Energy Environment and Society | Syllabus | Marking Scheme | IOE | IV-I part

ENERGY, ENVIRONMENT AND SOCIETY

EX

Lecture : 2

Year : IV

Tutorial : 0

Part : I

Practical : 0

Course Objective:

After the completion of this course students will understand the various types of energy sources and their environmental impact. This course is also focused on role of engineers for creating better and responsible society.

1. Technology and Development (3 hours)

    1.1. Introduction to Technology

    1.2. Appropriate Technology

    1.3. Role of Appropriate Technology in Transformation of Society

    1.4. Importance of Technology Transfer

    1.5. Impact of technology on Society

2. Energy Basics (4 hours)

    2.1. Importance of Energy in achieving Maslow's hierarchy of Needs, Human Development Index and Energy Consumption

    2.2. Current Energy Trends, Demand and Supply of Energy in World and Nepal

    2.3. Introduction to Global warming, Clean Development Mechanism, and Sustainability Issues

2.4. Conventional and Non-Conventional/Renewable Energy Sources

2.5. Conventional Energy Sources: Fossil fuel, Nuclear Energy

3. Renewable Energy Sources (14 hours)

3.1. Solar Energy

3.1.1. Solar radiation

3.1.2. Solar thermal energy

3.1.3. Solar Cell (Photovoltaic Technology)

3.2. Hydropower

3.2.1. Water sources and power

3.2.2. Water turbines and hydroelectric plants

3.2.3. Hydro Power Plant Classification (pico, micro, small, medium, large)

3.3. Wind Energy

3.3.1. Availability of Wind Energy sources

3.3.2. Wind turbines, wind parks and power control

3.4. Geothermal Energy

3.4.1. Sources of Geothermal Energy

3.4.2. Uses of Geothermal Energy

3.5. Bio-mass and Bio-energy

3.5.1. Synthetic fuels from the biomass

3.5.2. Thermo-chemical, physio-chemical and bio-chemical conversion

3.5.3. Bio-fuel cells

3.6. Hydrogen Energy and Fuel Cell

3.6.1. Basics of electrochemistry

3.6.2. Polymer membrane electrolyte (PEM) fuel cells

3.6.3. Solid oxide fuel cells (SOFCs)

3.6.4. Hydrogen production and storage

3.6.5. Coal-fired plants and integrated gassifier fuel cell (IGFC) systems

4. Environmental Impact of Energy sources (4 hours)

4.1. Emission hazard

4.2. Battery hazard

4.3. Nuclear hazard

5. Energy Storage (3 hours)

5.1. Forms of energy storage

5.2. Hybrid vehicles

5.3. Smart grid systems

5.4. Batteries

5.5. Super-capacitors

6. Relevant International/national case studies (2 hours)

References:

1. Godfrey Boyle, “Renewable Energy, Power for a sustainable future”, Oxford University Press, latest edition

2. Aldo V. da Rosa, "Fundamentals of Renewable Energy Processes"

Evaluation Scheme:

The questions will cover all the units of the syllabus. The evaluation scheme will be as indicated below:

Unit	Hour	Marks Distribution
1	3	4
2	4	5
3	14	20
4	4	4
5	3	4
6	2	3
Total	30	40

* There may be minor deviation in marks distribution.