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12MTP151/13MTH151

First Semester M.Tech. Degree Examination, Dec.2013/Jan.2014
Non-Conventional Energy System

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. State the immediate and long term needs for developing alternate energy source. **(02 Marks)**
b. What are the prospects of renewable energy sources in India? Explain. **(10 Marks)**
c. What are the advantages and limitations of renewable energy sources? **(08 Marks)**

2 a. Define the following terms of solar radiation geometry with respect to a tilted plane with the help of diagram.
i) Angle of incidence.
ii) Zenith angle.
iii) Solar altitude angle.
iv) Solar azimuth angle. **(10 Marks)**
v) Slope **(04 Marks)**
b. What are the applications of a solar photovoltaic system?
c. Determine the local solar time and declination at a location latitude 23°15′N, longitude 77°30′ E at 12.30 IST on June 19. Equation of time correction is –(1′01″) given from standard table or chart. **(06 Marks)**

3 a. Describe how solar energy can be used for drying and refrigeration. **(10 Marks)**
b. Enumerate the main applications of solar energy. Describe the forced circulation solar water heater. **(10 Marks)**

4 a. What are the factors affecting biodigestion? Explain them briefly. **(10 Marks)**
b. Explain working of a down draft gasifier, with clearly stating reactions and products at each stage. **(10 Marks)**

5 a. Derive $C_{Pmax} = 0.593$ using Betz theory and state the assumptions made in Betz theory. **(10 Marks)**
b. With a neat sketch, explain water pumping by using a wind turbine. **(08 Marks)**
c. How does the wave energy arise and mention the formula estimated to find power? **(02 Marks)**

6 a. Explain the basic concepts and methods of mini and micro hydropower generation. **(10 Marks)**
b. Mention the different types of turbines used in mini and micro hydro projects. Explain with a neat sketch bulb or tabular turbine. **(10 Marks)**

7 a. What are the different types of geothermal energy sources? Explain how geothermal energy can be used in refrigeration cycle. **(10 Marks)**
b. Explain the working principle of OTEC. Explain with neat sketches of Rankine cycle OTEC plant. **(10 Marks)**

8 a. Sketch and explain the basic principles of tidal power generation. **(10 Marks)**
b. Derive an expression for power per unit basin area for a simple single basin tidal system. **(10 Marks)**

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