

CS/B.Tech/ECE/Even/8th Sem/EC-802C/2014

- c) With suitable diagram, discuss the water heating process by using solar energy. (5+5+5=15)
9. What is meant by geo-thermal energy? By what methods this energy is extracted? What are the difficulties and disadvantages of a geo-thermal generation? What are the possible sources of geo-thermal pollution? How are these avoided? (2+2+4+4+3)
10. a) What is the basic principle of tidal power? Explain single basin, single effect tidal energy conversion Scheme.
- b) A single basin type tidal power plant has a basin area of 2 km^2 . The tide has an average range of 13 m. Power is generated only during the ebb cycle. The turbine stops operating when the head on it falls below 3 m. Calculate the average power generated by the plant in single emptying process of the basin if the turbine generator efficiency is 0.7. Estimate the average annual energy generation of the plant.
- c) Write down the limitations of tidal power schemes. (6+5+4)
11. a) Draw the equivalent circuit of a practical solar cell and describe its I-V characteristics. Also give a brief idea about the effect of variation of insulation and temperature.
- b) Describe briefly the following:
- i) Stand alone solar PV system.
- ii) Grid interconnected solar PV system. (4+3+4+4)

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2014

Renewable Energy

Time Alloted : 3 Hours

Full Marks : 70

The figure in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable

GROUP - A

(Multiple Choice Type Questions)

- 1. Choose the correct alternatives of the following:** 10x1=10
- i) Nominal power rating of a typical single PV cell when exposed to full sun light is
- a) 1.5W b) 0.33 W
c) 2.5 W d) 1.25 W
- ii) Wave energy is basically harnessed in the form of
- a) Electrical energy b) Thermal energy
c) Mechanical energy d) chemical energy
- iii) In a Fuel cell which energy converts into electrical energy?
- a) chemical b) kinetic
c) mechanical d) radioactive
- iv) For a high temperature range which fuel cell we generally use?
- a) solid oxide b) hydrogen-oxygen
c) Molten carbonate d) fossil fuel cell

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[Turn over]

- v) Kaplan turbine is a
- impulse turbine
 - mixed flow turbine
 - axial flow turbine
 - none these.
- vi) The tidal range is
- the highest level of tidal water
 - the lowest level of tidal water
 - the level difference between high and low
 - none of these.
- vii) The energy flux in waves is
- Less than that in wind energy
 - More than that in wind energy
 - Comparable to that in wind energy
 - More than that in wind energy but less than solar energy
- Viii) The use of Pelton wheel is desirable for the conditions of
- High head and low discharge
 - Low head and high discharge
 - High head and high discharge
 - Low head and low discharge
- ix) Wave energy is basically harnessed in the form of
- Thermal energy
 - chemical energy
 - mechanical energy
 - electrical energy
- x) Which type of Generator is employed in wind power plant:
- Synchronous generator
 - Induction generator
 - Permanent magnet motor
 - Brushless motor

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. 3x5=15

2. What are the advantages and disadvantages of Small Hydro schemes?

- Explain the basic principle of tidal energy.
- What are the main advantages and disadvantages of biomass energy?
- What are the basic instruments use in tidal power generation and also write the advantages of Tidal power generation.
- What are the different resources of geothermal power generation also write down the advantages of geothermal power generation.

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. 3x15=45

7. a) What are the factors affecting the distribution of wind energy on the surface of the Earth?
- b) The following data were measured for a Horizontal Axis Wind Turbine (HAWT):
- Speed of wind=20 m/s at 1 atm and 27° C
- Diameter of rotor=80 m
- Speed of rotor=40 rpm
- Calculate the torque produced at the shaft for maximum output of the turbine.
- c) Briefly describe Horizontal Axis Wind Turbine (HAWT).
- d) What are the speed control strategies for wind turbine?

(3+4+6+2=15)

8. a) Briefly describe Stand Alone Solar Photo Voltaic System.
- b) A PV system feeds a dc motor to produce 1 hp power at the shaft. The motor efficiency is 85%. Each module has 36 multi crystalline Silicon solar cells arranged in 9X4 matrix. The cell size is 125mmX 125mm and the cell efficiency is 12%. Calculate the number of modules required in the PV array. Assume global radiation incident normally to the panel as 1kW/m².