

<p style="text-align: center;"><b>B. E. MECHANICAL ENGINEERING</b>  <b>Choice Based Credit System (CBCS) and Outcome Based Education (OBE)</b></p>			
Open Elective-B (Semester VII)			
<b>ENERGY AND ENVIRONMENT</b>			
Course Code	<b>18ME751</b>	CIE Marks	40
Teaching Hours / Week (L:T:P)	3:0:0	SEE Marks	60
Credits	03	Exam Hours	03
<b>Course Learning Objectives:</b>			
<ul style="list-style-type: none"> <li>• To understand the fundamentals of energy sources, energy use, energy efficiency, and resulting environmental implications of various energy supplies.</li> <li>• To introduce various aspects of environmental pollution and its control.</li> <li>• To understand the causes and remedies related to social issues like global warming, ozone layer depletion, climate change etc.</li> <li>• To introduce various acts related to prevention and control of pollution of water and air, forest protection act, wild life protection act etc.</li> </ul>			
<b>Module-1</b>			
Basic Introduction to Energy: Energy and power, forms of energy, primary energy sources, energy flows, world energy production and consumption, Key energy trends in India: Demand, Electricity, Access to modern energy, Energy production and trade, Factors affecting India's energy development: Economy and demographics Policy and institutional framework, Energy prices and affordability, Social and environmental aspects, Investment.			
<b>Module-2</b>			
Energy storage systems: Thermal energy storage methods, Energy saving, Thermal energy storage systems Energy Management: Principles of Energy Management, Energy demand estimation, Energy pricing Energy Audit: Purpose, Methodology with respect to process Industries, Characteristic method employed in Certain Energy Intensive Industries			
<b>Module-3</b>			
Environment: Introduction, Multidisciplinary nature of environmental studies- Definition, scope and importance, Need for public awareness. Ecosystem: Concept, Energy flow, Structure and function of an ecosystem. Food chains, food webs and ecological pyramids, Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystems, Ecological succession.			
<b>Module-4</b>			
Environmental Pollution: Definition, Cause, effects and control measures of - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards, Solid waste Management, Disaster management Role of an individual in prevention of pollution, Pollution case studies.			
<b>Module-5</b>			
Social Issues and the Environment: Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation.			
<b>Group assignments:</b> Assignments related to e-waste management; Municipal solid waste management; Air pollution control systems; Water treatment systems; Wastewater treatment plants; Solar heating systems; Solar power plants; Thermal power plants; Hydroelectric power plants; Biofuels; Environmental status assessments; Energy status assessments etc.			
<b>Course Outcomes:</b> At the end of the course, the student will be able to:			

- CO1: Understand energy scenario, energy sources and their utilization.  
 CO2: Understand various methods of energy storage, energy management and economic analysis.  
 CO3: Analyse the awareness about environment and eco system.  
 CO4: Understand the environment pollution along with social issues and acts.

**Question paper pattern:**

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
<b>Textbook/s</b>				
1	Textbook for Environmental Studies for Undergraduate Courses of all Branches of Higher Education		University grant commission and Bharathi Vidyapeeth Institute of environment education and Research, Pune	
2	Energy Management Audit & Conservation- for Module 2	Barun Kumar De	Vrinda Publication	2nd Edition 2010
<b>Reference Books</b>				
1	Energy Management Hand book	Turner, W. C., Doty, S. and Truner, W. C	Fairmont Press	7 <sup>th</sup> Edition 2009
2	Energy Management	Murphy, W. R	Elsevier	2007
3	Energy Management Principles	Smith, C. B	Pergamum	2007
4	Environment pollution control Engineering	C S Rao	New Age International	reprint 2015, 2nd edition
5	Environmental studies	Benny Joseph	Tata McGraw Hill	2nd edition 2008