MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: **VI (New)**	**Term**	: **II**	**Academic Year**	: **2015-16**
Course No.	: EOES 365	**Title**	: **Renewable Energy Sources**		
Credits	: 3 (2+1)				
Day & Date	: Monday, 02.05.2016	**Time**	: 09.00 to 12.00	**Total Marks**	: **80**

Note : 1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 a) Compare conventional and non-conventional energy sources.
b) Discuss different renewable sources of energy with special reference to Indian context.

Q.2 a) Enlist various gasifiers and describe in detail biomass gasification process.
b) What do you understand by carbonization? List the stages in charcoal formation.

Q.3 a) Explain the factors affecting biogas production.
b) What are the basic differences between fixed dome and floating drum type biogas plant?

Q.4 a) What are the different types of solar water heaters? Explain thermo siphon type solar water heating system with neat sketch.
b) Determine the collector area to supply 300 liters per day, hot water at a temperature of 65^0C, for a family at a location, where average radiation intensity available is 6.5kWh per m^2. The temperature of supply water to the bottom of storage tank is 20^0C. Collection efficiency may be assumed to be 30%.

Q.5 a) What is solar desalination? How does solar still work?
b) Find the stored energy per unit volume and mass of the pebble bed to store heat for an air-type solar heating system, when its temperature is to be raised by 20^0C. The bed is required to store 25kW-hr. Average density and specific heat of the bed are 3000kg/m^3 and 800J/kg^{0}C respectively.

Q.6 a) Explain the photovoltaic principle with basic photo-voltaic system for power generation.
b) Enlist various wind mills and derive the expression for power developed from the wind.

Q.7 a) Explain the operation of hydro-electric power stations.
b) Write the applications of Ocean Thermal Energy Conversion (OTEC).

Q.8 a) Differentiate between piston press and screw press briquetting technology.

(P.T.O.)

b) The following data are given for a family biogas digester suitable for the output of five caws the retention time is 20 days, temperature 30^0C, dry matter consumed per day: 2kg, biogas yield is $0.24m^3$ per kg. The efficiency of burner is 60%, methane proportion is 0.8. Heat of combustion of methane: $28MJ/m^3$. Calculate: 1) Volume of biogas digester 2) Power available from the digester.

Q.9 a) What is Bio-diesel? Explain the process of preparation of Biodiesel.

b) Explain energy conservation techniques in Agriculture.

Q.10 Write short notes on (Any two).

1) Solar dryer
2) Solar cooker
3) Focusing collector
4) Fuel properties of biodiesel

SECTION "B"

Q.11 State True or False.

1) Orientations of solar appliances are facing towards East.
2) The pH range suitable for biogas production is 6.6 to 7.5.
3) The capacity of solar water heating system can be boosted by increasing flow rate.
4) The capacity of solar water heating system can be boosted by decreasing collector area.
5) The constituent of biogas is CH_4 and CO_2.
6) Density of briquettes normally varies between 1200 to 1400 kg/m^3 for high pressure processes.
7) In horizontal axis wind machine, rotor weight is less.
8) A typical silicon PV cell produces about 0.5 to 0.6 volt DC under open circuit, no load conditions.

Q.12 Fill in the banks.

1) Biomass is produced through chemical storage of _____ in plants and other organic matters as a result of photosynthesis.
2) The calorific value of biogas is _____ kcal/cum.
3) Gasification process is carried out in _____ different stages.
4) The pelton wheel is used where a _____ of water is available.
5) Liquid flat plate collectors are generally used for obtaining hot water at temperature less then _____.
6) Gasifiers are classified according to the _____ in the fuel column.
7) The power in the wind is proportional to the _____ of its velocity.
8) The law of _____ says that energy is neither created nor destroyed.

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