Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(BT)/SEM-7/BT-703B/2009-10

2009

RENEWABLE ENERGY TECHNOLOGY

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) Pyrolysis process is decomposition of organic matter in

a) presence of oxygen

b) absence of oxygen

c) oxygen deficient atmosphere

d) oxygen free or oxygen deficient atmosphere.

ii) The temperature range of water, from geothermal reservoir, used by Binary cycle power plant is

a) high (300°C – 500°C)

b) moderate (107°C – 182°C)

c) low (5°C – 25°C)

d) very high (500°C – 700°C)

iii) Producer gas mainly comprises
a) CO_2 , H_2 , O_2 b) CH_4 , N_2 , O_2
c) CO_2 , CO, CH_4 d) CO_2 , N_2 , CH_4 .

iv) Solar pond, an artificially designed pond, in which significant temperature rises in the lower region, is made possible by
a) preventing the phenomenon of convection
b) promoting the phenomenon of conduction
c) preventing the phenomenon of conduction
d) promoting the phenomenon of convection.

v) Solidity, one of the parameters for performance estimation of wind energy conversion system, is the ratio of
a) speed of blade and free stream wind speed
b) power extracted by rotor and power available in wind stream
c) blade area and swept frontal area (face area) of the machine
d) angular velocity and tip radius.

vi) Biogas mainly consists of
a) CO_2 and CH_4 b) CO_2 and H_2
c) H_2 S and N_2 d) CH_4 and H_2 S.

vii) The working principle of photovoltaic cells is mainly based on
a) Electric field b) Magnetic field
c) Electromagnetic field d) P-N junction.

viii) Electrochemical hydrogen production differs from biological hydrogen production by its requirement in
a) solar battery
b) high energy requirement
c) high conversion efficiency
d) all of these.

ix) The enzyme responsible for hydrogen evolution by green alga *Scenedesmus* under light conditions after being kept in anaerobic and dark conditions is
   a) hydrogenous b) nitrogenous
   c) nitrate reductase d) none of these.

x) Biosurfactants are compounds that contain
   a) hydrophobic moiety
   b) hydrophilic moiety
   c) both hydrophobic and hydrophilic moieties
   d) neutral moiety.

xi) Landfill gas is also known as
   a) ethane b) methane
   c) LPG d) CNG.

xii) Cyanobacteria and green algae are used for hydrogen production by
   a) Photosynthesis
   b) Fermentation
   c) Photorespiration
   d) Both photosynthesis and fermentation.

GROUP – B

(Short Answer Type Questions)

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

2. a) Radiant energy stored in plant as primary productivity, later on creates plant biomass or biomaterial. Comment.
   b) What is net primary productivity (NPP) ? 4 + 1

3. Explain in brief about geothermal reservoir and geothermal heat pumps. $2\frac{1}{2} + 2\frac{1}{2}$

4. What is solar collector ? Name different types of solar collector ? 1 + 4

5. "The manufacturing of photovoltaic cells also has its ill consequences on environment." Elaborate the statement.

6. Briefly describe rice husk based gasifier.

GROUP – C

(Long Answer Type Questions)

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

7. a) What is meant by energy plantation ?
   b) Mention its advantages and disadvantages.
   c) List some of the main plants proposed for the above purpose in India.
   d) Discuss any one biological route of conversion of biomass into energy. 3 + 5 + 2 + 5

8. a) What are the dirfferent schemes for the tidal energy conversion system ?
   b) Explain in brief about Simple single pool tidal system.
   c) A windmill with multiblade rotor lifts 3.03 m^3 /h of water through a head of 28 metre when the wind speed is 3.3 m/s. Calculate the power coefficient for a rotor diameter of 4.5 metre, assuming
      i) Transmission efficiency = 0.95
      ii) Pump efficiency = 0.70
      ii) Density of water = 996 kg/m^3 .
   d) What are the differences between nuclear fission and radioactivity ? 2 + 5 + 5 + 3

9. What are the different stages of anaerobic digestion involved in the production of biogas ? Describe these stages with a neat sketch and write the end products formed in each stage. 4 + 6 + 5

10. What is biophotolysis of water ? Give an account of direct biophotolysis and indirect biophotolysis as encountered in cyanobacterial species. 2 + 8 + 5

11. Write short notes on any *three* of the following : 5 + 5 + 5
    a) Biomass stoves
    b) Pyrolysis
    c) Ethanol production from biomass
    d) Microbial production of Xanthan gum.