Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(EE-OLD)/SEM-7/EE-703-D/2009-10

2009

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) Which of the following is not a non-conventional energy ?

   a) Geothermal b) Wind
   c) Nuclear d) Solar
   e) Tidal f) Biomass.

   ii) The present trend towards the non-conventional energy resources is due to

   a) pollutants released by fossil fuels
   b) increasing cost of fossil fuels
   c) limited stock of conventional fuels which are not renewable
   d) cheap availability of non-conventional energies
   e) zero pollution effect of non-conventional energies.

iii) An illuminated solar cell is

a) constant current device

b) constant voltage device

c) constant power output device

d) neither a constant current nor a constant voltage device.

iv) The standard value of solar constant as per National Aeronautics and Space Administration (NASA) is

a) 1150 W/m ^{2} b) 1353 W/m ^{2}

c) 2100 W/m ^{2} d) 1825 W/m ^{2} .

v) The energy radiated by the sun on a bright day is

a) 2·5 kW/m ^{2} b) 1·0 kW/m ^{2}

c) 500 W/m ^{2} d) 200 W/m ^{2} ,

vi) Power equation of the wind is given by

a) $P_w = \frac{1}{3} eA V^3$ b) $P_w = \frac{1}{2} eA V^2$

c) $P_w = \frac{\frac{1}{2} eA V^2}{A}$ d) $P_w = \frac{1}{2} eA V^3$.

vii) Geothermal energy field is available mainly in

a) hilly area b) volcanic area

c) offshore area d) desert area.

viii) Dutch type wind turbine has

a) two blades b) three blades

c) four blades d) five blades.

ix) Steam generated from ground water heated by the magma is called

a) magmatic steam b) meteoritic steam

c) both (a) & (b) d) none of these.

x) Maximum efficiency of a solar cell is around 20% when the cell is fabricated from

a) mono-crystalline Si b) Polycrystalline Si

c) amorphous Si d) any other Si.

xi) Dolphin mechanism is a method of extracting

a) solar energy b) wind energy

c) ocean wave energy d) geothermal energy.

GROUP – B

(Short Answer Type Questions)

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

2. a) Distinguish between Renewable and Non-renewable energy sources.

   b) State the different classes of electromagnetic radiation depending on wavelength.

3. a) What are the main types of Tidal power generation systems ?

   b) Explain what is meant by a tidal barrage.

4. What are the problems faced with conventional thermal and hydel power plants ?

5. Bring out the differences between pyrolysis and photosynthesis.

6. Write a short note on 'Hybrid system'.

GROUP – C

(Long Answer Type Questions)

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

7. 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

8. Define 'Betz Limit' and derive the expression for maximum power coefficient for wind turbine. Explain the following terms showing velocity duration and power duration curve of wind energy
   i) cutin speed
   ii) rated wind speed
   iii) cutout speed. 7 + 8

9. With probable chemical equations describe gasification of solid biomass in a down-draft gasifier. Give the average composition of biomass gasifier gas. 10 + 5

10. What is amourphous solar cell.
    Draw the equivalent circuit diagram of a solar cell & derive its figure of merit. Design a solar power system require to run the following loads for 5 hours duration :
    i) Lighting Load — 100 Watt.
    ii) Mechanical Load — 120 Watt.
    iii) Auxiliary Load — 250 Watt. 3 + 6 + 6

11. Write short notes on any *three* of the following : 3 × 5
    a) Demand side energy management..
    b) Environmental impact on biomass energy.
    c) Economics of non-conventional energy sources.
    d) Bio-diesel.
    e) Solar desalination