Semester III						
S.No	Course Code	Course Name	L	T	P	C
1	ME 203	Fluid Mechanics	2	1	0	6
2	ME 222	Mechanics of Materials	2	1	0	6
3	CE 201	Building and Construction Materials	1	1	2	6
4	HS 201	Economics	2	1	0	6
5	CE 204	Hydraulic Engineering	2	1	0	6
6	CE 203	Building Planning and Drawing	2	0	2	6
		Total Credits				36

1	**Title of the course** (L-T-P-C)	**Fluid Mechanics** **(3-0-0-6)**
2	**Pre-requisite courses(s)**	Nil
3	**Course content**	Introduction :Scope, definition of fluid as continuum, fluid properties.(2hr) Fluid Statics: Pressure at a point, basic equation for pressure field, pressure variation(fluid at rest):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) Elementary Fluid Dynamics: Statics, stagnation pressure, Bernoulli Equation assumptions(4hr) Fluid Kinematics The velocity filed : Eulerian and Largrangian flow descriptions, steady and deformation, Acceleration field: material derivative, unsteady and convective effects. Control volume and system representation : Reynolds' Transport Theorem, physical interpretation, steady, unsteady effects, moving control volume, potential function(6Hr) Integral approach Conservation of mass derivation of continuity, fixed, non-deforming control volume, moving non-deforming control volume, deforming control volume. Conservation of momentum: linear momentum and moment of momentum equation and their application., comparison of energy equation with Bernoulli's equation(6hr) Differential approach : linear motion and angular motion with deformation, Conservation of mass: differential form of continuity equation, stream function, Conservation of linear momentum, Inviscid flows, Irrotational flow(6hr) Viscous flow : Stress relationships,NS Equations, Simple solutions for viscous flows(4hr) Dimensional analysis Buckingham's II-theorem,Dimensionless groups & their importance (3hr) Viscous Flow in Pipes : General characteristics of pipe flow, fully developed laminar and turbulent flow, turbulent shear stress, turbulent velocity profile, Pipe Flow rate measurement.(4hr) Boundary layer: Boundary layer characteristics boundary layer structure and thickness on a plate, Blasius boundary layer, momentum integral boundary layer equation for a flat plate(4hr)
4	**Texts/References**	1. Yunus A. Cengel, John M. Cimbala, Fluid Mechanics, Tata McGraw Hill Education,2011 2. F.M.White Fluid Mechanics, Seventh Edition, Tata McGraw Hill Education,2011, 3. Kundu,Pijush K., and Ira M.Cohen.Fluid Mechanic, Elsevier,2001

1	**Title of the course** (L-T-P-C)	**Mechanics of Materials** **(2-1-0-6)**
2	**Pre-requisite courses(s)**	Nil
3	**Course content**	**Module 1:** 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. **Module 2:** 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. **Module 3**: Bending: Euler – Bernoulli model: normal and shear stresses, deflections for symmetric bending. Statically indeterminate problems, Elastic strain energy under flexure. **Module 4:** 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. **Module 5:** Energy methods – Castigliano's theorem and its applications, fictitious-load method. Stability of structures – Buckling of idealized and elastic columns
4	**Texts/References**	**TEXTBOOKS:** 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. **REFERENCES:** 1. J. M. Gere and Goodno, Mechanics of Materials, 7th ed, Cengage Learning India, 2012. 2. J.P Den Hartog, Strength of Materials, Dover, 1949. 3. J.M Gere and S.P Timoshenko, Mechanics of Materials, CBS Publishers, 1986 4. R. C. Hibbeler, Mechanics of Materials, Pearson, 10th edition, 2016 . 5. S.P Timoshenko and D.H Young, Elements of strength of Materials, 5th ed, Affiliated East West Press, 1976. 6. F. P. Beer, E. R. Johnston Jr., John T. DeWolf , D. F. Mazurek, Mechanics of Materials, McGraw- Hill Education; 7th edition, 2014 7. M. Salvadori and R. Heller, Structure in Architecture, Prentice Hall Inc, 1963. 8. S.P Timoshenko, History of Strength of Materials, Dover, 1983. 9. M. H. Sadd, Elasticity: Theory, Applications, and Numerics, 1st ed, Elsevier India, 2006.

1	**Title of the course** (L-T-P-C)	**Building and Construction Materials** **1-1-2-6**
2	**Pre-requisite courses(s)**	
3	**Course content**	**UNIT I STONES – BRICKS – CONCRETE BLOCKS 9** Stone 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. **UNIT II LIME – CEMENT – AGGREGATES – MORTAR 9** Lime – 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 **UNIT III CONCRETE 9** Concrete – Ingredients – Manufacturing Process – Batching plants –mixing – transporting – placing – compaction of concrete –curing and finishing – Ready mix Concrete – Mix specification. **UNIT IV TIMBER AND OTHER MATERIALS-9** Timber – 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 – Bitumens **UNIT V MODERN MATERIALS-9** Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles– Geomembranes and Geotextiles for earth reinforcement.

4	**Texts/References**	Text books 1. Varghese.P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2015. 2. Rajput. R.K., "Engineering Materials", S. Chand and Company Ltd., 2008. 3. Gambhir.M.L., "Concrete Technology", 3rd Edition, Tata McGraw Hill Education, 2004 4. Duggal.S.K., "Building Materials", 4th Edition, New Age International, 2008. **REFERENCES:** 5. Jagadish.K.S, "Alternative Building Materials Technology", New Age International, 2007. 6. Gambhir. M.L., & Neha Jamwal., "Building Materials, products, properties and systems", Tata McGraw Hill Educations Pvt. Ltd, New Delhi, 2012. 7. IS456 - 2000: Indian Standard specification for plain and reinforced concrete, 2011 8. IS4926 - 2003: Indian Standard specification for ready–mixed concrete, 2012 9. IS383 - 1970: Indian Standard specification for coarse and fine aggregate from natural Sources for concrete, 2011 10. IS1542-1992: Indian standard specification for sand for plaster, 2009 11. IS 10262-2009: Indian Standard Concrete Mix Proportioning –Guidelines, 200

1	**Title of the course** (L-T-P-C)	**Economics** **(2-1-0-6)**
2	**Pre-requisite courses(s)**	--
3	**Course content**	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. 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.
4	**Texts/References**	1. P. A. Samuelson & W. D. Nordhaus, Economics, McGraw Hill, NY, 1995. 2. A. Koutsoyiannis, Modern Microeconomics, Macmillan, 1975. R. Pindyck and D. L. Rubinfeld, Microeconomics, Macmillan publishing company, NY, 1989. 3. R. J. Gordon, Macroeconomics 4th edition, Little Brown and Co., Boston, 1987. 4. William F. Shughart II, The Organization of Industry, Richard D. Irwin, Illinois, 1990. 5. R.S. Pindyck and D.L. Rubinfeld. Microeconomics The (7 Edition), Pearson Prentice Hall, New Jersey,2009. 6. R. Dornbusch, S. Fischer, and R. Startz. Macroeconomics (9th Edition), McGraw-Hill Inc. New York, 2004.

1	**Title of the course** (L-T-P-C)	**Hydraulic Engineering** **2-1-0-6**
2	**Pre-requisite courses(s)**	
3	**Course content**	**Module 1:** Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. **Module 2:** Turbulent Flow- Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes, Moody's diagram. **Module 3:** Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control. **Module 4:** Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity, Rayleigh method, Buckingham's Pi method and other methods. Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problem. **Module 5**: Introduction to 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. **Module 6**: Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient "n". Most economical section of channel. Computation of Uniform flow, Normal depth. **Module 7**: Non-Uniform Flow- Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth. Channel Transitions. Measurement of Discharge and Velocity – Venturi Flume, Standing Wave Flume, Parshall Flume, Broad Crested Weir. Measurement of Velocity- Current meter, Floats, Hot-wire anemometer. Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile. Computation of water surface profile by graphical,

		numerical and analytical approaches. Direct Step method, Graphical Integration method and Direct integration method. **Module 8:** Hydraulic Jump- Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types, applications and location of hydraulic jump. Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges. Dynamics of Fluid Flow-Momentum principle, applications: Force on plates, pipe bends, moments of momentum equation, **Module 9:** Flow through Pipes: Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel, flow through laterals, flows in dead end pipes, siphon, power transmission through pipes, nozzles. Analysis of pipe networks: Hardy Cross method, water hammer in pipes and control measures, branching of pipes, three reservoir problem. **Module 10:** Computational Fluid Dynamics: Basic equations of fluid dynamics, Grid generation, Introduction to in viscid incompressible flow, Boundary layer flow as applicable to C.F.D. Hydro informatics: Concept of hydro informatics –scope of internet and web based modeling in water resources engineering.
4	**Texts/References**	**1.** Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House **2.** Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill. **3.** Open channel Flow, K. Subramanya, Tata McGraw Hill. **4.** Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill. **5.** Burnside, C.D., “Electromagnetic Distance Measurement,” Beekman Publishers, 1971.

1	**Title of the course** (L-T-P-C)	**Building Planning and Drawing** **2-0-2-6**
2	**Pre-requisite courses(s)**	NIL
3	**Course content**	**Functional planning of buildings**: Sustainability and concept of green building, General aspects to consider for planning, byelaws and regulations, Selection of the site for building construction, Principles of planning, Orientation of building and its relation to the outside environment **Components of buildings**: 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. **Functional requirements to be considered for design and construction of buildings**: 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. **Civil Engineering Drawing**: Drawing various plans and elevations, isometric views & perspective views of civil engineering structures like buildings, bridges, retaining walls, dams, pipelines, and water tanks with design notations, Drawing staircases in 3D, **Detailing**: Detailing of reinforcement in concrete structures
4	**Texts/References**	**Reading:** 1. Arora S. P., and Bindra S. P, "Building Construction", Dhanpat Rai Publications, 2010. 2. Varghese P. C, "Building Construction", PHI Learning Pvt. Ltd., 2nd edition, 2016. 3. S.S. Bhavikatti and M.V. Chitawadagi "Building Planning and Drawing", Dreamtech Press, 2019. 4. AutoCAD 2020, "A Project-Based Tutorial" Kishore; Illustrated edition, 2020. **References**: 1. N. Kumara Swamy, A. Kameswara Rao, "Building Planning and Drawing", Charotar Publishing House Pvt. Ltd.; 9th Edition, 2019. 2. BIS, "National Building Code of India", Bureau of Indian Standards, 2017. 3. Rangwala "Civil Engineering Drawing", Charotar Publishing House Pvt. Ltd.; 3rd Edition,2017. 4. Francis D. K. Ching"Building Construction Illustrated", Wiley; 6th edition, 2020. 5. AutoCAD Manual.