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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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: **VI (New)**	**Term**	: **II**	**Academic Year**	: **2016-17**
Course No.	: EOES 365	**Title**	: **Renewable Energy Sources**		
Credits	: 3 (2+1)				
Day & Date	: Monday, 08.05.2017	**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) Explain with neat sketches about contrast between renewable and finite energy supplies with environmental and harnessed energy flow.

b) Give comparison of renewable and conventional energy sources.

Q.2 a) Explain physical conversion of solar radiation into heat using flat plate collect.

b) Enlist different applications of flat plate collector. Explain any one.

Q.3 Explain principle of combustion of biomass. Enlist important parameters affecting combustion. Elaborate the conditions for efficient combustion of biomass.

Q.4 Explain gasification processes in detail. Describe the impact of different properties of fuel, which influence gasification.

Q.5 a) Enlist different factors affecting biodigestion. Explain the effect of temperature and hydrogen ion concentration on biogas generation.

b) The family size biogas plant suitable for five cows is having following data:

i) Retention period :20 days ii) Temperature :35^{0}C iii) Biogas yield :0.24 m^3/kg (dry matter) iv) Dry matter consumed : 3 kg /day /cow v) Efficiency of burner: 60%. vi) Methane production :0.8 vii) CV of methane : 28 MJ/m^3

Calculate : i) Volume of digester(m^3) ii) Power generated from digester (kWh/day)

Q.6 a) Enlist different wind energy conversion devices. Compare horizontal and vertical axis wind machines.

b) What are the applications of Ocean Thermal Energy Conversion system? Explain open cycle Ocean Thermal Energy conversion system for electricity generation.

Q.7 a) Explain working of solar photovoltaic cell. Explain functions of each component of PV based power system.

b) Enlist different applications of Solar Photovoltaic system and describe solar PV deep well water pumping system.

(P.T.O.)

Q.8 a) Determine the number of collector array for daily heating need of 150 kWh/day. The average solar intensity is 05 kWh/m^2. day. Each panel has area of 2 m^2 and 60 % thermal efficiency

b) Describe natural circulation solar water heating system with neat sketch.

Q.9 What is solar cooking? Give classification of solar cookers. Explain parabolidal type solar cooker with neat sketch.

Q.10 Write short notes (Any Two).

1) Hydro electric power generation
2) Biodiesel production
3) Wind energy conversion devices

SECTION "B"

Q.11 State True or False.

1) Gasification is the process of heating of biomass in absence of air.
2) The average calorific value of producer gas is 4717 kJ/Nm^3.
3) Gasification process is biochemical conversion of solid into gaseous fuel.
4) The briquettes has diameter greater than 30 mm.
5) Constant gas pressure is available in fixed dome type biogas.
6) Solar thermal devices are normally oriented towards South in India.
7) Solar PV cell converts solar energy into alternate current.
8) In horizontal axis wind machine, rotor weight is less.

Q.12 Fill in the blanks.

1) The _____ is the source of all energy sources.
2) The wind turbine converts _____ energy into mechanical energy.
3) The biomethanation process converts the solid biomass into _____fuel.
4) The digestion of the biomass in presence of air is called _____ digestion.
5) To obtain the higher output voltage, PV arrays are connected in _____.
6) The C:N ratio suitable for biogas production is _____.
7) The flat plate collectors are used to attend the temperature up to _____.
8) _____ biogas plants are more costly than floating drum biogas plants.

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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: **VI (Old)**	**Term**	: **II**	**Academic Year**	: **2017-18**
Course No.	: EOES 365	**Title**	: **Renewable Energy Sources**		
Credits	: 3 (2+1)				
Day & Date	: Saturday, 05.05.2018	**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) Classify Energy Sources.
b) Define renewable and non-renewable energy and compare it with suitable examples.

Q.2 a) Define biomass gasification. State the classification of biomass gasifiers.
b) Compare updraft and down draft gasifiers.

Q.3 a) Explain in brief, the factors affecting biogas generation.
b) The following data are given for a family biogas digester suitable for the out put of five cows: the retention time is 20 days, temperature 30^0C, dry matter consumed per day = 2 kg, biogas yield is 0.24 m^3 per kg. The efficiency of burner is 60%, methane proportion is 0.8. Heat of combustion of methane = 28 MJ/m^3. Calculate (i) the volume of biogas digester and (ii) the power available from the digester.

Q.4 a) What is meant by solar cell? Enumerate the advantages and disadvantages of the solar cell system.
b) Determine the collector area to supply 200 liters per day hot water at 65^0C for a family at location, where average radiation intensity available is 6 kWh/m^2. The temperature of supply water to the bottom of storage tank is 15^0C. Collection efficiency may be assumed to be 30%

Q.5 a) Describe in detail horizontal axis two aerodynamic blade wind will.
b) Draw the sketches of various solar drier designs.

Q.6 a) Explain in brief the stages in charcoal formation.
b) Explain in brief about design principle and construction details of Box type solar cooker.

Q.7 a) Describe process of briquetting and explain in brief pellet press.
b) Explain energy saving techniques in farming operations.

Q.8 a) Explain the principles of energy conservation.
b) State main applications of solar air heaters.

(P.T.O.)

Q.9 a) Explain operation of Hydroelectric power plant.

b) Explain in brief about the construction and working principle of solar still.

Q.10 Write short notes (Any Two) :

a) Bio diesel Preparation

b) Applications of OTEC

c) Performance characteristics of wind mills.

SECTION "B"

Q.11 a) Give the answer in one sentence.

1) Which type of material is used for rotor of Sail type of wind mill?

2) State Tip speed Ratio in case of wind machine.

3) What is the calorific value of biogas?

4) What is the maximum theoretical conservation efficiency of horizontal axis wind will?

5) What is the requirement of slurry temperature for optimum biogas production?

6) Define Aerogenerator.

7) In which temperature range the mesophilic bacteria in biogas production works?

8) Name the solar drier in which solar radiation does not fall on product to be dried.

Q.12 Fill in the blanks.

1) Savouries rotor requires relatively _____ wind velocity.

2) _____ collectors are generally used for low temperature applications.

3) The micro-organism involved in the production of biogas to the family of _____.

4) In closed cycle OTEC system, _____ is used to vaporize the working fluid.

5) In _____ type gasifier air is introduced at the bottom and acts as a counter current to fuel flow.

6) Pragati type biogas plant is an example of _____ biogas plant.

7) With parabolic disc concentrator type solar cooker, temperature of the order of _____ ^{0}C can be obtained.

8) Methane gas is liquefied at a pressure of about _____ kg/cm^2 and critical temperature of _____ ^{0}C.

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