Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/EIE (O) ICE (N)/SEM-8/EE-802G/2010

2010

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 : $10 \times 1 = 10$

i) The cause of Greenhouse effect is

a) depletion of ozone layer

b) decrease in N_2

c) increase in CO_2

d) depletion of H_2O layer.

ii) Sagar Island is renowned for its

a) Tidal power plant

b) Solar power plant

c) Geothermal power plant

d) Hydel power plant.

iii) Example of conventional energy source is

a) Coal b) Wind

c) Tidal d) Solar.

iv) A full tidal cycle is of the duration of

a) 6 hours

b) 12 hours

c) 12 hours 25·2 minutes

d) 24 hours.

v) Output of the wind turbine depends on air velocity

a) proportionally b) exponentially

c) cubically d) to the power 4.

vi) The maximum efficiency of a silicon solar cell is achieved when the cell is fabricated from

a) Monocrystal Si b) Polycrystal Si

c) Amorphous Si d) any other Si.

vii) The production of biogas through anaerobic digestion depends on slurry

a) temperature

b) temperature and pH value

c) pH value only

d) pressure.

viii) For wind power generation, it is possible to use

a) only induction generator

b) only synchronous generator

c) either induction or synchronous generator

d) *dc* generator.

ix) Fossil fuel will soon be exhausted because

a) it has limited storage

b) it is renewable

c) it is commercially used

d) thermal power plants use it.

x) Biomass energy is obtained from

a) inorganic matter b) crude material

c) organic matter d) radioactive material.

xi) Tidal energy is one type of

a) Renewable energy b) Cosmic energy

c) Conventional energy d) Ocean thermal energy.

GROUP – B

(Short Answer Type Questions)

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

2. Draw and explain the equivalent circuit of an ideal & practical solar PV cell.

3. Define the following parameters used in rotor design :

a) Pitch angle

b) Solidity

c) Tip speed ratio.

4. What are the advantages and limitations of non-conventional energy sources ?

5. Why is coal not considered as biomass energy source though it is originated from biomass ?

6. What is geothermal energy ? What are geothermal fields ?

1 + 4

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Derive the expression for power developed due to wind.

b) What factors are taken onto consideration in site selection for wind power generation ?

c) Discuss the advantages and disadvantages of wind power generation. 4 + 6 + 5

8. 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 ?

   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) Explain the principle of operation of a biomass gasifier.

   8 + 3 + 4

10. a) Discuss environmental effects and economics of non- conventional energy sources.

    b) What are energy sources ? Classify them.

    c) Discuss potential of non-conventional energy generation in India. 5 + 5 + 5

11. Write short notes on any *three* of the following : 3 × 5

    a) Vertical Axis Wind Turbrine (VAWT)

    b) Hot Dry Rock (HDR) resources

    c) Shadowing effect on solar cell

    d) Vapour dominated geothermal system.