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## Question Paper Code : X10902

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020

Fifth/Seventh Semester

Civil Engineering

ORO 551 – RENEWABLE ENERGY SOURCES

(Common to Aeronautical Engineering/Agriculture Engineering/Automobile Engineering/Biomedical Engineering/Electronics and Communication Engineering/Electronics and Telecommunication Engineering/Environmental Engineering/Industrial Engineering/ Industrial Engineering and Management/ Manufacturing Engineering/Marine Engineering/Material Science and Engineering/Mechanical Engineering/Medical Electronics/Petrochemical Engineering/Production Engineering/Bio Technology/Chemical Engineering/ Chemical and Electrochemical Engineering/Fashion Technology/ Food Technology/Handloom and Textile Technology/Petrochemical Technology/ Petroleum Engineering/Pharmaceutical Technology/Textile Chemistry/Textile Technology/Mechanical Engineering (Sandwich)/ Aerospace Engineering)  
(Regulation 2017)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A

**(10×2=20 Marks)**

1. What is solar constant and what is its value ?
2. Mention the instruments used for solar radiation and type of solar radiation measured using each instrument.
3. Specify the applications of flat plate solar collectors.
4. Define concentration ratio of solar collector.
5. What is meant by solar pond ?
6. List the different modes of solar cooling.
7. How wind is created on earth surface ?
8. Classify the bio-mass resources.
9. List out the advantages of wave energy generation.
10. Write the principle of Magneto Hydro Dynamic energy conversion.

**PART – B****(5×13=65 Marks)**

11. a) Discuss about the terrestrial and extraterrestrial solar radiation.  
Derive the equation for solar radiation falling on a tilted surface. (13)  
**OR**  
b) Describe the various non-conventional energy resources available in India and its potential to supplement the conventional energy sources. (13)
12. a) Describe the characteristics and types of flat plate solar collectors. (13)  
**OR**  
b) Discuss about the features of different types of concentrating type solar collectors. Discuss about its applications. (13)
13. a) Draw illustrative diagram showing all the important components of solar heating and solar cooling unit. Explain the working principles of these devices. (13)  
**OR**  
b) Explain the principle of solar photovoltaic energy conversion system. Explain the working of grid connected solar power plant. (13)
14. a) Describe with a neat sketch the working of a wind energy conversion system (WECS) with its main components. (13)  
**OR**  
b) Explain continuous and batch type biogas plants and compare them with regard to operation and efficiency. (13)
15. a) Draw the layout of geothermal power plant and explain its operation. Enumerate the advantages and disadvantages of geothermal plant. (13)

**OR**

- b) Draw and explain the following types of ocean thermal energy conversion (OTEC) systems i) Open OTEC ii) Closed OTEC. (13)

**PART – C****(1×15=15 Marks)**

16. a) Evaluate the methods to use the solar data for solar energy generation forecasting. (15)  
**OR**  
b) Derive the equation for power developed in a wind turbine. Also derive the Betz limit for wind turbines from the basic principles. (15)