



**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)

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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