MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PE-EE501C/PE-EEE501C Renewable & Non Conventional Energy

UPID : 005529

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer *any ten* of the following : [1 x 10 = 10]

(I) In fuel cell which gas is primarily used as a fuel?

(II) A renewable resource is a infinite resource & inexhaustible. TRUE or FALSE?

(III) Photovoltaic energy is the conversion of sunlight into_____

(IV) Which generators are normally equipped with Wind Energy Conversion Systems?

(V) What is Biomass energy or bio-energy?

(VI) The temperature in the crust increases with depth at a rate of about
(a) 300 Deg C/km (b)10 Deg C/km (c)1 Deg C/km (d) 30 Deg C/km

(VII) Ocean Waves possess potential (P.E) and also kinetic energy (K.E). True or False?

(VIII) In MHD power generation the magnitude of a force acting on a charges particle with velocity *u* having charge *q* is given by _____.

(IX) How is hydrogen gas produced from fossil fuels?

(X) The most popular application of hydrogen fuel cell is_____
a) vehicles b) power plants c) stand-alone power supplies d) spacecraft

(XI) What is Kyoto Protocol?

(XII) Why bypass diodes are used in solar cell?

Group-B (Short Answer Type Question)

Answer *any three* of the following : [5 x 3 = 15]

2. What are the different Hydrogen Production methods? What is the major difficulty of use of Hydrogen Energy? [5]

3. Draw the *energy flow diagram* of different Biomass energy sources for harnessing Electrical Energy [5]

4. What are the different Ocean energy sources? Explain the cause of generation of Ocean *Tidal energy*. [5]

5. What are the various types of Geothermal Resources? Explain the origin of the Geothermal energy. [5]

6. What is *polarization* effect in a fuel cell. Explain the polarization curve (voltage-current characteristics) of the cell. [5]

Group-C (Long Answer Type Question)

Answer *any three* of the following : [15 x 3 = 45]

7. (a) Explain advantages and disadvantages of onshore and the offshore type of wind farm. [4]
   (b) Draw a block-diagram of the general components of Wind Energy Conversion System (WECS) with proper identification. [8]
   (c) Why induction generators are preferred compared to DC and synchronous generator in WECS system? [3]

8. (a) What are the advantages of the geothermal energy over the conventional fossil fuel. [3]
   (b) Explain the resource identification techniques for the selections of sites of the geothermal plant. [8]
   (c) Give an overview on the prospects of geothermal sites for the development of geothermal energy in India. [4]

9. (a) Classify various Wave Energy Conversion machines on the basis of actuating motion used in capturing the wave power. [2]
   (b) Explain with diagram the operations of different kind of Heaving float type wave machines for harnessing wave energy. [10]
   (c) Explain how a tapered channel (TAPCHAN) device can be utilized for capturing wave energy. [3]

10. (a) Explain the operating mechanism of a Solar Photovoltaic (PV) system. [4]

(b) Write down the names of different types of commercially available solar modules and their features. [3]

(c) Draw the solar cell characteristics and hence explain the *dark current*, *short-circuit current* and *maximum power point (MPP)* [8]

11. (a) What is gasification process of Biomass? Write the name of the producer gases which are extracted in biomass gasification process? [3]

(b) Classify different types of biogas gasifier and their various operating zones. What is *pyrolysis*? [4]

(c) Explain the operation of a *updraft* gasifier indicating various process zones. What is the disadvantage of this type of gasifier? [8]

*** END OF PAPER ***