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10ME754

Seventh Semester B.E. Degree Examination, June/July 2017

Non-Conventional Energy Sources

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***No data handbooks are allowed.***

PART – A

1 a. Describe briefly conventional and non-conventional energy sources. **(07 Marks)**

b. What are advantages and disadvantages of renewable energy over conventional energy sources? **(07 Marks)**

c. Briefly discuss the need for non-conventional energy sources. **(06 Marks)**

2 a. Explain principles of solar radiations at Earth's surface. **(08 Marks)**

b. Explain with neat sketch:
i) Pyrheliometer
ii) Pyrometer
iii) Sun-shine recorder **(06 Marks)**

c. Define the following:
i) Declination angle
ii) Surface azimuth angle
iii) Solar latitude angle
iv) Angle of incidence
v) Hour angle
vi) Zenith angle **(06 Marks)**

3 a. Explain with neat sketch working of flat plate collector to get heat energy. **(10 Marks)**

b. Calculate the angle made by beam radiation with normal to flat collector on December 1st at 9.00 AM. Solar time for location at 28°35'N. The collector is tilted at an angle of latitude plus 10° with horizontal and pointing due south. **(10 Marks)**

4 a. Explain transmissivity of cover system for flat plate collector based on reflection-refraction and derive expression for transmissivity. **(10 Marks)**

b. Describe with equations of overall loss coefficient and heat transfer correlations of top loss coefficient, bottom loss coefficient, and side loss coefficients. **(10 Marks)**

PART – B

5 a. With a neat sketch, explain the basic working principles of photovoltaic system for power generation. **(06 Marks)**

b. Give the classifications of WIND MACHINES. Explain with neat sketch any one type of wind machine. **(06 Marks)**

c. Determine the windmill rotor diameter to operate an pump which has a discharge of 40000 lit/day with a total head of 10 meters. The pump operates for 10 hours a day. The rated speed of wind 6 mtrs. The power coefficient is 0.3, density of air 1.2 kg/m^3. Assume transmission efficiency as 95% and pump efficiency as 35%. **(08 Marks)**

6 a. Explain the main components of tidal power plant. **(06 Marks)**
b. Sketch and explain Rankine cycle for Ocean Thermal Energy Conversion. **(07 Marks)**
c. Discuss the problems associated with geothermal energy conversion. **(07 Marks)**

7 a. Describe the method of photosynthetic oxygen production, along with chemical reactions. **(06 Marks)**
b. Explain with sketch any two BioGas production plants. **(08 Marks)**
c. Describe the applications of bio-gas in engines and advantages. **(06 Marks)**

8 a. Discuss the sources of hydrogen and production of hydrogen. **(07 Marks)**
b. Explain the different method of hydrogen storage. **(07 Marks)**
c. Discuss the applications of hydrogen as domestic and industrial purposes. **(06 Marks)**

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