

SEMESTER V**PH5D01.2U – Open course****Energy and Environmental Studies****Credits – 4****No. of contact hours – 72**

Scope: The course creates concern among the students on energy conservation and environmental protection.

Prerequisites: Basic knowledge in science.

Module I**Energy sources (14 hrs)**

World's reserve of energy sources - various forms of energy - non- renewable energy sources:- coal, oil, natural gas; merits and demerits - renewable energy sources:- solar energy, biomass energy, biogas energy, wind energy, wave energy, tidal energy, hydro energy, geothermal, fusion energy, hydrogen; merits and demerits - storage of intermittently generated renewable energy (qualitative).

Text Books for study

1. Renewable Energy sources; Their impact on Global Warming and Pollution, Tasneem Abbasi and S.A. Abbasi (PHI Pvt. Ltd)
2. Non- conventional energy resources D.S Chauhan and S.K Srivastava (New Age International)

Solar energy utilization (16 hrs)

Sun as a source of energy - solar radiation - spectral distribution - flat plate collector- solar water heating – different types of solar water heaters - solar pond - convective and salt gradient types - optical concentrator - solar desalination - solar dryer – direct and indirect type - solar cooker - direct and indirect type - solar heating of buildings - solar green houses- solar photovoltaics - working principle.

Text Books for study

1. Non-conventional Energy Sources- G.D. Rai (Khanna Publishers).

Module II

Environmental pollution (20 hrs)

Basic concepts of ecology and environment - environmental pollution:- primary and secondary pollutants, classification - environmental degradation (causes, effects and control/treatment methods):- air pollution:- green house gases, global warming, climatic effects, water pollution, soil pollution, groundwater pollution, marine pollution, noise pollution, nuclear hazards - environmental pollution due to environmental disasters.

Text Books for study

1. Essential Environmental Studies S.P Misra, S.N Pandey (Ane Books Pvt Ltd)
2. Environmental Science: Principles and Practice- R.C. Das and D.K. Behera (PHI Pvt. Ltd)
3. Environmental chemistry and pollution control S.S Dara (S. Chand)

Module III

Environment impact assessment and control (8 hrs)

Basic ideas of environment impact assessment - environment ethics - environmental laws and constitutional provisions to control pollutions in India:- the general acts , water and air acts , environment protection acts.

1. Environmental Science: Principles and Practice- R.C. Das and D.K. Behera (PHI Pvt. Ltd)
2. Environmental Pollution - R K Khitoliya (S Chand)
3. Essential Environmental Studies S.P Misra, S.N Pandey (Ane Books Pvt Ltd)

Waste management (14 hrs)

Waste minimization and resource conservation:- source reduction, recycling , conservation and waste minimization - management of solid wastes (management and handling):- hazardous solid waste, municipal solid wastes, biomedical solid wastes - waste treatment and disposal methods:- physical, biological and chemical process- biogas plant-moving dome type.

Text Books for study

1. Environmental Science: Principles and Practice- R.C. Das and D.K. Behera (PHI Pvt. Ltd)
2. Environmental chemistry and pollution control S.S Dara (S. Chand)
3. Biotechnology for waste and wastewater treatment- N.P. Cheremisinoff (PHI Pvt. Ltd)
4. Environmental management- B. Krishnamoorthy (PHI Pvt. Ltd)

References

1. Essential Environmental Studies S.P Misra, S.N Pandey (Ane Books Pvt Ltd)
2. Environmental Science G Tyler Miller (Cengage Learning)
3. Introduction to Environmental Science Y Anjaneyulu (B S Publications)
4. Introduction to Environmental engineering and science- G.M. Masters and W.P. Ela(PHI Pvt. Ltd)
5. Environmental management- B. Krishnamoorthy (PHI Pvt. Ltd)
6. Solar energy- fundamentals and applications- H.P. Garg and J. Prakash (Tata Mc Graw Hill).
7. Solar energy-fundamentals, design, modeling and applications- G.N. Tiwari (Narosa Pub. House).