CE(HS)302	**Introduction to Civil Engineering**	1L + 1T=	2 Credits
Module 1	**Basic Understanding**: What is Civil Engineering/ Infrastructure? Basics of Engineering and Civil Engineering; Broad disciplines of Civil Engineering; Importance of Civil Engineering, Possible scopes for a career **Tutorials** Develop a matrix of various disciplines and possibleroles for engineers in each		1 L
Module 2	**History of Civil engineering**: Early constructions and developments over time; Ancient monuments & Modern marvels; Development of various materials of construction and methods of construction; Works of Eminent civil engineers **Tutorials** Identify 10 ancient monuments and ten modern marvels and list the uniqueness of each		1 L
Module 3	**Overview of National Planning for Construction and Infrastructure Development**; Positionof construction industry vis-à-vis other industries, five year plan outlays for construction; currentbudgets for infrastructure works **Tutorials** Develop a Strategic Plan for Civil Engineering worksfor next ten years based on past investments andidentify one typical on-going mega project in eacharea		1 L
Module 4	**Fundamentals of Architecture & Town Planning**: Aesthetics in Civil Engineering, Examples of great architecture, fundamentals of architectural design & town planning; BuildingSystems (HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities **Tutorials** Identify ten best civil engineering projects with highaesthetic appeal with one possible factor for each; Listdown the possible systems required for a typical SmartCity		1 L
Module 5	**Fundamentals of Building Materials**: Stones, bricks, mortars, Plain, Reinforced &PrestressedConcrete, Construction Chemicals; Structural Steel, High Tensile Steel, Carbon Composites;Plastics in Construction; 3D printing; Recycling of Construction & Demolition wastes **Tutorials** Identify three top new materials and their potential inconstruction; Visit a Concrete Lab and make a report		2 L
Module 6	**Basics of Construction Management & Contracts Management**: Temporary Structures in Construction; Construction Methods for various types of Structures; Major Construction equipment; Automation & Robotics in Construction; Modern Project management Systems; Advent of Lean Construction; Importance of Contracts Management **Tutorials** Identify 5 typical construction methods and list theiradvantages/ positive features		2 L
Module 7	**Environmental Engineering & Sustainability**: Water treatment systems; Effluent treatment systems; Solid waste management; Sustainability in Construction **Tutorials** Sustainability principles, Sustainable builtenvironment, water treatment systems, and good practicesof wastewater management. examples of Solid andhazardous waste management, Air pollution andcontrol		2L
Module 8	**Geotechnical Engineering**: Basics of soil mechanics, rock mechanics and geology; various types of foundations; basics of rock mechanics & tunnelling **Tutorials** List top five tunnel projects in India and their features;collect and study geotechnical investigation report ofany one Metro Rail (underground) project; Visit aconstruction site and make a site visit report		2 L
Module 9	**Hydraulics, Hydrology &Water Resources Engineering**: Fundamentals of fluid flow, basics ofwater supply systems; Underground Structures; Underground Structures Multi-purpose reservoirprojects **Tutorials** Identify three river interlinking projects and theirfeatures; visit a Hydraulics Lab and make a report		1 L
Module 10	**Ocean Engineering**: Basics of Wave and Current Systems; Sediment transport systems; Ports &Harbours and other marine structures **Tutorials** Identify 5 typical ports in India and list the structuresavailable in them; Visit a related/similar facility, ifpossible in nearby place and make a report		1 L
Module 11	**Power Plant Structures**: Chimneys, Natural & Induced Draught Colling towers, coal handling systems, ash handling systems; nuclear containment structures; hydro power projects		1 L

	Tutorials Collect the typical layout for a large thermal powerplant and a large hydro power plant and identify all thestructures and systems falling in them.	
Module 12	**Structural Engineering**: Types of buildings; tall structures; various types of bridges; Water retaining structures; Other structural systems; Experimental Stress Analysis; Wind tunnel studies; **Tutorials** Identify 5 unique features for typical buildings,bridges, tall structures and large span structures; VisitStructures Testing Lab/facility and make a report	3 L
Module 13	**Surveying & Geomatics**: Traditional surveying techniques, Total Stations, Development of Digital Terrain Models; GPS, LIDAR; **Tutorials** Collect visual representations prepared by a TotalStation and LIDAR and compare; Study typicalGoogle street map and Google Earth Map and studyhow each can facilitate the other	1 L
Module 14	**Traffic &Transportation Engineering**: Investments in transport infrastructure development inIndia for different modes of transport; Developments and challenges in integrated transport development in India: road, rail, port and harbour and airport sector; PPP in transport sector; Intelligent Transport Systems; Urban Public and Freight Transportation; Road Safety underheterogeneous traffic; Sustainable and resilient pavement materials, design, construction andmanagement; Case studies and examples. **Tutorials** Investments in transport infrastructure; Developmentsand challenges; Intelligent Transport Systems; SmartCities, Urban Transport; Road Safety; Sustainable andresilient highway design principles; Plan a sustainabletransport system for a city; Identify keyfeatures/components in the planning and design of agreen field highway/airport/port/railway and the cost –economics.	1 L
Module 15	**Repairs & Rehabilitation of Structures:** Basics of corrosion phenomena and other structural distress mechanisms; some simple systems of rehabilitation of structures; Non-Destructivetesting systems; Use of carbon fibre wrapping and carbon composites in repairs. **Tutorials** Collect the history of a major rehabilitation project andlist the interesting features	1 L
Module 16	**Computational Methods, IT, IoT in Civil Engineering:** Typical software used in Civil Engineering- Finite Element Method, Computational Fluid Dynamics; Computational Geotechnical Methods; highway design (MX), Building Information Modelling; Highlighting typical available software systems (SAP, STAAD, ABAQUS, MATLAB, ETAB, NASTRAN, NISA, MIKE 21, MODFLOW, REVIT, TEKLA, AUTOCAD,…GEOSTUDIO, EDUSHAKE, MSP, PRIMAVERA, ArcGIS, VisSIM, …) **Tutorials** Visit an AutoCad lab and prepare a report; Identify teninteresting software systems used in Civil Engg andtheir key features	2 L
Module 17	**Industrial lectures**: Case studies of large civil engineering projects by industry professionals, covering comprehensive planning to commissioning; **Tutorials** For each case study list the interesting features	2 L
Module 18	**Basics of Professionalism**: Professional Ethics, Entrepreneurial possibilities in Civil Engineering, Possibilities for creative & innovative working, Technical writing Skills enhancement; Facilities Management; Quality & HSE Systems in Construction	3 L
Tutorials	List 5 cases of violation of professional ethics and listpreventive measures; Identify 5 interesting projectsand their positive features; Write 400 word reports on one ancient monument and a modern marvel of civilengineering	5L
Reference	1. Patil, B.S.(1974), Legal Aspects of Building and Engineering Contract 2. The National Building Code, BIS, (2017) 3. RERA Act, (2017) 4. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset 5. Chandiramani, Neelima (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai 6. Avtarsingh (2002), Law of Contract, Eastern Book Co. 7. Dutt (1994), Indian Contract Act, Eastern Law House 8. Anson W.R.(1979), Law of Contract, Oxford University Press 9. Kwatra G.K.(2005), The Arbitration & Conciliation of Law in India with case law on UNCITRAL Model Law on Arbitration, Indian Council of Arbitration 10. Avtarsingh (2005), Law of Arbitration and Conciliation, Eastern Book Co. 11. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co. 12. P. S. Narayan (2000), Intellectual Property Rights, Gogia Law Agency 13. T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House	

	14. Bare text (2005), Right to Information Act 15. O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers 16. K.M. Desai(1946), The Industrial Employment (Standing Orders) Act 17. Rustamji R.F., Introduction to the Law of Industrial Disputes, Asia Publishing House 18. Vee, Charles &Skitmore, Martin (2003) Professional Ethics in the Construction Industry, Engineering Construction and Architectural management, Vol.10, Iss. 2, pp 117-127, MCB UP Ltd 19. American Society of Civil Engineers (2011) ASCE Code of Ethics – Principles Study and Application 20. Ethics in Engineering- M.W.Martin&R.Schinzinger, McGraw-Hill 21. Engineering Ethics, National Institute for Engineering Ethics, USA 22. www.ieindia.org 23. Engineering ethics: concepts and cases – C. E. Harris, M.S. Pritchard, M.J.Rabins 24. Resisting Bureaucratic Corruption: Alacrity Housing Chennai (Teaching Case Study) -S. Ramakrishna Velamuri -CEIBS 25. CONSTRUCTION CONTRACTS, http://www.jnormanstark.com/contract.htm 26. Internet and Business Handbook, Chap 4, CONTRACTS LAW, http://www.laderapress.com/laderapress/contractslaw1.html 27. Contract &Agreements , http://www.tco.ac.ir/law/English/agreements/General/Contract%20Law/C.htm 28. Contracts, http://206.127.69.152/jgretch/crj/211/ch7.ppt 29. Business & Personal Law. Chapter 7. “How Contracts Arise”, http://yucaipahigh.com/schristensen/lawweb/lawch7.ppt 30. Types of Contracts, http://cmsu2.cmsu.edu/public/classes/rahm/meiners.con.ppt 31. IV. TYPES OF CONTRACTS AND IMPORTANT PROVISIONS, http://www.worldbank.org/html/opr/consult/guidetxt/types.html 32. Contract Types/Pricing Arrangements Guideline- 1.4.G (11/04/02), http://www.sandia.gov/policy/14g.pdf	