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Examination, December 2013

**Renewable Energy System***Time : Three Hours**Maximum Marks : 70***Note:** Attempt any five questions. All questions carry equal marks.

1. a) State Types of solar radiations. How radiations can be measured? Explain the working principle of any one instrument used for solar radiation measurement.  
b) State the principle of Photovoltaic conversion of solar energy. Discuss any one technology for fabrication of Photovoltaic devices.
2. a) State the working principle of solar flat plate collectors. Name various solar flat plate and concentrators.  
b) Draw a neat sketch of "Solar Stills". What are the various process parameters that affects its efficiency?
3. a) State and discuss about weibull, Rayleigh and normal distribution related to wind speed statistics.  
b) Draw a component layout of WECS and state the function of each element.
4. a) Define the following terms related to wind energy:  
i) Power curve of wind turbine.
- ii) Capacity factor.  
iii) Wind rose.
- b) Discuss power, torque and speed characteristics of wind energy conversion system.
5. a) Classify various routes for biomass conversion. Discuss any one thermo-chemical route.  
b) Define Biomass Gasification. Draw a neat diagram of any one type of biomass gasifier showing its various temperature and reaction zones.
6. a) State the need and importance of small hydropower plants over conventional hydropower plants. Compare micro, mini and small hydro systems.  
b) State principle of "Ocean Wave Energy" and Tidal energy conversion.
7. a) State classification and characteristics of fuel cells. Draw a neat sketch of any one type of fuel cell.  
b) State working principle of geothermal energy. State its site selection.
8. Write technical note on following (any two):  
i) Basic thermodynamics and reactions of fuel cell.  
ii) Organic PV cells.  
iii) Operation and maintenance of biogas plants.  
iv) Solar cooling and refrigeration.

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