Civil and Infrastructure Engineering

Semester VII						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	CE401C	Civil and Infrastructure Engineering Design	1	0	2	6
2	CE401P	BTP-I/Intensive BTP-1*	0	0	6/9	6/9
3	CE308T	Estimation and Costing in Civil Engineering	2	1	0	6
4		Institute Elective-III/ Program Elective-I	2	1	0	6
5		Institute Elective-IV	2	1	0	6
		Total Credits				**27**

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1	**Title of the course** (L-T-P-C)	**Civil and Infrastructure Engineering Design (2-1-0-6)**
2	**Pre-requisite courses(s)**	Nil
3	**Course content**	**Introduction and Scope of Civil Engineering**: Basics of Engineering and Civil Engineering; Broad disciplines of Civil Engineering; Importance of Civil Engineering, History of Civil Engineering: Early constructions and developments over time, ancient monuments of the world, Civil Engineering aspects of Indian heritage structures. Civil Engineering Specializations: Structural Engineering, Geotechnical Engineering, Water Resources Engineering, Environmental Engineering, Transportation Engineering, Construction Management, Ocean Engineering, Remote Sensing and GIS, Energy and Sustainable Infrastructure. **Megastructures of Civil Engineering**: Design, Construction and Structural Details of Some of the Megastructures of the World. Mega Civil Engineering Projects of India and world. Futuristic Mega Projects in Civil Engineering. Failure Case Studies in Civil Engineering: Structures, Foundations, Dams, Pavement Systems, and the Geo-environment. Some Major Civil Engineering Challenges **Materials in Civil Engineering**: Stones, bricks, mortars, Plain, Reinforced & Prestressed Concrete, Construction Chemicals, Structural Steel, High Tensile Steel, Carbon Composites, Plastics in Construction, 3D printing, Recycling of Construction & Demolition wastes, Sustainable Building Materials. **Introduction to Plan Reading, and Construction Techniques**: Scale drawings of floor plans, sections, and elevations; Plan types, Interpretation of plans. Components of a building. Typical loads and forces in Civil Engineering structures. Introduction to estimation and costing. **Smart Cities and Current Trends in Construction Industry**: Application of Machine Learning (ML) and Artificial Intelligence (AI) in Civil Engineering. Position of construction industry vis-à-vis other industries, plan outlays for construction; current budgets for infrastructure works; Possible scopes for a career, Importance of ethics in engineering.
4	**Texts/References**	**READING:** **1.** Gordon, J. E. (2003). *STRUCTURES: Or Why Things Don't Fall Down*, 3rd Ed., Da Capo Press; Cambridge, USA **2.** Paul A. B., Pamalee A. B, Norbert J. D., Parfitt, M. K. (2013). *Failure Case Studies in Civil Engineering: Structures, Foundations, and the Geoenvironment*, 2nd Ed., American Society of Civil Engineers, Reston. **3.** Varghese, P. C. (2015). *Building Materials*, 2nd Ed., Prentice Hall India Learning Private Limited, New Delhi. **4.** Anglin, G. (2019). *Introduction to Estimating, Plan Reading and Construction Techniques*, 1st Ed., Routledge, New York. **5.** Xu, Y. L., Jia, H. (2019). *Smart Civil Structures*, 1st Ed., CRC Press, New York. **REFERENCES:** **1.** Samui, P., Kim, D., Iyer, N. R, Chaudhary, S. (2020). *New Materials in Civil Engineering*, 1st Ed., Butterworth-Heinemann, Oxford. **2.** Moaveni, s. (2011). *Engineering Fundamentals: An Introduction to Engineering*, 4th Ed., Cengage Learning India Pvt. Ltd., New Delhi **3.** Gordon, J. E. (2020). *The New Science of Strong Materials – Or Why You Don`t Fall through the Floor*, Princeton University Press, New Jersy. **4.** BIS, "National Building Code of India", Bureau of Indian Standards, 2017. **5.** Martin M. W., and Schinzinger, R. (2017). *Ethics in Engineering*, 4th Ed., McGraw Hill Education, New Delhi. **6.** Bhavikatti, S. S. and Chitawadagi, M. V. (2019). *Building Planning and Drawing*, 1st Ed., Dreamtech Press, New Delhi.

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1	**Title of the course** (L-T-P-C)	**Estimation and Costing in Civil Engineering** **1.5-0-0-3**
2	**Pre-requisite courses(s)**	
3	**Course content**	**1.** Introduction to estimates: Purpose of estimating; Different types of estimates - their function and preparation; Building estimates: Schedule of rates, Units of measurements, units of works; Road Estimates Volume of earthwork, Different methods, Earthwork for hill roads; Railway and canal works Estimates for a new track railway line; earthwork in canals. **2.** Analysis of rates: Preparation for analysis of rates. Quantity of materials per unit rate of work, labour estimate. **3.** Specifications: Necessity, types of specifications, specifications for different civil engineering materials. **4.** Contracts: Essentials of contracts, types of engineering contracts advantages and disadvantages. **5.** Tenders: tender forms, tender documents & notices time limits, necessity. **6.** Valuation: Purpose, difference between value and cost, qualifications and functions of a valuer, scrap & salvage value, sinking fund, capitalised value.
4	**Texts/References**	**1.** Chakraborti, M, Estimation, costing, specifications and valuation in civil engineering National Halftone Co. Calcutta, 2005. **2.** Dutta B.N., Estimation and costing in civil engineering: theory and practice UBS Publishers Distributors Ltd, 2006. **3.** Birdie, G.S. - Estimation and costing in civil engineering Dhanpat Rai Publishing co. ltd.