



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.TECH(ICE)/SEM-8/EE-802G/2012**

**2012**

**NON-CONVENTIONAL ENERGY SOURCES**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

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

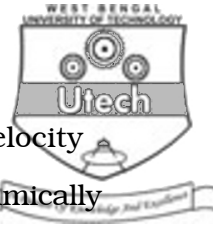
**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) Low temperature ( up to 60°C ) pyrolysis is known as
  - a) solidification
  - b) liquefaction
  - c) carbonization
  - d) gasification.
- ii) The maximum efficiency of a silicon solar cell is fabricated from
  - a) amorphous Si
  - b) monocrystal Si
  - c) polycrystal Si
  - d) Ferro - Si.
- iii) PV module formed by number of solar cells connected in
  - a) series
  - b) parallel
  - c) star
  - d) series-parallel.



- iv) Output of a wind turbine varies on air velocity
  - a) exponentially
  - b) logarithmically
  - c) linearly
  - d) cubically.
- v) Solar insolation on a clear day on the equator at mean sea level is
  - a)  $1 \text{ MW/m}^2$
  - b)  $1 \text{ kW/m}^2$
  - c)  $1 \text{ W/m}^2$
  - d)  $1 \text{ mW/m}^2$ .
- vi) Boiling point of isobutane is
  - a)  $10^\circ\text{C}$
  - b)  $30^\circ\text{C}$
  - c)  $50^\circ\text{C}$
  - d)  $70^\circ\text{C}$ .
- vii) Application of steam and hot water from wet geothermal reservoirs is
  - a) electric vehicle
  - b) space craft
  - c) room heating for buildings
  - d) fuel cell.
- viii) Double basin arrangement is a class of
  - a) solar pond power plant
  - b) biogas power plant
  - c) large wind power generator
  - d) tidal power plant.
- ix) Tidal power is directly proportional to
  - a) square root of tidal range
  - b) square of tidal range
  - c) logarithm of tidal range
  - d) proportional to tidal range.



- x) For wind power generation, it is possible to use
- amplidyne
  - linear motor-generator set
  - induction motor
  - induction generator.
- xi) The variation of short circuit current of solar cell with insolation is
- constant
  - linear
  - exponential
  - unpredictable.
- xii) Waves are generated in oceans or large lakes
- due to season changes
  - by the underwater rocks
  - by the force winds
  - du to rainbow.

### GROUP – B

#### ( Short Answer Type Questions )

Answer any *three* of the following.  $3 \times 5 = 15$

- State the advantages and limitations of non-conventional energy systems.
- What is greenhouse effect ? State its cause and effective consequences ?
- Draw the cross-section of a Flat plate collector and discuss its operation.
- What is geothermal energy ? Discuss the generation of natural hot spring and its structure.
- Draw the cross-section of a typical solar PV cell and its equivalent circuit.



**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. a) Classify solar photovoltaic systems.  
b) Explain various types of solar cells based on the type of active material and the type of junction structure.  
c) Explain the I-V characteristics of a solar cell and define fill factor. What is the significance of fill factor ?  
 $3 + 6 + 6$
8. a) Explain how the variation of insolation and temperature affects the I-V characteristics of a cell.  
b) What are the major advantages and disadvantages of solar PV system ?  
c) What are various biomass resources and biofuels produced from them ?  
 $8 + 4 + 3$
9. a) Make a comparison between floating drum type and fixed dome type biogas plants with suitable diagrams.  
b) How is ethanol produced from various types of biomass ?  
c) What are the most favourable sites for installing of wind turbines ?  
 $8 + 3 + 4$
10. a) Explain the principle of operation of Horizontal Axis Wind Turbine ( HAWT ) with the help of a diagram.  
b) Derive the relation between extracted wind power and unperturbed wind speed by Betz Model.  
c) What is understood by pitch angle ?  
 $7 + 7 + 1$
11. Write short notes on any *three* of the following :  $3 \times 5$   
a) Ocean Thermal Energy Conversion ( OTEC )  
b) Magnetohydrodynamic Power Conversion ( MHD )  
c) Solar Pond Power Plant ( SPPP )  
d) Conversion of Wave Energy  
e) Tidal Energy Conversion.

