Semester VI						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	CE301T	Environmental Studies	3	0	0	6
2	MA403T	Ordinary Differential Equations	2	1	0	6
3	MA602T	Measure Theory	3	1	0	8
4		Program Elective-III				6
5		HSS Elective-I	3	0	0	6
		Total Credits				**30**

1	**Title of the course** (L-T-P-C)	**Environmental studies** **(3-0-0-6)**
2	**Pre-requisite courses(s)**	Nil
3	**Course content**	• Module A: Natural Resources, Ecosystems, Biodiversity and its conservation: Natural resources and ecosystems, Forest, grassland, desert and aquatic ecosystems, biodiversity at global, national and local levels, conservation of biodiversity • Module B: Air Pollution Introduction to understanding air quality management, fundamental processes of meteorology, Air Pollutants – Gaseous and particulate, Criteria for pollutants, ambient and source standards, Aerosols: Characterisation of aerosols, size distributions, measurement methods; Transport behaviour: diffusion, sedimentation, inertia; Visibility; principles of particulate control systems. • Module C: Water Treatment Discussion of water quality constituents and introduction to the design and operation of water and wastewater treatment processes. • Module D: Solid Waste Management and Climate Change Different aspects of solid and hazardous waste management. Climate change and greenhouse gas emissions, technologies would reduce the greenhouse gas emissions. Climate change and its possible causes. • Module E: Sociology/Environmentalism Description: Environmentalism in sociological tradition, Sustainability, North-South divide, Political economy approaches in environmental studies, Debates over environmental issues • Module F: Economics Energy economics and financial markets, Market dynamics, Energy derivatives, Energy Efficiency; Sustainable Development: Concept, Measurement & Strategies, Interaction between Economic Development and the Environment • Module G: Philosophy Environmental ethics, Deep ecology, Practical ecology, Religion and attitude towards environmental ethics, Ecofeminism and its evolution. • Module H: Field work and project: visit to a local area to document environmental assets, case studies of a simple ecosystem and group discussions on current environmental issues.
4	**Texts/References**	• Cunningham W.P. and Cunningham M.A. (2002), Principles of Environmental Science, Tata McGraw-Hill Publishing Company, New Delhi. • Dasgupta, P. and Maler, G. (eds.), (1997), The Environment and Emerging Development Issues, Vol. I, Oxford University Press, New Delhi. • Jackson, A.R.W. and Jackson, J.M. (1996), Environmental Sciences: The Environment and Human Impact, Longman Publishers. • Nathanson, J.A., (2002), Basic Environmental Technology, Prentice Hall of India, New Delhi. • Red clift, M. and Woodgate, G. (eds.), (1997), International Handbook of Environmental Sociology. • Srivastava, K.P. (2002), An Introduction to Environmental Study, Kalyani Publishers, Ludhiana. • Review articles from literature

1	**Title of the course** (L-T-P-C)	**Ordinary Differential Equations** **(2-1-0-6)**
2	**Pre-requisite courses(s)**	Calculus 1 and 2, Linear Algebra, DE 1 or Instructor's consent
3	**Course content**	Review of solution methods for first order as well as second order equations, Power Series methods with properties of Bessel functions and Legendre polynomials. Existence and Uniqueness of Initial Value Problems: Picard's and Peano's Theorems, Gronwall's inequality, continuation of solutions and maximal interval of existence, continuous dependence. Higher Order Linear Equations and linear Systems: fundamental solutions, Wronskian, variation of constants, matrix exponential solution, behaviour of solutions.Two Dimensional Autonomous Systems and Phase Space Analysis: critical points, proper and improper nodes, spiral points and saddle points.Asymptotic Behavior: stability (linearized stability and Lyapunov methods). Boundary Value Problems for Second Order Equations: Green's function, Sturm comparison theorems and oscillations, eigenvalue problems.
4	**Texts/References**	• M. Hirsch, S. Smale and R. Deveney, Differential Equations, Dynamical Systems and Introduction to Chaos, Academic Press, 2004 • L. Perko, Differential Equations and Dynamical Systems, Texts in Applied Mathematics, Vol. 7, 2nd Edition, Springer Verlag, New York, 1998. • Rama Mohana Rao, Ordinary Differential Equations: Theory and Applications. Affiliated East-West Press Pvt. Ltd., New Delhi, 1980. • A. Sanchez, Ordinary Differential Equations and Stability Theory: An Introduction, Dover Publ. Inc., New York, 1968.

1	**Title of the course** (L-T-P-C)	**Measure Theory** **(3-1-0-8)**
2	**Pre-requisite courses(s)**	Real analysis
3	**Course content**	Construction of Lebesgue measure on Real line, Introduction to abstract measure theory, Measurable functions, Caratheodory's Extension Theorem, MCT, Fatou's Lemma, DCT, Product space, Product measure, Fubini's Theorem, Definition of signed measures, Positive and negative sets. Hahn-Jordan Decomposition. Absolute continuity of two σ- finite measures. Radon-Nikodyme Theorem and Lebesgue Decomposition.
4	**Texts/References**	• H. L. Royden; Real analysis. Third edition. Macmillan Publishing Company, New York, 1988. • W. Rudin; Real and complex analysis. Third edition. McGraw- Hill Book Co., New York, 1987. • S. Athreya and V.S. sunder; Measure & probability. CRC Press, Boca Raton, FL, 2018. • K.R. Parthasarathy; Introduction to probability and measure, Hindustan Book Agency, 2005.