GUJARAT TECHNOLOGICAL UNIVERSITY

ENERGY ENGINEERING (39)
ENERGY RESOURCES, ECONOMICS & ENVIRONMENT
SUBJECT CODE: 2713901
SEMESTER: I

Type of course: Energy Engineering

Prerequisite: Basic knowledge of Energy, Environment and Economics

Rationale: The course provides basic knowledge of 3Es (Energy, Economics and Environment) and their interaction

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks		Practical Marks				
				ESE (E)	PA (M)	PA (V)		PA (I)		
						ESE	OEP	PA	RP	
4	2#	0	5	70	30	30	0	10	10	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	**Global Energy Scenario :** • Role of energy in economic development and social transformation, Energy &GDP, GNP and its dynamics. • Discovery of various energy sources, Energy Sources and Overall Energy demand and availability, Energy Consumption in various sectors and its changing pattern, Exponential increase in energy consumption and projected future demands. • Non conventional and conventional energy Resources: Coal, Oil, Natural Gas, Nuclear Power and Hydroelectricity, Solar and Other Renewable etc. • Depletion of energy sources and impact on exponential rise in energy consumption on economies of countries and on international relations. • Energy Security, Energy Consumption and its impact on environmental climatic change. • International Energy Policies of G-8 Countries, G-20 Countries, OPEC Countries, EU Countries. • International Energy Treaties (Rio, Montreal, Kyoto), INDO-US Nuclear Deal. Future Energy Options, Sustainable Development, Energy Crisis.	15	40
2	**Indian Energy Scenario:** • Energy resources & Consumption, Commercial and noncommercial forms of energy, Fossil fuels, Renewable sources including Bio-fuels in India and their utilization pattern in the past, present and future projections of consumption pattern, Sector wise energy consumption. • Impact of Energy on Economy, Development and	10	

	Environment, Energy for Sustainable Development, Energy and Environmental policies, Need for use of new and renewable energy sources, present status and future of nuclear and renewable energy, Energy Policy Issues related Fossil Fuels, Renewable Energy, Power sector reforms, restructuring of energy supply sector, energy strategy for future. • Energy Conservation Act-2001 & its features, Electricity Act-2003 & its features. • Framework of Central Electricity Authority (CEA), Central & States Electricity Regulatory Commissions (CERC & ERCs)		
3	**Energy Policy:** • Global Energy Issues, National & State Level Energy Issues, National & State Energy Policy, Industrial Energy Policy, Energy Security, Energy Vision. • Energy Pricing & Impact of Global Variations. • Energy Productivity (National & Sector wise productivity).	8	30
4	**Energy Economics:** • Simple Payback Period, Time Value of Money, IRR, NPV, Life Cycle Costing, Cost of Saved Energy, Cost of Energy Generated	7	
5	**Environment:** • Concept of environment and ecology, various natural cycles in environment and ecology, effect of human activities on environment and ecology. • Environmental Impact Assessment & Economics Analysis, Methodologies for environmental pollution prevention. • Rules, regulations, laws etc. regarding environmental protection, pollution prevention and control, waste disposal etc., Role of government, semi/quasi govt. and voluntary organizations. • Global Environment Concerns and Issues, United Nations Framework Convention on Climate Change (UNFCC), Clean Development Mechanism (CDM), Prototype Carbon Fund (PCF)	20	30

Reference Books:

1. Goldemberg, J. *Energy for a Sustainable World.* World Resources Institute, 1987.
2. Desai B V. Energy policy for India
3. Modeling approach to long term demand and energy implication by J.K.Parikh.
4. Energy Policy and Planning by B.Bukhootsow.
5. TEDDY Year Book Published by Tata Energy Research Institute (TERI),
6. S. Rao, "Energy Technology"
7. 'International Energy Outlook' -EIA annual Publication
8. Principles of Energy Conversion by A.W. Culp (McGraw Hill International
9. BEE Reference book: no.1/2/3/4
10. Frank P Lees, "Loss Prevention in Process Industries" Volume 1, 2 & 3

Course Outcome:

After learning the course the students should be able to:

1. List various Energy Sources

2. Estimate potential energy sources for sustainable development
3. Demonstrate interrelation of 3Es (Energy, Economics and Environment).
4. Calculate cost of energy generated
5. Assess the effect on economical development on energy and environment
6. Generate frameworks for clean and sustainable development

Major Equipments: NIL

List of Open Source Software/learning website:

www.nptel.iitm.ac.in/courses/;
https://www.coursera.org/
https://www.edx.org/