

ELECTIVE II (EC): RENEWABLE ENERGY TECHNOLOGY

UNIT 1:

Sun as source of energy: solar radiation and its spectral characteristics; Fossil fuels-classification, composition, physico-chemical characteristics and energy content of coal, petroleum and natural gas, energy use pattern in different parts of the world.

UNIT 2:

Solar Energy: Introduction, Need for alternative energy Sources. Estimation of solar radiation. Solar energy collectors: Flat plate collectors - solar air Heaters - concentrating collectors – Focussing. Type - non-focussing type. Applications of solar Energy- solar energy water heating, space heating - space cooling- solar distillation - Solar furnace - solar thermal electric power conversion Solar photovoltaics - solar cell - solar pumping - solar energy storage systems - solar ponds - solar hydrogen.

UNIT 3:

Wind Energy: Introduction, Basic principles of wind energy conversion - wind data and energy estimation - site selection considerations - Basic components of a wind energy conversion systems (WEC). Classification of WEC systems, Types of wind machines - Applications of wind energy - Environmental aspects. Energy from the Ocean: Ocean thermal energy conversion (OTEC) - Energy from tides - Energy from ocean waves - micro-hydel power.

UNIT 4:

Energy from Biomass: Introduction - Biomass conversion technologies - Biogas generation - classification and types of biogas plants - construction : and Design considerations - Community biogas plants - Materials used for biogas generation - Different wastes and weeds - utilization and biogas; Thermal gasification of biomass, Classification of gasifiers, Gasification process. Applications .energy plantation.

UNIT 5

Bio-energy resources: Petroplants – Biodiesel from *Jatropha sp.*. Fuel cell , Principles, -Hydrogen fuel cell-Alcohol fuel cell-advantages and disadvantages. Briquetting of solid wastes. Pyrolysis. Improved chulhas, smokeless chulhas. Pedal power devices. Low cost house - construction. Integrated approach for biovillages, IREP, Urjagrams.

REFERENCES

1. Anubha Maheswari and Geetha Parmar.2002.A text book of Energy, Ecology

- Environment and Society, Anmol Publications, New Delhi.
2. Bender ,G.T. Chemical instrumentation W.B. Saunders Co., Philadelphia.
 3. Broun,R.D. Introduction to Instrumental analysis. McGraw Hill Book Company,
 4. Chakraverty ,A.Biotechnology and other alternative technologies. Oxford and IBH publishing Co. Pvt. Ltd.,
 5. Desai,A.V. Bioenergy .Wiley Eastern Ltd., New Delhi.
 6. Desai,A.V. Alternative liquid fuels .Wiley Eastern Ltd., New Delhi.
 7. Dunn, P.D. Appropriate technology .Macmillan Education limited.,
 8. Eving ,G.W.Instrumental method of Chemical analysis. McGraw Hill Book Company,New York.
 9. Johnson,G.L. Wind energy system. Prentice - Hall Inc., New Delhi.
 10. Maheswar ,D. Renewable Energy Environmental and development. Konark publishers pvt ltd.,
 11. Mathur,G.C.1993. Low-Cost Housing in developing countries, Oxford and IBH publishing co ltd.,Kolkatta.
 12. Rai ,G.D.2001. Non-conventional energy sources. Khanna publishers,New Delhi.
 13. Sukhatme, S.P.1996. Solar Energy . Tata Mc Graw Hill publishing company Ltd., New Delhi.
 14. Trivedi.P.R,and K.N.Sudarshan.1994.Environment and natural resources conservation. Common wealth publishers, New Delhi.
 15. Tyagi .Fuels from weeds and wastes.
 16. Weber ,C.I. Biological field and laboratory methods of measuring the quality of surface water and effluent. EPA6704 93001 -Ohio.
 17. Weigbery, Instrumentation manual .McGraw Hill, NewYork.