First Semester M.Tech. Degree Examination, December 2011
Non – Conventional Energy Sources

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1   a. What are the prospects of non – conventional energy sources in India? Explain. **(10 Marks)**
    b. What are types of energy sources available? Explain. **(06 Marks)**
    c. What are the limitations of conventional energy sources? **(04 Marks)**

2   a. Describe the solar spectrum outside the atmosphere at a ground level. **(08 Marks)**
    b. What are the applications of a solar photovoltaic system? **(06 Marks)**
    c. Calculate the angle made by beam radiation with the normal to a flat collector on December 1, at 9.00 AM, solar time, for a location at $28^0 35'N$. The collector is tilted at an angle of latitude plus 10^0, with the horizontal and is pointing south. **(06 Marks)**

3   a. Enumerate the main applications of solar energy. Describe the forced circulation solar water heater. **(10 Marks)**
    b. With a neat sketch, explain the solar refrigeration system. **(06 Marks)**
    c. What are applications of a solar photovoltaic system? **(04 Marks)**

4   a. What are the factors affecting biodigestion? Explain them briefly. **(10 Marks)**
    b. With a neat sketch, explain the down draft gasifier. **(10 Marks)**

5   a. Wind at 1 standard atmospheric pressure and 15^0C has velocity of 15 m/s. Calculate :
      i) the total power density in the wind stream   ii) the maximum obtainable power density   iii) a reasonably obtainable power density   iv) the total power   v) the torque at maxim efficiency   vi) maximum axial thrust. Given : turbine diameter = 120m and turbine operating speed = 40rpm at maximum efficiency. Propeller type wind turbine is considered. (Assume $\eta = 35\%$). **(12 Marks)**
    b. With a neat sketch, explain water pumping by using a wind turbine. **(08 Marks)**

6   a. Describe basic components of a small hydro power station. **(10 Marks)**
    b. Write a note on the tubular turbine. **(06 Marks)**
    c. What ate conclusions of mini and micro hydro power plants? **(04 Marks)**

7   a. Explain with a neat sketch, the preheat hybrid system, in geothermal energy. **(10 Marks)**
    b. What are the advantages and disadvantages of geothermal energy? **(06 Marks)**
    c. Describe a closed O.T.E.C cycle. **(04 Marks)**

8   a. Sketch and explain the basic principles of tidal power generation. **(10 Marks)**
    b. With a neat sketch, explain the schematic layout of a tidal power house. **(10 Marks)**

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