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 MW/m^2 b) 1 kW/m^2

c) 1 W/m^2 d) 1 mW/m^2 .

vi) Boiling point of isobutane is

a) 10°C b) 30°C

c) 50°C d) 70°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

a) amplidyne

b) linear motor-generator set

c) induction motor

d) induction generator.

xi) The variation of short circuit current of solar cell with insolation is

a) constant b) linear

c) exponential d) unpredictable.

xii) Waves are generated in oceans or large lakes

a) due to season changes

b) by the underwater rocks

c) by the force winds

d) du to rainbow.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. State the advantages and limitations of non-conventional energy systems.
3. What is greenhouse effect ? State its cause and effective consequences ?
4. Draw the cross-section of a Flat plate collector and discuss its operation.
5. What is geothermal energy ? Discuss the generation of natural hot spring and its structure.
6. 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 × 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 affcts 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 umperturbed 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 × 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.