KERALA AGRICULTURAL UNIVERSITY

B.Tech (Agrl.Engg.) 2014 Admission

Vth Semester Final Examination-January-2017

Cat No: Fpme.3114. Marks: 50.00

Title: **Renewable Energy Sources(2+1)** Time: 2 hours

I **Fill up the blanks/Define** (10x1=10)

1. The central ministry for renewable energy is called ----------
2. ---------, ---------- and --------- are examples for gaseous, liquid and solid fossil fuels.
3. ---------, ---------- and --------- are the three combustible components of producer gas.
4. 1 Langley is ----------
5. The power available in the wind is proportional to ---------, ---------- and ---------

Define the following

6. Biomass
7. Isodynes
8. Solar constant
9. Hydraulic Retention Time
10. Torque coefficient (of a wind turbine)

II **Write short answers on any FIVE of the following** (5x2=10)

1. Explain the three basic sun earth angles.
2. What are concentrating type solar energy collectors?
3. What are the important characteristics of solar cells?
4. What do you mean by OTEC?
5. What is the relevance of tip speed ratio of wind rotors?
6. What is geothermal energy? How can we utilize it?
7. Briefly explain different types of biomass gasifiers.

III **Write short answers on any FIVE** (5x4=20)

1. Explain the methodology for estimation of solar radiation using Angstrom and Page equations.
2. A solar water heater of capacity 100 litre per day is used to raise the water temperature by 40°C. Calculate the area of collector surface required, if the average daily solar radiation incident is 2.5 kWh/m^2 and the overall system efficiency is 50%
3. Is it possible to extract 100% of power in the wind using a wind rotor? Why? Explain power density duration curve.
4. Classify wind turbines. Enlist the different types in different categories with sketches.
5. Explain the principle of operation of a small hydel system. What are their advantages over big hydel projects?
6. Differentiate between fixed dome type and floating gas holder type biogas plants.
7. Explain the working of a biomass gasifier with a sketch depicting different reaction zones.

IV **Write essay on any ONE** (1x10=10)

1. Explain anaerobic digestion process mentioning the importance of different phases involved and the operational and environmental factors affecting the performance of biogas systems. Design a floating drum type biogas plant for a farmer having 5 cows.
2. What are the advantages of using solar energy for thermal applications? Explain the principle of operation of a solar flat plate collector mentioning the heat losses from it. Explain the working of any three devices/gadgets utilizing solar thermal energy.

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