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Renewable Energy Sources VTU CBCS Question Paper Set 2018

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10EE836

Eighth Semester B.E. Degree Examination, June/July 2015
Renewable Energy Sources

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice

PART - A

1 a. What is meant by Renewable Energy Sources? Explain in brief these energy sources, with a special reference to the Indian context. **(10 Marks)**

b. What are the advantages and limitations of Renewable Energy Sources? Explain the prospects on Non – conventional Energy Sources in India. **(10 Marks)**

2 a. Define the following with respect to Solar radiation : i) Altitude Angle ii) Zenith Angle iii) Declination Angle iv) Hour Angle. **(06 Marks)**

b. Calculate the sunset hour angle and day length at location latitude of 35^0N on February 14^{th}. **(04 Marks)**

c. What is the difference between Pyrheliometer and Pyranometer? Describe the principle of Angstrom type pyrheliometer. **(10 Marks)**

3 a. Explain the principle of conversion of solar energy into heat. Explain with a neat diagram how this is employed in Flat plate collectors. **(10 Marks)**

b. State the advantages and disadvantages of concentrating collectors over Flat plate collectors. **(04 Marks)**

c. Classify solar energy storage systems. Describe in brief any one of the different storage systems. **(06 Marks)**

4 a. With a neat sketch, describe the construction and working of solar cooker. **(06 Marks)**

b. Explain the principle of solar photovoltaic power generation. What are the main elements of solar PV system? **(10 Marks)**

c. What are major advantages and disadvantages of solar PV system? **(04 Marks)**

PART - B

5 a. Classify the Wind Energy Conversion Systems. **(04 Marks)**

b. State and briefly explain the factors that determine the output power from wind energy. **(06 Marks)**

c. With usual notations, derive an expression for the maximum power output of horizontal axis wind turbine. **(10 Marks)**

6 a. Explain clearly the factors affecting the Biogas generation. **(10 Marks)**

b. With a neat diagram, explain the KVIC biogas plant. **(10 Marks)**

7 a. Discuss the basic principle of OTEC plants. Explain in brief the main types of OTEC systems. **(10 Marks)**

b. With a simple diagram, the working of a tidal power plant. **(06 Marks)**

c. List out the advantages and limitations of OTEC plants. **(04 Marks)**

8 Write short notes on :

a. Applications of wind energy.

b. Wave Energy.

c. Stand – alone solar PV system.

d. Small hydro resources. **(20 Marks)**

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PART – A

1 a. List the difference between renewable and nonrenewable energy sources. **(08 Marks)**

b. What are the advantages and limitations of renewable energy sources? **(06 Marks)**

c. Explain briefly the Indian Energy Scenario. **(06 Marks)**

2 a. What is difference between pyrheliometer and pyranometer? Describe the principle of Angstrom type pyrheliometer. **(10 Marks)**

b. Define the terms: i) Altitude angle, ii) Zenith angle and iii) Declination angle. **(06 Marks)**

c. Calculate the day length on a horizontal surface at New Delhi (28°35′N, 77°12′E) on December 1st. **(04 Marks)**

3 a. With a neat diagram, explain the working principle of solar water heater. **(06 Marks)**

b. State the advantages and disadvantages of concentrated collector over flat plate collector. **(04 Marks)**

c. Classify the different methods of storing solar energy. Describe thermal energy storage systems. **(10 Marks)**

4 a. With a neat diagram, explain solar water pumping systems. **(08 Marks)**

b. What are the major advantages and disadvantages of solar PV systems? **(04 Marks)**

c. With the help of neat diagrams, describe the principle and working of central receiver system. **(08 Marks)**

PART – B

5 a. What is basic principle of wind energy conversion system? Classify the wind energy conversion system. **(04 Marks)**

b. With a neat block diagram, explain the basic components of WECS. **(08 Marks)**

c. With usual notations, derive an expression for the maximum power output of wind turbine. **(08 Marks)**

6 a. What are the factors affecting biogas generation? **(04 Marks)**

b. With a neat diagram, explain KVIC biogas plant. **(10 Marks)**

c. What are the advantages and disadvantages of floating drum type plant? **(06 Marks)**

7 a. Explain the working of single basin Tidal plant. **(06 Marks)**

b. With a suitable diagram, explain the working of open cycle OTEC for ocean thermal energy. **(10 Marks)**

c. What are the advantages and limitations of wave energy conversion systems? **(04 Marks)**

8 a. Describe the classification of fuel cell. With a neat sketch, explain the working of fuel cell. **(08 Marks)**

b. Explain various methods of production of hydrogen for the use of energy carrier. **(06 Marks)**

c. What are the advantages and disadvantages of small hydropower plants? **(06 Marks)**

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PART – A

1 a. List the differences between renewable and non-renewable energy sources. **(08 Marks)**
b. What are the advantages and limitations of renewable energy sources? **(06 Marks)**
c. Explain briefly the Indian Energy scenario. **(06 Marks)**

2 a. Define the following with respect to solar radiation:
(i) Latitude angle (ii) Altitude angle (iii) Hour angle (iv) Zenith angle
(v) Azimuth angle **(10 Marks)**
b. What is the difference between a pyrheliometer and pyranometers? With neat sketch, explain the working of Angstrom type pyreheliometer. **(10 Marks)**

3 a. With a neat diagram, explain the working principle of solar water heater. **(08 Marks)**
b. With a neat sketch, explain the working principle of solar still and solar furnace. **(12 Marks)**

4 a. With a neat sketch, explain the working of a solar pond electric power plant. **(08 Marks)**
b. What are the advantages and disadvantages of solar PV systems? **(06 Marks)**
c. With a neat sketch, explain any one type of thermal energy storage system. **(06 Marks)**

PART – B

5 a. With a suitable block diagram, explain the functions of different components of WECS. **(10 Marks)**
b. Classify the wind energy conversions system. **(04 Marks)**
c. Describe the main considerations in selecting a site for wind generators. **(06 Marks)**

6 a. With a neat diagram, explain the working principle of biogas plant. **(10 Marks)**
b. List & explain the factors affecting biogas generation. **(10 Marks)**

7 a. With a neat diagram, explain the principle of tidal power. **(10 Marks)**
b. With a neat diagram, explain the principle of ocean thermal energy conversion system. **(10 Marks)**

8 a. Describe the classification of fuel cells. **(06 Marks)**
b. Explain the principle of operation of an alkaline fuel cell. **(08 Marks)**
c. What are the advantages and disadvantages of hydrogen energy? **(06 Marks)**

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