Mechanical Engineering

Semester VI						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	CE301T	Environmental studies	3	0	0	6
2	ME301L	Kinematics and Dynamics of Machinery lab	0	0	3	3
3	ME206L	Manufacturing processes laboratory	0	0	3	3
4	ME302L	Applied Thermodynamics Laboratory	0	0	3	3
5	MA203T	Introduction to Numerical Methods (1st Half)	3	1	0	4
6		Elective Course from Physics Department	3	0	0	6
7		Elective 2	3	0	0	6
8		Elective 3	3	0	0	6
		Total Credits				**37**

Mechanical Engineering

1	**Title of the course (L-T-P-C)**	**Environmental studies (3-0-0-6)**
2	**Pre-requisite courses(s)**	**Nill**
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**	**1.** Cunningham W.P. and Cunningham M.A. (2002), Principles of Environmental Science, Tata McGraw-Hill Publishing Company, New Delhi. **2.** Dasgupta, P. and Maler, G. (eds.), (1997), The Environment and Emerging Development Issues, Vol. I, Oxford University Press, New Delhi. **3.** Jackson, A.R.W. and Jackson, J.M. (1996), Environmental Sciences: The Environment and Human Impact, Longman Publishers. **4.** Nathanson, J.A., (2002), Basic Environmental Technology, Prentice Hall of India, New Delhi **5.** Redclift, M. and Woodgate, G. (eds.), (1997), International Handbook of Environmental Sociology. **6.** Srivastava, K.P. (2002), An Introduction to Environmental Study, Kalyani Publishers, Ludhiana. **7.** Review articles from literature.

1	**Title of the course** (L-T-P-C)	**Kinematics and Dynamics of Machinery lab (0-0-3-3)**
2	**Pre-requisite courses(s)**	
3	**Course content**	Fabrication or model demonstration of ● Lower and Upper joins ● Multi-degree of freedom linkages with verification of Kutzback's Equation ● Inversions of 4R, 3R-P and 2R-2P four-link linkages ● Grashof Criterion ● Approximate and Exact Straight line generating mechanisms ● Pantograph Linkages ● Ackerman's steering linkage ● Geneva Mechanism ● Simple, Compound and Planetary Gear trains – Verification of velocity analysis, velocity ratio, instantaneous centers – Demonstration of inversion in synthesis of Cam profiles – Examination of geometry of involute gears in mesh – Passive Vibration Analysis; Damped response – Active Vibration Analysis; Frequency Response; Resonance – Vibration of two degree of freedom systems – Balancing of rotating masses – Balancing of reciprocating masses – Critical speed of shafts
4	**Texts/References**	**1.** Kinematics, Dynamics, and Design of Machinery: Edition 3 **2.** Kenneth J. Waldron, Gary L. Kinzel, Sunil K. Agrawal, 10 May 2016 John Wiley & Sons

1	**Title of the course** (L-T-P-C)	**Manufacturing processes laboratory (0-0-3-3)**
2	**Pre-requisite courses(s)**	Manufacturing processes
3	**Course content**	**List of experiments:** **1.** CNC milling programming **2.** CNC turning programming **3.** Surface Roughness testing **4.** Eccentric Turning **5.** Angle measurement using Sine bar **6.** Chip Thickness measurement using microscope **7.** Different type of drilling **8.** Shaping **9.** Green Sand moulding Casting process Solidification Study Digital Fabrication (3D printing)
4	**Texts/References**	• Val Marinov Manufacturing Process Design Laboratory Manual, Kendall/Hunt Publishing Company, ISBN 1465275312, 9781465275318 • R. K. Rajput A Textbook of Manufacturing Technology: Manufacturing Processes • Ghosh and A. K. Mallik, Manufacturing Science, Affiliated East West Press, 1985. HMT, Production Technology, Tata McGraw Hill, 1980. • J. Mcgeough, Advanced Methods of Machining, Chapman and Hall, 1988.

1	**Title of the course** (L-T-P-C)	**Introduction to Numerical Methods** **(3-1-0-4)**
2	**Pre-requisite courses(s)**	Calculus, MA101 & Linear Algebra, MA 106
3	**Course content**	Interpolation by polynomials, divided differences, error of the interpolating polynomial, piecewise linear and cubic spline interpolation. Numerical integration, composite rules, error formulae. Solution of a nonlinear equation, bisection and secant methods. Newton's method, rate of convergence, solution of a system of nonlinear equations, Numerical solution of ordinary differential equations, Euler and Runge-Kutta methods, multi-step methods, predictor-corrector methods, order of convergence, Finite difference methods, numerical solutions of elliptic, parabolic, and hyperbolic partial differential equations. Exposure to MATLAB
4	**Texts/References**	S. D. Conte and Carl de Boor, Elementary Numerical Analysis- An Algorithmic Approach (3rd Edition), McGraw-Hill, 1980.