AC – 20/5/2025
Item No– 6.58 (N) 5

As Per NEP 2020

University of Mumbai

Syllabus for Basket of OE	
Board of Studies in Chemical Engineering	
UG First Year Programme	
Semester	III/IV/V
Title of Paper	ENERGY AND ENVIRONMENTAL ENGINEERING
Credits	2
From the Academic Year	2024-25

Sr. No.	Heading	Particulars
1	**Description the course :**	Energy and Environment Engineering is crucial for developing sustainable energy solutions and minimizing environmental impact. It focuses on renewable energy, energy efficiency, and reducing emissions to combat climate change and pollution. This field supports energy security and sustainable resource management, shaping policies for a greener future. By advancing clean technologies, it ensures the well-being of both the planet and its inhabitants
2	**Vertical :**	Open Elective
3	**Type :**	Theory
4	**Credit**:	2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives**: 1. To understand the dynamics of India's energy sector and the importance of sustainable energy practices. 2. To understand various renewable and non-renewable energy sources, their technologies, and applications for sustainable energy solutions. 3. To understand effective energy audits and implement energy-saving measures in various facilities. 4. To study environmental challenges, promoting sustainable practices and conservation efforts. 5. To provide basic understanding of air and water pollution control, regulations, and standards 6. **To** provide basics of water pollution sources and air pollution sources	

8	**Course Outcomes**: 1. To analyze the challenges and opportunities in India's energy sector and propose solutions for sustainable energy development. 2. To apply different energy technologies for efficient and sustainable energy production and management. 3. To conduct energy audits, analyze energy consumption data, and recommend practical solutions for enhancing energy efficiency and reducing costs. 4. Understand ecological principles, the significance of biodiversity, and the impact of human activities on the environment, preparing them to contribute to sustainable solutions. 5. To identify importance of environment pollution control, environment, related laws and standards. 6. To identify sources and effects of water and air pollutants on humans and environment
9	**Modules**:
	Module 1: Energy Scenario **Hours: 04**
	Review of energy scenario in India, energy and environment (climate change), Fuel and Energy substitution, Energy Needs of Growing Economy , Energy sector reforms, Energy Conservation Act, Energy Conservation measures and its importance. Star &Labeling : Needs and its benefits
	Module 2: Introduction to Nonconventional Energy Sources **Hours: 05**
	Primary and Secondary Energy, advantages of renewable energy sources, Solar Energy: solar energy storage systems – mechanical, electrical, chemical and electro-magnetic, Wind Energy: Basic principles of wind energy conversion, Geothermal Energy: Geothermal sources, hydrothermal resources Energy from Biomass, Chemical Energy sources: Fuel cells -principle of operation of fuel cell, Energy from the oceans
	Module 3: Energy Audit **Hours: 04**
	Types And Methodology, Need of Energy audit, Energy Audit Reporting Format, understanding energy costs ,Benchmarking and Energy Performance, Energy Audit Instruments
	Module 4: **Introduction to Environmental Technology** **Hours:04**
	Introduction; Ecology, environment and biodiversity; Ecosystem services and its risk, Pollution types and sources ; Impact/consequences of pollutants; Transmission of pollutants in environment
	Module 5: **Environmental pollution control regulations** **Hours:05**

	Importance of environmental pollution control, Environmental Legislation & Regulations, Indian standards for ambient air, noise and water emission and effluents, Water (prevention & control of pollution) act, Air (prevention & control of pollution) act.	
	Module 6: Air and water pollution **Hours:05**	
	Classification of sources and effect of water pollutant on human being and ecology Air pollutants sources, classification and characterization of air pollutants, effect on health, vegetation & materials	
10	**Text Books:** 1. G.S. Sawhney, Non-Conventional Energy Sources, 1st Edition, Prentice India Pvt. Ltd, 2012 2. D.P. Kothari, R. Rakesh and K.C. Singal, Renewable Energy Resources and Emerging Technologies, 2nd Edition, Prentice India Pvt. Ltd, 2011. 3. Rao, C.S., Environmental Pollution Control Engineering, New Age International (P) Ltd.	
11	**Reference Books:** 1. Hand Books by BEE - [Bureau of Energy Efficiency], Publications of Bureau of Energy Efficiency (BEE). 2. Albert Thumann P. E. and W. J. Younger, Handbook of Energy Audits, Fairmont Press, 2008. 3. Wayne C. Turner, Energy management Hand Book - the Fairmount Press, Inc., 1997 4. Mahajan, S.P., Pollution Control in Process Industries, Tata McGraw Hill Publishing Company Limited.	
12	**Internal Continuous Assessment: 40%**	**Semester End: 60%**
13	**Continuous Evaluation through:** IAT-1 : 15 marks IAT-2: 15 marks Average of IAT-1 & IAT-2 = 15 marks. Projects, Presentation and assignments, (5 marks)etc.	**Semester End Examination (30 marks) - Duration 1 hours.**
14	**Format of Question Paper: End-semester examination** ● Question Paper will comprise three questions each with 10 marks. All modules must be covered. All three questions need to be answered.	

Sd/-	**Sd/-**	**Sd/-**
Dr. Parag R. Gogate	**Dr. Deven Shan**	**Dr. Shivram Garge**
BoS Chairman	**Offg. Associate Dean**	**Offg. Dean**
Chemical Engineering	**Faculty of Science & Technology,**	**Faculty of Science & Technology,**
	University of Mumbai.	**University of Mumbai.**