

Course No.	Course title	L	T	P/D	Hours	Credits
CES-111	Engineering Mathematics-I	3	1	0	4	3

Linear Algebra: Algebra of matrices, inverse, rank, system of linear equations, symmetric, skewsymmetric and orthogonal matrices. Hermitian, skew-Hermitian and unitary matrices. eigenvalues and eigenvectors, diagonalisation of matrices, Cayley-Hamilton Theorem.

Calculus: Functions of single variable, limit, continuity and differentiability, Mean value theorems, Indeterminate forms and L'Hospital rule, Maxima and minima, Taylor's series, Fundamental and mean value-theorems of integral calculus. Evaluation of definite and improper integrals, Beta and Gamma functions, Functions of two variables, limit, continuity, partial derivatives, Euler's theorem for homogeneous functions, total derivatives, maxima and minima, Lagrange method of multipliers, double and triple integrals and their applications, sequence and series, tests for convergence, power series, Fourier Series, Half range sine and cosine series.

Vector Calculus: Gradient, divergence and curl, vector identities, directional derivatives, line, surface and volume integrals, Stokes, Gauss and Green's theorems (without proofs) applications.

Integral Calculus: Quadrature, Rectification, Surface and Volume of revolution for simple curves, Double integrals and their applications, Change of order of integration, Triple integrals and their applications, Change of variables.

Complex Variables: Analytic functions, Cauchy-Riemann equations, Application in solving potential problems, Line integral, Cauchy's integral theorem and integral formula (without proof), Taylor's and Laurent' series, Residue theorem (without proof) and its applications.

Books

- 1) Advanced Engineering Mathematics: by Erwin Kreyszig. John Wiley and Sons, NC, New York.
- 2) Advanced Engineering Mathematics: by R. K. Jain & S. R. K lyengar, Narosa Pub. House.
- 3) Advanced Engineering Mathematics: by C. R. Wylie & L. C. Barrett, McGraw Hill
- 4) Differential & Integral Calculus: by N. Piskunov , MIR Publications.

Course No.	Course title	L	T	P/D	Hours	Credits
CES-112	Chemistry for Civil Engg.	3	1	0	4	3

Structure of Materials : Space lattice and unit cells, crystal system, Symmetry operation, Structures of common metallic, Semiconductor ceramic and superconductor materials, Miller Indices, Representation of Directions and planes, Packing fractions, Structure determination using X-ray diffraction, Braggs law, and lattice parameter determination, Bonding in solids, coordination number, ceramics, silicates and clay structures, glass transition temperature, non-crystalline materials.

Materials Science : Classification of engineering materials and their applications: Metals and alloys, Ceramics and glasses, Polymers, Composites and Novel Materials, Price and availability of materials, Processing of engineering materials, Chemical bonding and properties of materials: Mechanical, Electrical, Magnetic, Optical, Thermal, Oxidation and degradation behaviour of engineering materials. Levels of structure: Nuclear structure, Crystal structure, Nanostructure, Microstructure and Macrostructure, Processing structure property correlations.

Corrosion and Protective Coatings : Corrosion, Types and causes of corrosion, factors influencing corrosion, electrolysis, electrode potential, reference electrode, theories of corrosion, corrosion control, protective coatings, pretreatment of surface, metallic coating, electro less plating, inorganic non metallic coatings, organic coatings, special paints.

Electronic Properties and Band Theory :Metals, insulators and semiconductors, electronic structure of solids-band theory, band structure of metals, insulators and semiconductors. Intrinsic and extrinsic semiconductors, doping semiconductors, p-n junctions, super conductors. Optical properties- Optical reflectance, photoconduction, Magnetic Properties- Classification of materials: quantum theory of paramagnetic cooperative phenomena-magnetic domains, hysteresis.

Water Technology : Water, Impurities in water and sources of impurities, Hard water, Boiler feed water, Boiler, corrosion, Prevention of scale formation, softening of water, potable water, desalination, and chlorination of water.

Books

- 1) Applied Chemistry- A textbook for engineers and technologist by H.D. Gesser.
- 2) Engineering Chemistry: by P C Jain & Monika Jain
- 3) A Text Book of Engineering Chemistry: by Shashi Chawla
- 4) Engineering Chemistry by N. Krishnamurty, P. Vallinayagam, D. Madhavan

Course No.	Course title	L	T	P/D	Hours	Credits
CEH-113	Communication Skills	3	1	0	4	3

The Process of Communication: Introduction, What is Communication, Barriers of Communication, Different Types of Communication, Written Vs Oral Communication, Different Types of face-to-face Interactions, Characteristics and Conventions of Conversation, Conversational problems of Second Foreign Language Users, Difference between Conversation and Other Speech Events.

Telephone Techniques: Speaking and Listening: Commonly used Phrases in Telephone Conversations. Reading: Conference Calls. Vocabulary. Writing and Listening: Leaving a message, Grammar and Usage: The Perfect Tenses, pronunciations: Contracted Forms.

Job Applications and Interviews: Reading, Vocabulary, Apply for a Job, Curriculum Vitae, Language Focus: Some Useful Words, Study skills, Preparing for an Interview, Listening, Speaking, Writing.

Group Discussions: Reading, Writing Skills, Listening: How to be successful in a Group Discussion, Study Skills, Language Focus, Vocabulary, Speaking, Grammar: Connectives, Pronunciation.

Managing Organisational Structure: Warm Up Values to Influence and Lead, Reading: The Role of a Manager, Vocabulary: Leadership, Speaking and Listening, Language Focus, Degree of Probability Grammar: Modals, Writing, Reports, Pronunciation.

Meetings: Reading. A Successful Meeting, Speaking: One to One Meetings. Language, Focus: Opening, Middle and Close. Study Skills. Editing. Listening. Criteria for Successful Meetings. Vocabulary, Grammar: Reporting Verbs, Writing: Memos, Pronunciation: Stress According to Part of Speech.

Taking Notes and Preparing Minutes: Taking Notes. The Note Taking Skill: The Essential Components, The Note-Taking Skill: An Example Preparing Minutes, Format of Minutes, Language and Style of Minutes, Grammar: Using the Passive Voice.

Presentation Skills-I: Reading, Presentation Skills, Grammar, Verbs often required in Presentation, Language Focus, Listening, Importance of Body Language in Presentations, Speaking, Preparing an Outline of a Presentation, Pronunciation.

Presentation Skills-II: Reading, Structure of Presentation, Study Skills: Visual Aids, Ending the Presentation, Language Focus, Talking about Increase and Decrease, Grammar, Prepositions, Listening: Podium Panic, Speaking, Pronunciation: Emphasizing the important Words in Context.

Negotiation Skills: Language focus Idiomatic Expressions, Study Skills: Process of Negotiations, Grammar: Phrasal Verbs, Listening Effective Negotiations, Speaking, Writing.

Books:

- 1) Effective Technical Communication by M. Ashraf Rizvi, Pub: Tata McGraw Hill
- 2) Developing Communication Skills by Krishna Mohan, Pub: Mac Millan India Limited.
- 3) An Approach to Communication Skills by Indrajit Bhattacharya, Pub: Dhanpat Rai Co. Pvt. Ltd., New Delhi (2007).
- 4) Handbook of Practical Comm Skills by Wright, Chrissie, Pub: Jaico Publishing House, Mumbai
- 5) The Skills of Communicating by Bill Scott, Jaico Publishing House, Mumbai

Course No.	Course title	L	T	P/D	Hours	Credits
CED-114	Building Materials	3	1	0	4	3

Unit Introduction and Principle properties of Engineering materials: Physical & Mechanical Properties of building materials, Classification.

Rocks and Stones: Classification of rock and stone, requirements of good structural stone, quarrying, blasting and sorting out of stones, dressing, prevention and seasoning of stone, application of stone

Clay product(Clay Brick and Tiles): Classification, manufacturing, testing of bricks, constituents of good brick earth, harmful ingredients, tiles, types of terra-cotta, porcelain, stone ware, majolica, earth ware.

Limes: Classification, manufacturing, artificial hydraulic lime, testing of lime and storage of lime.

Cement and cement blocks: composition of cements, types of cement, manufacturing of Ordinary Portland Cement, rate of hydration, testing of cement, special types of cement, storage of cement, flyash, pozzolona, manufacturing of cement block

Fine and Coarse aggregate: Source, Impurities, Classification, Characteristics, Testing.

Water: Quality of water, effect of mixing water from different source, testing.

Mortars and Plastering: classification, characteristics, functions of ingredient, cement mortar, lime mortar, surki mortar, and mud mortar, testing.

Cement concrete and Special concrete: Classification, physical properties, type, water-cement ratio, testing, Types of concrete.

Timber: Classification, characteristics, structure, seasoning, defects, fire proofing of timber, plywood, fibre board, important Indian timbers, testing.

Ceramic products: classification, refractories, glass, various properties of ceramic materials.

Ferrous Metals and alloys (Cast iron & Steel): Classification, Properties, Testing,

Non-Ferrous Metals and alloys : Aluminium, Copper, Zinc, Lead, Tin, Nickel.

Paints, Distemper & Varnishing: Basic constituents, types, painting of wood, constituents, characteristics and types of varnishes, defect, enamel, distemper method of application.

Polymeric materials (Plastics, Fibres & Rubber): Definition, classification Fibre and rubber, composition and raw materials, manufacturing, characteristics and uses, special varieties.

Bitumen, Asphalt & Tar: Choice of Product, Properties, Testing, Application.

Miscellaneous Materials: Characteristics and application of thermocol, Asbestos, Adhesives, Abrasive, Geosynthetics, Gypsum, Fly Ash, admixtures.

Books

- 1) S.C. Rangawala, Building Material S.K. Duggal, Building Materials, New Age International Publishers.
- 2) P.C.Varghese, Building Materials, PHI
- 3) R.K. Rajput, Engineering Materials, S. Chand Publishers.
- 4) Surinder Singh, Engineering Materials.
- 5) A.M. Neville, Properties of Concrete, Longman.
- 6) M.S.Shetty, Concrete Technology, S.Chand.
- 7) A.R.Santhakumar, Concrete Technology, Oxford University Press.
- 8) M.L.Gambhir, Concrete Technology, Tata Mcgraw Hill Education

Course No.	Course title	L	T	P/D	Hours	Credits
CED-115	Strength of Materials	3	1	0	4	3

Simple Stresses and Strains: Stress & strain, Types of stresses and strains in Elastic body, Hooks law, Stress - strain diagram for ductile and brittle material, Elastic constants and their relationships, Thermal Stress & Strain, Stresses induced due to uniaxial stress, stresses induced by state of simple shear, stresses induced due to biaxial stress, Transformation of Plane Stress and strains, Principal Stresses and strains, Maximum Shearing Stress and strain, Analytical and graphical methods: Mohr's Circle.

Centre of Gravity and Moment of Inertia: Centroid and centre of mass: Centroids of composite plane figures and curves, Centre of Gravity and Moment of Inertia: First and second moment of area; Radius of gyration; Parallel and perpendicular axis theorem; Product of inertia, Rotation of axes and principal moment of inertia; Moment of inertia of simple and composite bodies, Mass moment of inertia.

Beam under Transverse Loading: Relationship between load, SF and BM, shear force and bending moment diagram for different types of loads and beams, Point of contra flexure, Using singularity functions to determine shear and bending moment in a beam, Equation of the elastic curve, Direct determination of the elastic curve from the load distribution and method of superposition.

Stresses in Beam: Pure bending of beams, Moment of resistance, Section modulus & neutral axis, Stress distribution in symmetric and unsymmetrical sections, Concept of direct & transverse shear stress, Response under axial and eccentric load, direct stresses, bending stresses, Determination of the shearing stresses in a beam, Shear Center, Distribution of stresses in a narrow rectangular beam, Longitudinal shear on a beam element of arbitrary shape.

Torsion: Theory of Pure torsion, Derivation of Torsion equation for a circular shaft subject to torsion, Maximum torque transmitted by a Solid and hollow shaft, Power transmitted by a shaft, Close coiled helical spring subjected to axial load and axial torque, Polar modulus, torsion rigidity, Shear stress produced in the members.

Thin & Thick Cylinders and Spheres: Thin and Thick cylinders subjected to internal pressures, Concept of stresses & strains, Hoop stress, Longitudinal stress, in a cylinder, principal stresses in sphere and change in diameter and internal volume.

Columns & Struts: Stability of Structures, Euler's Formula for Pin-Ended Columns, Extension of Euler's Formula to Columns with Other End Conditions, Eccentric Loading; the Secant Formula, Columns under a Centric Load and Eccentric Load, Rankin's Theory.

Books

1. M.A.Jayaram, Mechanics of Materials with Programs in C, PHI.
2. B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, Strength of Materials, Laxmi.
3. S. Ramamrutham, R. Narayan, Strength of Materials, Dhanpat Rai Publishing Company (P) Limited.
4. Ferdinand Beer, E. Russell Johnston, John DeWolf, David Mazurek, Mechanics of Materials, 7th Edition, McGraw-Hill Engineering.
5. Gere and Timoshenko, Mechanics of Materials, 4th Edition, PWS Publishing Company.
6. R. C. Hibbeler, Mechanics of Materials, Pearson.
7. E. P. Popov, Engineering Mechanics of Solids, Pearson.
8. I. H. Shames & J. M. Pitarresi, Introduction To Solid Mechanics, PHI
9. S.H.Crandall, N.C.Dahl & T. J. Lardner, Mechanics of Solids, TATA McGraw Hill Education

Course No.	Course title	L	T	P/D	Hours	Credits
CEH-117	Communication Lab	0	0	3	3	1

1. Listening and answering questions
2. Listening and sequencing of sentences
3. Reading and answering questions
4. Phonetics and Correct Pronunciation
5. Face to Face Conversation
6. Telephone conversation
7. Role play activities
8. Viewing and discussing audio-visual materials
9. Students prepare their own resume and report
10. Students make presentations on given topics and time management
11. Students participate in group discussions
12. Students participate in mock interviews

Course No.	Course title	L	T	P/D	Hours	Credits
CED-118	Building Materials Lab	0	0	3	3	1

1) Test For Cement:

- i. Fines of Cement -
 - a) Sieve Analysis
 - b) Air Permeability Test
- ii. Standard Consistency
- iii. Initial and Final Setting Time
- iv. Soundness
- v. Compressive Strength
- vi. Specific Gravity

2) Test for Fine Aggregate:

- i. Specific Gravity (FA)
- ii. Bulking of Fine Aggregate
- iii. Fineness Modulus and Particle Size Distribution & Classification of zone of sand.

3) Test for Course Aggregate:

- i. Specific Gravity and Water Absorption
- ii. Fineness Modulus and Particle Size Distribution

4) Test for Fresh & Hard Concrete:

- i. Workability Test
 - a) Slump Test
 - b) Compaction Factor Test
 - c) Vee Bee Test
- ii. Cube and Cylinder Strength of Concrete(Compression&Tensile)
- iii. Flexural Tensile Strength

5) Test for Brick & Stone:

- i. Water Absorption/Efflorescence
- ii. Compressive Strength

Books:

- 1) H. Sood, L.N. Mittal, P.D. Kulkarni, Laboratory Manual on Concrete Technology, CBS Publishers & Distributors Pvt. Ltd.
- 2) M.L.Gambhir, Concrete Technology, Tata Mcgraw Hill Education.
- 3) S.D. Hasan, Civil Engineering Materials and their Testing, Narosa Publishing House.
- 4) S.C. Rangawala, Building Material
- 5) S.K. Duggal, Building Materials, New Age International Publishers.
- 6) P.C.Varghese, Building Materials, PHI
- 7) R.K. Rajput, Engineering Materials, S. Chand Publishers.
- 8) Surinder Singh, Engineering Materials.
- 9) A.M. Neville, Properties of Concrete, Longman.
- 10) M.S.Shetty, Concrete Technology, S.Chand.
- 11) A.R.Santhakumar, Concrete Technology, Oxford University Press.