Code No. 3146

FACULTY OF ENGINEERING

B.E. 4/4 (Mech./Prod) I-Semester (**Supplementary**) Examination, June / July 2011

Subject : **Non-Conventional Energy Sources** (Elective-I)

Time : 3 Hours Max. Marks: 75

Note: Answer all questions from Part-A and answer any **Five** questions from Part-B.

PART - A (25 Marks)

1. What are the primary and secondary energy sources? 3
2. What are the advantages of non-conventional energy sources? 2
3. On an average, how much solar power is received on the surface of the earth at noon during a bright sunny day? 2
4. Define solar irradiance, extra terrestrial radiation and terrestrial radiation. 3
5. What are the main components in a solar PV system? 3
6. Comment on the environmental impacts of wind energy. 2
7. What is Betz criterion with reference to wind turbines? 2
8. What are the various sites in the world suitable for geothermal power generation? 2
9. What are the environmental impacts of OTEC? 3
10. Explain the term biomass gasification. 3

PART - B (5 x 10 = 50 Marks)

11.a) Write statistics of conventional energy resources in developing countries. 5
b) Explain the importance of non-conventional energy sources in the context of global warming. 5

12.a) Define declination angle, hour angle, zenith angle, solar azimuth angles and angle of incidence. 5
b) Calculate the angle made by beam radiation with the normal to a flat plate collector, tilted at 30^0 to the horizontal, pointing due south, located at New Delhi, at 11.00 h (IST) on 1st June. The latitude and longitude for New Delhi are 28^0 55' N and 77^0 12' E respectively. The standard IST longitude is 81^0 44' E. 5

13. Explain the classification of solar PV systems with suitable diagrams. 10

14.a) Sketch the diagram of a Horizontal Axis Wind Turbine (HAWT) and explain the functions of its main components. 7
b) Give the brief classification of Wind Turbines. 3

15.a) Explain the various types of geothermal resources. 7
b) What are the environmental impacts of Geothermal Energy? 3

16.a) Explain the process of production of bio gas from bio mass. 5
b) Explain the working of a closed cycle OTEC plant. 5

17. Write short notes on the following :