

# VTU B.E/B.TECH QUESTION PAPER SET

## CBCS SEMESTER V RENEWABLE ENERGY SOURCES

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# CBCS SCHEME

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15EE563

## Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Renewable Energy Sources

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. Discuss four causes of energy scarcity. (04 Marks)  
 b. Find the solar elevation angle ( $\alpha$ ) at 2h after local solar noon on 1<sup>st</sup> June 2012 for a city, which is located at 26.75°N latitude. (06 Marks)  
 c. With the help of diagram, define :  
 i) Solar altitude angle    ii) Latitude angle    iii) Surface Azimuth angle. (06 Marks)

**OR**

- 2 a. Define i) Declination angle and ii) Hour Angle. (04 Marks)  
 b. Write note on classification of energy resources. (06 Marks)  
 c. Briefly explain any six solar thermal energy applications. (06 Marks)

### Module-2

- 3 a. With neat sketch, discuss important parts of flat plate solar collector. (04 Marks)  
 b. With the help of diagram, explain Brayton cycle solar electric generation. (06 Marks)  
 c. With neat diagram, explain solar pond and write any one advantage of it. (06 Marks)

**OR**

- 4 a. What are the factors which limit the efficiency of the solar cell? (04 Marks)  
 b. Briefly explain any six applications of solar cells. (06 Marks)  
 c. With the help of neat diagram, explain key elements of a Photo – Voltaic cell. (06 Marks)

### Module-3

- 5 a. Discuss any four applications of hydrogen energy. (04 Marks)  
 b. Explain the thermochemical hydrogen production technology. (06 Marks)  
 c. Describe the main considerations in selecting site for wind generators. (06 Marks)

**OR**

- 6 a. Define and explain recycling of wastes and its benefits. (04 Marks)  
 b. Derive the expression for power developed due to wind. (06 Marks)  
 c. Explain with diagram, dry steam geothermal power plant. (06 Marks)

### Module-4

- 7 a. Explain with sketch, two-basin system of tidal power harnessing. (04 Marks)  
 b. Draw sketch of down – draft gasifier and explain its working. Write its applications. (06 Marks)  
 c. Describe the construction and working of floating dome type bio – gas plant and its materials aspects. (06 Marks)

**OR**

- 8 a. Briefly explain four problems faced in exploiting tidal energy. (04 Marks)  
b. Describe the construction and working of fixed dome type biogas plant and its material aspects. (06 Marks)  
c. With diagram, explain updraft gasifier and write its applications area. (06 Marks)

**Module-5**

- 9 a. Write advantages of sea wave power. (04 Marks)  
b. Explain how the ocean temperature differences can be used to generate electrical power using open cycle system. (06 Marks)  
c. Describe with diagram, principle of oscillating water column ocean wave machine. (06 Marks)

**OR**

- 10 a. Briefly explain types of devices for harnessing wave energy. (04 Marks)  
b. Describe the 'Closed - Cycle' OTEC system, with the help of diagram. (06 Marks)  
c. State the merits and demerits of OTEC plants. (06 Marks)

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15EE563

**Fifth Semester B.E. Degree Examination, June/July 2019**  
**Renewable Energy Sources**

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing  
ONE full question from each module.**

Module-1

- 1 a. Briefly explain factors affecting energy resource development. (08 Marks)  
b. Discuss worldwide renewable energy availability. (08 Marks)

OR

- 2 a. Define : i) Latitude angle ii) Declination angle iii) Hour angle. (03 Marks)  
b. Explain various layers of the sun. (06 Marks)  
c. Derive a relationship between various sun angles. (07 Marks)

Module-2

- 3 a. Explain working of stirling or Brayton heat engine with a neat diagram. (06 Marks)  
b. Explain solar dryers. (06 Marks)  
c. Mention the applications of solar cell systems. (04 Marks)

OR

- 4 a. Explain the I-V characteristics of solar cells. (06 Marks)  
b. Write a short note on solar cell materials. (04 Marks)  
c. Explain working of solar cooker. (06 Marks)

Module-3

- 5 a. Briefly explain various electrolytic hydrogen production technologies. (06 Marks)  
b. Explain various factors in wind turbine site selection. (06 Marks)  
c. Mention various advantages and disadvantages of waste recycling. (04 Marks)

OR

- 6 a. With a net diagram, explain working of double flash type geo thermal electric power generation. (07 Marks)  
b. With the help of block diagram briefly explain waste recovery management scheme. (06 Marks)  
c. List the uses of hydrogen energy. (03 Marks)

Module-4

- 7 a. Explain the working of down draft gassifier with chemical equations. (07 Marks)  
b. Explain the working of fixed dome type biogas plant. (06 Marks)  
c. List the advantages and disadvantages of tidal power. (03 Marks)

1 of 2

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.

OR

- 8 a. Explain the working of two basin system for tidal power generation. (09 Marks)  
b. Explain various stages of cooling and cleaning of gasifiers gas. (07 Marks)

**Module-5**

- 9 a. Explain working of salters duck system for harnessing sea wave energy. (08 Marks)  
b. Explain open cycle Ocean Thermal Energy conversion technique. (08 Marks)

OR

- 10 a. Explain working of oscillating water column device for harnessing sea wave energy. (08 Marks)  
b. List the advantages, disadvantages and benefits of OTEC system. (08 Marks)

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15EE563

**Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020**  
**Renewable Energy Sources**

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

Module-1

- 1 a. Explain the causes of energy scarcity. What are the solution to energy scarcity and limitations of renewable energy sources? (09 Marks)
- b. Explain the factors affecting energy resources development. (04 Marks)
- c. Explain the classification energy resources. (03 Marks)

OR

- 2 a. With reference to the solar radiation geometry define the following :  
Declination Angle( $\delta$ ), Latitude angle( $\phi$ ), Solar Altitude Angle( $\alpha$ ), Surface Azimuth Angle( $\gamma$ ). (06 Marks)
- b. Calculate Zenith angle of the sun at Lucknow ( $26.75^\circ\text{N}$ ) at 9.30AM on February 16, 2014. (04 Marks)
- c. Write the short notes on the following :  
i) Beam and diffuse radiation and  
ii) Solar constant. (06 Marks)

Module-2

- 3 a. With a neat sketches, discuss the important parts of any flat plate collector? Discuss the material aspects of individual parts. (08 Marks)
- b. What are the advantages and disadvantages of concentrating collectors over a flat plate collectors. (08 Marks)

OR

- 4 a. Write a notes on the following :  
i) Solar water heating system  
ii) Solar pond power generation. (06 Marks)
- b. Explain the principle of solar photovoltaic power generation? What are main parts of solar PV systems? (05 Marks)
- c. What are the major advantages and disadvantages of solar PV systems? (05 Marks)

Module-3

- 5 a. State and explain briefly the methods of hydrogen production technologies. (05 Marks)
- b. What are the applications, advantages and disadvantages of hydrogen energy? (07 Marks)
- c. Mention the problems associated with the development and application of hydrogen energy. (04 Marks)

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OR

- 6 a. Explain the considerations and guidelines for the site selection of wind power generation. (05 Marks)  
b. Explain any one type of geothermal based electric power generation. (06 Marks)  
c. What are the advantages and disadvantages of horizontal – axis wind turbine? (05 Marks)

**Module-4**

- 7 a. Explain the theory of biomass gasification? List the classification and applications of biomass gasifiers. (04 Marks)  
b. Explain with figures up draft and down draft gasifiers? What are their uses above gasifiers. (08 Marks)  
c. What are the main applications of gasifiers. (04 Marks)

OR

- 8 a. What is biogas? Explain with block diagram and main stages (process) of Anaerobic digestion. (05 Marks)  
b. Explain the construction and working of a typical biogas plants. (06 Marks)  
c. What are the advantages and disadvantages tidal power generation? (05 Marks)

**Module-5**

- 9 a. Discuss the principle and working of sea wave energy. What are the limitations sea wave energy conversion? (05 Marks)  
b. What are the advantages and disadvantages of sea wave power? Limitations of sea wave power. (06 Marks)  
c. Write a note on devices for harnessing wave energy. (05 Marks)

OR

- 10 a. Explain the principle of OTEC? Explain the basic Rankine cycle and its working. (05 Marks)  
b. With block diagram, explain the working of open cycle OTEC. (05 Marks)  
c. What are the advantages, disadvantages and benefits of OTEC? (06 Marks)

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17EE563

**Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020**  
**Renewable Energy Resources**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

Module-1

- 1 a. Explain causes of energy scarcity. (06 Marks)  
 b. Classify the energy resources. What are the factors affecting energy resource development. (08 Marks)  
 c. Discuss Indian renewable energy availability. (06 Marks)

OR

- 2 a. With the help of a diagram. Define : (08 Marks)  
 i) Hour angle  
 ii) Latitude angle  
 iii) Solar Azimuth angle  
 iv) Declination angle.  
 b. Explain basic Rankine cycle of electricity production. (04 Marks)  
 c. Briefly explain any six solar thermal energy applications. (08 Marks)

Module-2

- 3 a. With a neat sketch discuss the operation of solar flat plate air and liquid collectors. (08 Marks)  
 b. Explain the advantages of solar pond? Discuss the operation of a solar pond with neat diagram. (06 Marks)  
 c. Discuss solar space cooling and solar cookers working and uses. (06 Marks)

OR

- 4 a. Explain about solar cell materials. (06 Marks)  
 b. Discuss the various applications of solar cell systems. (06 Marks)  
 c. Explain I-V characteristics of a solar cell. Discuss the efficiency of a solar cell. (08 Marks)

Module-3

- 5 a. Discuss the advantages of hydrogen energy. (06 Marks)  
 b. Explain different hydrogen production technologies. (06 Marks)  
 c. Discuss the considerations and guidelines for wind turbine site selection. Also explain worldwide wind energy scenario. (08 Marks)

OR

- 6 a. With a neat diagram, explain any two types of Geothermal Based Electric power generations. (08 Marks)  
 b. With a block diagram briefly explain waste recovery management scheme. (08 Marks)  
 c. Discuss the recycling of plastics. (04 Marks)

1 of 2

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**Module-4**

- 7 a. Explain how biomass production takes place. (06 Marks)  
b. With a neat sketch, explain updraft and down draft gasifiers. (08 Marks)  
c. Explain advantages and uses of Biogas. (06 Marks)

OR

- 8 a. Explain the single basin and two basin systems of tidal power harnessing. (08 Marks)  
b. With a neat diagram, explain floating dome type biogas plant. (08 Marks)  
c. Discuss the tidal Power Generation in India. (04 Marks)

**Module-5**

- 9 a. Explain the various devices for Harnessing wave energy. (06 Marks)  
b. What are the advantages and disadvantages of wave power? (06 Marks)  
c. Explain open cycle and closed cycle OTEC techniques. (08 Marks)

OR

- 10 a. With a neat diagram, explain oscillating water column device for harnessing sea wave energy. (08 Marks)  
b. Explain basic OTEC hybrid cycle. (06 Marks)  
c. What are the advantages disadvantages and benefits of OTEC? (06 Marks)

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