CO No:	Course Outcome Description	K - Level
CO1	Acquire knowledge about concepts of remote sensing, sensors and their characteristics.	K-1
CO2	Familiarize with data models and data structures to introduce various Raster and Vector Analysis capabilities in GIS.	K-1
CO3	Digitize and create thematic map and extract important features to calculate geometry.	K-3
CO4	Perform surface analysis over Contour to develop digital elevation model.	K-3
CO5	Use GIS software to perform simple analysis in water resources and transportation engineering.	K-3

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	2	2	-	-	2	-	-	-	-	2	3	2
CO2	2	-	2	2	-	-	2	-	-	-	-	2	3	2
CO3	2	2	2	2	2	2	3	-	2	2	2	3	3	2
CO4	2	2	2	2	2	2	3	-	2	2	2	3	3	2
CO5	2	2	2	2	2	2	3	-	2	2	2	3	3	2

COURSE CONTENT:**UNIT – 1**

Introduction to Remote sensing: History of Remote Sensing, Electromagnetic Radiation, Electromagnetic Spectrum, Energy Interaction with Atmosphere, Energy Interaction with the Earth Surfaces - Characteristics of Remote Sensing Systems, Sensor Resolutions, Advantages & Limitations - Platforms: Types of Sensors, Airborne Remote Sensing, Spaceborne Remote Sensing - IRS, LANDSAT, SPOT & Recent satellite.

UNIT – 2

Digital Image analysis: Digital Image Characteristics, Digital Image Data Formats, Band Interleaved by Pixel (BIP), Band Interleaved by Line (BIL), Band Sequential (BSQ) – Visual Interpretation Elements, Preprocessing, Enhancement, Classification, Supervised classification, Unsupervised classification.

UNIT – 3

Introduction to Geographic Information System: Principles, Components and Applications of GIS - Map projections, Spatial Data Structures, Raster and Vector Data Formats, Data Inputs, Data Manipulation, Data Retrieval, Data Analysis - Spatial data analysis: Overlay Function-Vector Overlay Operations, Raster Overlay Operations, Arithmetic Operators, Comparison and Logical Operators, Conditional Expressions - Network Analysis: Components of network, Transportation network - Optimum path analysis.

TEXT BOOKS:

1. BasudebBhatta (2021). ‘Remote sensing and GIS’ , 3rd edn., Oxford University Press.
2. S. Kumar, (2016) ‘Basics of Remote sensing & GIS’ , Laxmi Publications.
3. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2022) ‘Remote Sensing and Image Interpretation’ , 7thedn., Wiley India Pvt. Ltd.
4. Demers, M.N, (2013) ‘Fundamentals of Geographic Information Systems’ , 4th edn., Wiley India Pvt. Ltd.

List of Experiments:

- Expt. 1 :Georeferencing a Toposheet or Map
- Expt. 2 : Digitization and Attribute table creation.
- Expt. 3 : Creation of Thematic Map
- Expt. 4 : Calculation of Feature geometry - Length, Area & Perimeter.
- Expt. 5 : Contour map - developing TIN & DEM from Contour.
- Expt. 6 : Stream network - Stream ordering map.
- Expt. 7 : Watershed - calculate Hydro-geomorphological parameters.
- Expt. 8 : Transportation Network Map - Route analysis.

GIS SOFTWARE: QGIS / ArcGIS

Textbook for Practical

1. QGIS User Guide
2. ArcGIS User Manual by ESRI

REFERENCES:

1. Schowengerdt, R. A (2006) 'Remote Sensing' , Elsevier publishers.
2. Burrough P A and R.A. McDonnell, (1998) 'Principals of Geographical Information Systems' , Oxford University Press.
3. George Joseph (2013) 'Fundamentals of Remote Sensing' , Universities Press.

Web references:

1. <https://nptel.ac.in/courses/10510319>



Course Category:	Engineering Science (ES)	Credits: 2			
Course Type:	Theory	Lecture-Tutorial-Practice:	1	0	2
Prerequisites	-	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After successful completion of course, the student will be able to:

CO No:	Course Outcome Description	K - Level
CO1	Define the concepts related to design thinking.	K-1
CO2	Explain the fundamentals of Design Thinking and innovation.	K-2
CO3	Apply the design thinking techniques for solving problems in various sectors.	K-3
CO4	Analyse to work in a multidisciplinary environment.	K-4
CO5	Evaluate the value of creativity.	K-5

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	2	-	-	2	2	-	2	-	-
CO2	3	3	3	3	3	2	-	-	2	2	-	2	-	-
CO3	3	3	3	3	3	2	-	-	2	2	-	2	-	-
CO4	3	3	3	3	3	2	-	-	2	2	-	2	-	-
CO5	3	3	3	3	3	2	-	-	2	2	-	2	-	-

COURSE CONTENT:**UNIT – 1 Introduction to Design Thinking**

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT - 2 Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, customer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT - 3 Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT - 4 Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modeling, how to set specifications, Explaining their own product design.

UNIT – 5 Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for startup.

Text books:

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, & Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

E-RESOURCES/DIGITAL MATERIAL:

- <https://nptel.ac.in/courses/110/106/110106124/>
- <https://nptel.ac.in/courses/109/104/109104109/>
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview



Course Category:	Mandatory Course (MC)	Credits: 0			
Course Type:	Theory	Lecture-Tutorial-Practice:	2	0	0
Prerequisites	Basic Civil Engineering	Continuous Evaluation	-		
		Semester End Evaluation	-		
		Total Marks	-		

Course Outcomes:

After successful completion of course, the student will be able to:

CO No:	Course Outcome Description	K - Level
CO1	Identify the engineering Properties of building construction materials like stones, bricks, tiles and their suitability in present day constructions.	K-2
CO2	Classify various brick masonry, stone masonry construction and understand the properties of wood and glass	K-2
CO3	Describe the use of lime and cement in various constructions.	K-2
CO4	Recognize the importance of building components	K-2
CO5	Select type of Finishings, Paints, Enamel and Varnishes	K-2

Note: K-Level is defined from Blooms Taxonomy

Contribution of Course Outcomes mapping with POs & PSOs (1- Low, 2 – Moderate, 3 – High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	3	2	-	-	-	-	3	2
CO2	2	-	-	-	-	-	3	2	-	-	-	-	3	2
CO3	2	-	-	-	-	-	3	2	-	-	-	-	3	2
CO4	2	-	-	-	-	-	3	2	-	-	-	-	3	2
CO5	2	-	-	-	-	-	3	2	-	-	-	-	3	2

COURSE CONTENT:**UNIT-1:**

Stones: Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone

Bricks: Composition of good brick earth, various methods of manufacturing of bricks.

Tiles: Characteristics of good tile - manufacturing methods, types of tiles.

Uses of materials like Aluminium, Gypsum, Glass and Bituminous materials

UNIT-2:

Masonry: Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls.

Wood: Structure – Properties- Seasoning of timber Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiber Reinforced Plastics, Steel, Aluminium

UNIT-3:

Glass: Composition, classification, properties and types of glass.

Modern Materials: Ceramics, Sealants for joints, Fibre glass reinforced polymer, Plastics, Bitumen, Plaster of Paris, heat insulating materials; water proofing materials.(Applications)

UNIT-4:

Finishings: Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering.

Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Rubber paints, plastic emulsion paints, plastic paints, enamel paints, texture paints, wax polish

UNIT-5:

Building Components

Building Components Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

Form Works and Scaffoldings.

TEXT BOOKS:

[1]Engineering Materials by Rangwala S.C; Charotar Publishing House, 33rd Edn 2017.

[2] Building Materials, S. S. Bhavikatti, Vices publications House private ltd.

[3] Building Construction, S. S. Bhavikatti, Vices publications House private ltd.

[4] Building Materials, B. C. Punmia, Laxmi Publications private ltd.

[5] Building Construction, B.C. Punmia, Laxmi Publications (p) ltd.

REFERENCE BOOKS:

1. Building Materials, S. K. Duggal, New Age International Publications.

2. Building Materials, and Building construction P. C. Verghese, PHI learning (P) ltd.

3. Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi

4. Building Materials, Construction and Planning, S. Mehaboob Basha, Anuradha Publications, Chennai.

E-RESOURCES/DIGITAL MATERIAL:

(a) <https://nptel.ac.in/courses/105102088>