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First Semester M.Tech. Degree Examination, February 2013
Non-Conventional Energy Systems

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

1. a. Discuss the reserves and production levels of various conventional energy sources at the national level. (08 Marks)
 b. What are the prospects of non-conventional energy sources in India? Explain. (08 Marks)
 c. What are the advantages and disadvantages of non-conventional energy sources? (04 Marks)
2. a. Explain the following : (04 Marks)
 i) Beam radiation ii) Diffuse radiation.
 b. Describe the solar pond for solar energy collection and storage. (08 Marks)
 c. With the help of a neat sketch, explain the working of an instrument used to measure both diffuse and global radiation. (08 Marks)
3. a. Explain the three basic steps of anaerobic digestion used to generate biogas from biomass. (06 Marks)
 b. What are the factors affecting bio-digestion? Explain briefly. (06 Marks)
 c. Explain the constructional details and working of KVIC digester. (08 Marks)
4. a. Derive an expression to show the relation between the available wind power, diameter of the rotor and the velocity of the wind. Comment on the same. (08 Marks)
 b. A horizontal shaft, propeller type wind turbine is located in area having following wind characteristics. Speed of wind 10 m/sec at 1 atm and 15°C, calculate the following:
 i) Air density
 ii) Total power density in wind stream, W/m²
 iii) Maximum possible obtainable power density, W/m²
 iv) Actual obtainable power density, W/m²
 v) Total power from a wind turbine of 120 meter diameter
 vi) Torque and axial thrust on the wind turbine operating at 40 rpm and at maximum efficiency of 42%. (12 Marks)
5. a. With a neat sketch, explain geothermal field. (06 Marks)
 b. With a neat sketch, explain a closed cycle OTEC plant, with its advantages over open cycle system. (10 Marks)
 c. What are the advantages and disadvantages of wave energy? (04 Marks)
6. a. Distinguish between mini and micro hydel systems. How do you classify small hydro power stations? (06 Marks)
 b. With a neat sketch explain a typical small hydropower station. (08 Marks)
 c. Name the types of turbines used in small hydropower station. Explain any one type of turbine that is used for small scale hydroelectric plant. (06 Marks)
7. a. Explain with sketches, the various methods of tidal power generation. (10 Marks)
 b. What are the advantages and disadvantages of tidal power generation? (05 Marks)
 c. Explain the utilization of nuclear fusion energy. (05 Marks)
8. Write short notes on any four: (20 Marks)
 a. Solar cooking b. Photovoltaic cells c. Wind energy storage
 d. Pyrheliometer e. Wave energy conversion f. Solar refrigeration.

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.