KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food. Engg) 2011 Admission
Vth Semester Final Examination- December /January -2013

Cat. No: Fden.3108   Marks: 80
Title: Energy for Food Industries (1+1)   Time: 3 hours

Part I: Fill in the blanks of all questions.   (1 x 10 = 10)

1. Photovoltaic solar cells are made of ....

2. The value of solar constant is ....W/m^2.

3. In case of solar cabinet dryer, the length of dryer is normally kept at .... times its width.

4. ....: reflector used in solar power plant to reflect sunlight.

5. LNG stands for ....

6. The temperature inside the solar cooker ranges from.....................

7. Heat value of the gas produced in a gasifier is about.......................

8. In .... gasifier the reaction gases flow counter to the path of the incoming cool feed stock and exit at a relatively low temperature.

9. A group of solar cell is ....

10. The minimum wind velocity for operating a wind generator is .... km/h.

Part II: Answer ANY TEN of the following.   (3x10= 30)

1. What do you understand by *Renewable Energy* and *Non Renewable Energy*?

2. Write principle elements of a Solar Cabinet Dryer.

3. What are the advantages of a solar flat plate collector?

4. Give a note on *Heat energy recovery in Food industries.*

5. Write a short note on geothermal energy.

6. Give a brief note on Semiconductors.

7. A grey body having an emissivity of 0.8 has a temperature of 50°C. Determine total emissive power of the body.

8. Solar refrigeration.
9. Write about waste heat utilization.
10. Fuel efficiency in furnaces.
11. Brief about solar grain dryers.
12. Write a note on tidal energy.

Part III: Answer ANY SIX of the following. (6 x 5=30)

1. Explain two basic designs of solar cooker.

2. Describe the principle of a Photo Voltaic System used for power generation.

3. How can the renewable energy systems be exploited in food industry?

4. Write a detailed note on *Energy Auditing*.

5. Describe in detail the Biomass Gasification Process.

6. Write short notes on *Wind Turbines*.

7. Compute the system output and current of a PV array to be used for a small household lighting from a 12 V battery system for 5 hours each night at 3A. Assume number of peak sunshine hours to be 6 hours and Calculate also the system output and current if battery charging efficiency, battery self discharge level and variability factor are 0.9, 0.9 and 0.45 respectively.

8. Write a note on solar constant.

Part IV: Answer ANY ONE of the following. (1 x 10 = 10)

1. Classify energy sources. Explain briefly the major renewable energy sources.

2. The wind speed recorded over a 1.5 x 2.0 m flat plate solar collector is 3 m/s. Compute the heat transfer coefficient due to wind on the collector. Properties of air are as follows:
   Thermal Conductivity, $k = 2.63 \times 10^{-2}$ W/m-°C
   Thermal diffusivity, $\alpha = 22.5 \times 10^{-6}$ m^2/s
   Kinematic viscosity, $\gamma = 15.68 \times 10^{-6}$ m^2/s