

# Civil and Infrastructure Engineering

Semester III						
Sr. No	Course Code	Course Name	L	T	P	C
1	ME 203	<a href="#">Fluid Mechanics</a>	2	1	0	6
2	ME 222	<a href="#">Mechanics of Materials</a>	2	1	0	6
3	CE 201	<a href="#">Building and Construction Materials</a>	1	1	2	6
4	HS 201	<a href="#">Economics</a>	2	1	0	6
5	CE 202	<a href="#">Surveying &amp; Geomatics</a>	2	1	0	6
6	CE 203	<a href="#">Building Planning and Drawing</a>	2	0	2	6
		<b>Total Credits</b>				<b>36</b>

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1	<b>Title of the course (L-T-P-C)</b>	<b>Fluid Mechanics (2-1-0-6)</b>
2	<b>Pre-requisite courses(s)</b>	Nil
3	<b>Course content</b>	<p><b>Introduction:</b> Scope, definition of fluid as continuum, fluid properties. (2hr)</p> <p><b>Fluid Statics:</b> Pressure at a point, basic equation for pressure field, <b>pressure variation (fluid at rest):</b> standard atmosphere, Measurement of pressure manometer, Hydrostatics force on a plane and curve surface, Buoyancy, flotation and stability, pressure variation in a fluid with rigid body motion linear motion, rigid body rotation(4hr)</p> <p><b>Elementary Fluid Dynamics:</b> Statics, stagnation pressure, Bernoulli Equation assumptions(4hr)</p> <p><b>Fluid Kinematics The velocity field:</b> Eulerian and Lagrangian flow descriptions, steady and deformation, <b>Acceleration field:</b> material derivative, unsteady and convective effects.</p> <p><b>Control volume and system representation:</b> Reynolds' Transport Theorem, physical interpretation, steady, unsteady effects, moving control volume, potential function(6Hr)</p> <p>Integral approach Conservation of mass derivation of continuity, fixed, non-deforming control volume, moving non-deforming control volume, deforming control volume. <b>Conservation of momentum:</b> linear momentum and moment of momentum equation and their application., comparison of energy equation with Bernoulli's equation(6hr)</p> <p><b>Differential approach:</b> linear motion and angular motion with deformation, <b>Conservation of mass:</b> differential form of continuity equation, stream function, Conservation of linear momentum, Inviscid flows, Irrotational flow(6hr)</p> <p><b>Viscous flow:</b> Stress relationships, NS Equations, Simple solutions for viscous flows(4hr)</p> <p>Dimensional analysis Buckingham's II-theorem, Dimensionless groups &amp; their importance (3hr)</p> <p><b>Viscous Flow in Pipes:</b> General characteristics of pipe flow, fully developed laminar and turbulent flow, turbulent shear stress, turbulent velocity profile, Pipe Flow rate measurement. (4hr)</p> <p><b>Boundary layer:</b> Boundary layer characteristics boundary layer structure and thickness on a plate, Blasius boundary layer, momentum integral boundary layer equation for a flat plate(4hr)</p>
4	<b>Texts/References</b>	<ol style="list-style-type: none"> <li>1. Yunus A. Cengel, John M. Cimbala, Fluid Mechanics, Tata McGraw Hill Education,2011</li> <li>2. F.M.White Fluid Mechanics, Seventh Edition, Tata McGraw Hill Education,2011,</li> <li>3. Kundu, Pijush K., and Ira M.Cohen.Fluid Mechanic, Elsevier,2001</li> </ol>

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1	<b>Title of the course (L-T-P-C)</b>	<b>Mechanics of Materials (2-1-0-6)</b>
2	<b>Pre-requisite courses(s)</b>	Nil
3	<b>Course content</b>	<p><b>Module 1:</b> Basics: Fundamentals of mechanics of deformable solids. Concepts of stress and strain and their relationships. Axially loaded members - Normal stress and strain, Simple (direct) shear stress and strain, Hooke's law, Stresses on inclined planes under axial loading, thermal stresses and strains, statically indeterminate problems. Elastic strain energy under axial loads.</p> <p><b>Module 2:</b> Torsion: torsion of circular cross-section shafts (Solid and hollow sections): Deformation field, Torsion formulae for stresses and angular deflection, Elastic strain energy under torsion, Closely-wound helical springs – stresses and deflections.</p> <p><b>Module 3:</b> Bending: Euler – Bernoulli model: normal and shear stresses, deflections for symmetric bending. Statically indeterminate problems, Elastic strain energy under flexure.</p> <p><b>Module 4:</b> Combined stresses: State of stress and strain at a point, transformation laws, Mohr's circle diagram for stress and principal stresses, thin-walled structures: thin cylinders and spheres. Theories of failure: Maximum Normal-Stress theory, Maximum shear-stress theory, and Maximum Distortional-energy theory.</p> <p><b>Module 5:</b> Energy methods – Castigliano's theorem and its applications, fictitious-load method. Stability of structures – Buckling of idealized and elastic columns</p>
4	<b>Texts/References</b>	<p><b>TEXTBOOKS:</b> 1) S.H Crandall, N.C Dahl and S.J Lardner, An Introduction to Mechanics of Solids, Tata McGraw Hill, Third Edition, 2012. 2) E.P. Popov, Engineering Mechanics of Solids, Prentice Hall of India, 2nd edition, 2012.</p> <p><b>REFERENCES:</b></p> <ol style="list-style-type: none"> <li>1. J. M. Gere and Goodno, Mechanics of Materials, 7th ed, Cengage Learning India, 2012.</li> <li>2. J.P Den Hartog, Strength of Materials, Dover, 1949.</li> <li>3. J.M Gere and S.P Timoshenko, Mechanics of Materials, CBS Publishers, 1986</li> <li>4. R. C. Hibbeler, Mechanics of Materials, Pearson, 10th edition, 2016 .</li> <li>5. S.P Timoshenko and D.H Young, Elements of strength of Materials, 5th ed, Affiliated East West Press, 1976.</li> <li>6. F. P. Beer, E. R. Johnston Jr., John T. DeWolf, D. F. Mazurek, Mechanics of Materials, McGraw- Hill Education; 7th edition, 2014</li> <li>7. M. Salvadori and R. Heller, Structure in Architecture, Prentice Hall Inc, 1963.</li> <li>8. S.P Timoshenko, History of Strength of Materials, Dover, 1983.</li> <li>9. M. H. Sadd, Elasticity: Theory, Applications, and Numerics, 1st ed, Elsevier India, 2006.</li> </ol>

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1	<b>Title of the course (L-T-P-C)</b>	<b>Building and Construction Materials (1-1-2-6)</b>
2	<b>Pre-requisite courses(s)</b>	-
3	<b>Course content</b>	<p><b>UNIT I STONES – BRICKS – CONCRETE BLOCKS</b> 9Stone as building material – Criteria for selection – Tests on stones –Deterioration and Preservation of stonework – Bricks – Classification –Manufacturing of clay bricks – Tests on bricks Compressive Strength – Water Absorption – Efflorescence – Bricks for special use – Refractory bricks – Concrete blocks – Lightweight concrete blocks.</p> <p><b>UNIT II LIME – CEMENT – AGGREGATES – MORTAR</b> 9Lime – Preparation of lime mortar – Cement – Ingredients – Manufacturing process – Types and Grades – Properties of cement and Cement mortar –Hydration – Compressive strength – Tensile strength – Fineness– Soundness and consistency – Setting time – fine aggregates – river sand – crushed stone sand – properties – coarse Aggregates – Crushing strength – Impact strength – Flakiness Index – Elongation Index – Abrasion Resistance – Grading.</p> <p><b>UNIT III CONCRETE</b> 9Concrete – Ingredients – Manufacturing Process – Batching plants –mixing – transporting – placing – compaction of concrete – curing and finishing – Ready mix Concrete – Mix specification.</p> <p><b>UNIT IV TIMBER AND OTHER MATERIALS</b> 9Timber – Market forms – Industrial timber– Plywood – Veneer – Thermocol – Panels of laminates Steel – Aluminum and Other Metallic Materials – Composition – Aluminium composite panel – Market forms – Mechanical treatment – Paints – Varnishes – Distempers – Bitumen’s.</p> <p><b>UNIT V MODERN MATERIALS</b> 9Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products Refractories – Composite materials – Types – Applications of laminar composites – Fibre textile Geomembranes and Geotextiles-for-earth-reinforcement.</p>
4	<b>Texts/References</b>	<p><b>TEXTBOOKS</b></p> <ol style="list-style-type: none"> <li>1. Varghese.P.C. (2015). Building Materials, 2nd Ed., PHI Learning Pvt. Ltd, New Delhi, India.</li> <li>2. Rajput. R.K. (2008). Engineering Materials,3rd Ed., S. Chand andCompany Ltd. New Delhi, India.</li> <li>3. Gambhir.M.L.(2004). Concrete Technology, 3rd Ed., Tata McGraw Hill Education Pvt. Ltd., New Delhi, India.</li> <li>4. Duggal.S.K. (2008). Building Materials, 4th Ed., New Age International, Newdelhi.</li> </ol> <p><b>REFERENCES:</b></p> <ol style="list-style-type: none"> <li>1. Jagadish K.S., Venkatarama Reddy B.V., and Nanjunda Rao K.S. (2007). Alternative Building Materials Technology, New Age International, New Delhi, India.</li> <li>2. Gambhir M.L., &amp; Neha Jamwal (2012). Building Materials, products, properties and systems, Tata McGraw Hill Education Pvt. Ltd, New Delhi, India.</li> </ol>

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	<ol style="list-style-type: none"><li>3. IS456 – 2000 (2021): Plain and reinforced concrete-code of practice. Bureau of Indian Standards, New Delhi.</li><li>4. IS4926 - 2003: Indian Standard specification for ready-mixed concrete, Bureau of Indian Standards, New Delhi.</li><li>5. IS383 – 1970 (2011): Indian Standard specification for coarse and fine aggregate from natural Sources for concrete, Bureau of Indian Standards, New Delhi.</li><li>6. IS1542-1992(2009): Indian standard specification for sand for plaster, Bureau of Indian Standards, New Delhi.</li><li>7. IS 10262-2009: Indian Standard Concrete Mix Proportioning – Guidelines, Bureau of Indian Standards, New Delhi.</li></ol>
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<b>1</b>	<b>Title of the course (L-T-P-C)</b>	<b>Economics (2-1-0-6)</b>
<b>2</b>	<b>Pre-requisite courses(s)</b>	--
<b>3</b>	<b>Course content</b>	<p>Basic economic problems. resource constraints and Welfare maximizations. Nature of Economics: Positive and normative economics; Micro and macroeconomics, Basic concepts in economics. The role of the State in economic activity; market and government failures; New Economic Policy in India. Theory of utility and consumer's choice. Theories of demand, supply and market equilibrium. Theories of firm, production, and costs. Market structures. Perfect and imperfect competition, oligopoly, monopoly. An overview of macroeconomics, measurement, and determination of national income. Consumption, savings, and investments. Commercial and central banking.</p> <p>Relationship between money, output, and prices. Inflation - causes, consequences, and remedies. International trade, foreign exchange and balance payments, stabilization policies: Monetary, Fiscal and Exchange rate policies.</p>
<b>4</b>	<b>Texts/References</b>	<ol style="list-style-type: none"> <li>1. P. A. Samuelson &amp; W. D. Nordhaus, Economics, McGraw Hill, NY, 1995.</li> <li>2. A. Koutsoyiannis, Modern Microeconomics, Macmillan, 1975. R. Pindyck and D. L. Rubinfeld, Microeconomics, Macmillan Publishing Company, NY, 1989.</li> <li>3. R. J. Gordon, Macroeconomics 4th edition, Little Brown and Co., Boston, 1987.</li> <li>4. William F. Shughart II, The Organization of Industry, Richard D. Irwin, Illinois, 1990.</li> <li>5. R.S. Pindyck and D.L. Rubinfeld. Microeconomics Th (7<sup>th</sup> Edition), Pearson Prentice Hall, New Jersey,2009.</li> <li>6. R. Dornbusch, S. Fischer, and R. Startz. Macroeconomics (9th Edition), McGraw-Hill Inc. New York, 2004.</li> </ol>

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1	<b>Title of the course (L-T-P-C)</b>	<b>Surveying &amp; Geomatics (2-1-0-6)</b>
2	<b>Pre-requisite courses(s)</b>	-
3	<b>Course content</b>	<p><b>UNIT I: INTRODUCTION TO PLANE &amp; GEODETIC SURVEYING 9</b> Fundamental Principles, Traversing, Leveling, Instrumentation</p> <p><b>UNIT II: DIGITAL LEVELS AND TOTAL STATION 9</b> Basics, Different types of surveying methods, Different sources of errors, Error adjustments</p> <p><b>UNIT III: CONTOUR SURVEYING 9</b> Characteristics and uses of Contours, methods of contour surveying, applications of contour mapping</p> <p><b>UNIT IV: GNSS BASED SURVEYING 9</b> Basic concepts, Different types of GPS errors, Different types of GNSS based surveying techniques.</p> <p><b>UNIT V: LiDAR AND UAS BASED SURVEYING 9</b> LiDAR concepts- Terrestrial LiDAR, Airborne LiDAR overview. Unmanned Aerial System (UAS) Photogrammetry &amp; Remote Sensing Overview</p>
4	<b>Texts/References</b>	<ol style="list-style-type: none"> <li>1. B.C. Punmia, A.K. Jain and A.K. Jain (2015), Surveying, Vol. 1 and II, 5th Ed., Laxmi Publications, New Delhi, India</li> <li>2. Chandra A. M.(2007), Higher Surveying, New Age International Publishers New Delhi, India</li> <li>3. Chandra A. M.(2007), Plane Surveying, New Age International Publishers, New Delhi, India</li> <li>4. James, M Anderson &amp; Edward M Mikhail (2012)., Surveying Theory and Practice, Tata Mc Graw Hill Education, New Delhi, India</li> <li>5. Charles D Ghilani, Paul R Wolf.(2012), Elementary Surveying, Prentice Hall Pvt. Ltd., New Delhi, India.</li> <li>6. Sathesh Gopi, R. Sathikumar, and N. Madhu (2007). Advanced Surveying: Total Station, GIS and Remote Sensing, 1st Ed.,Pearson Publishers., New Delhi, India</li> <li>7. Charles D. Ghilani (2017), Elementary Surveying: An Introduction to Geomatics, 15<sup>th</sup> Ed.,Pearson Publishers, New Delhi, India</li> <li>8. Pinliang Dong, Qi Chen (2017). LiDAR Remote Sensing and Applications, 1st Ed.,, CRC Press, New Delhi, India.</li> <li>9. Harry M. Jol (2009). Ground Penetrating Radar Theory and Applications, 1 st Ed.,Elsevier publications. Journal articles as informed by the instructor</li> </ol>

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1	<b>Title of the course (L-T-P-C)</b>	<b>Building Planning and Drawing (2-1-0-6)</b>
2	<b>Pre-requisite courses(s)</b>	Nil
3	<b>Course content</b>	<p><b>UNIT I FUNCTIONAL PLANNING OF BUILDINGS</b> <span style="float: right;"><b>9</b></span> Sustainability and concept of green building, General aspects to consider for planning, bye-laws and regulations, Selection of the site for building construction, Principles of planning, Orientation of building and its relation to the outside environment</p> <p><b>UNIT II COMPONENTS OF BUILDINGS</b> <span style="float: right;"><b>9</b></span> Foundation, and its functional requirements, Characteristics of soil, types of foundations, construction of the foundation; Masonry: Definitions of terms used in masonry, materials used, stone masonry, brick masonry, different bonds used for brick masonry, permissible stress of brick masonry work; Floors and Roofs: Components of a floor, materials used for floor construction, different types of flooring, types of roofs, basic roofing elements, and roof coverings; Staircases: Functional requirements of a good stair, type of steps, type of stairs, planning a staircase, guidelines for accessible buildings</p> <p><b>UNIT III FUNCTIONAL REQUIREMENTS TO BE CONSIDERED FOR DESIGN AND CONSTRUCTION OF BUILDINGS</b> <span style="float: right;"><b>9</b></span> Damp proofing, fire protection, and thermal insulation, causes and effects of dampness on buildings, materials and methods used for damp proofing, fire hazards, grading of buildings according to fire resistance, fire resisting properties of common building materials, fire-resistant construction, general methods of thermal insulation and thermal insulating materials.</p> <p><b>UNIT IV CIVIL ENGINEERING DRAWING</b> <span style="float: right;"><b>9</b></span> <b>9</b> Drawing various plans and elevations, isometric views &amp; perspective views of civil engineering structures like buildings, bridges, retaining walls, dams, pipelines, and water tanks with design notations, Drawing staircases in 3D,</p> <p><b>UNIT V DETAILING</b> <span style="float: right;"><b>9</b></span> Detailing of reinforcement in concrete structures</p>
4	<b>Texts/References</b>	<p><b>Reading:</b></p> <ol style="list-style-type: none"> <li>1. Arora S. P., and Bindra S. P (2010), Building Construction, 2nd Ed., Dhanpat Rai Publications, Ltd, New Delhi, India.</li> <li>2. Varghese P. C (2016), Building Construction, 2nd Ed., PHI Learning Pvt. Ltd., New Delhi, India.</li> <li>3. S.S. Bhavikatti and M.V. Chitawadagi (2019), Building Planning and Drawing, Dreamtec Press, New Delhi, India.</li> <li>4. AutoCAD 2020 (2020), A Project-Based Tutorial- Floor Plans, Elevations, Printing, 3D Architectural Modeling, and Rendering; Illustrated edition, Kishore Publications.</li> </ol> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. N. Kumara Swamy and A. Kameswara Rao (2019), Building Planning</li> </ol>

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		<p>and Drawing, 9th Ed., Charotar Publishing House Pvt. Ltd. New Delhi, India</p> <ol style="list-style-type: none"><li>2. BIS, “National Building Code of India”, Bureau of Indian Standards, 2017.</li><li>3. Rangwala (2017), Civil Engineering Drawing, 3rd Ed., Charotar Publishing House Pvt. Ltd. New Delhi, India.</li><li>4. Francis D. K. Ching (2020), Building Construction Illustrated, 6th Ed., Wiley Publisher Pvt. Ltd., New Delhi, India.</li><li>5. AutoCAD Manual (2011), Autodesk, Inc.</li></ol>
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