RENEWABLE ENERGY TECHNOLOGY
(BIOT 4241)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

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

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) B5 indicates a blend with
(a) 5% biodiesel and 95% diesel fuel
(b) 95% biodiesel and 5% diesel fuel
(c) 50% biodiesel and 50% diesel fuel
(d) none of these.

(ii) Non edible oils for biodiesel production are obtained from
(a) Soybean (b) Jatropha
(c) Sunflower (d) Rapeseed.

(iii) Bio-oil production is maximum in which Pyrolysis process
(a) slow (b) fast
(c) flash (d) all of these.

(iv) Thousands of mirrors or curved metals are used to focus solar energy to make it very hot, in
(a) solar cells (b) solar heater
(c) solar furnace (d) solar battery.

(v) Biofuels obtained from algae are known as
(a) 1st Generation biofuels (b) 2nd Generation
(c) 3rd Generation biofuels (d) 4th Generation biofuels.

(vi) Which transesterification reaction is most frequently used at all biodiesel production sites
(a) acidic (b) basic
(c) neutral (d) enzymatic.

(vii) Which component in a Biomass will be the easiest one to be pyrolysed
(a) cellulose (b) lignin
(c) hemicellulose (d) proteins.

(viii) Black painted panels which are hanged at roofs to trap heat and energy from sun, are
(a) solar cells (b) solar heater
(c) solar furnace (d) solar battery.

(ix) Torrefaction is a part of which pyrolysis process
(a) slow (b) fast
(c) flash (d) all of these.

(x) Wind is beneficial resource of energy as it doesn't cause
(a) pollution (b) echo
(c) noise (d) sound.

Group - B

2. (a) What do you mean by Renewable Energy? What are the different types of Renewable Energy?

(b) Describe the barriers to Renewable Energy Technology.

(c) What do you mean by volatile matter in a biomass? What role does it play in combustion of biomass? How can you determine the volatile matter in a biomass?

(1 + 2) + 3 + (2 + 2 + 2) = 12

3. (a) What are the benefits of using Renewable Energy?

(b) What do you mean by moisture content in a biomass? What role does it play in combustion of biomass? How can you determine the moisture content in a biomass?

6 + (2 + 2 +2) = 12

Group - C

4. Briefly describe the process of Biodiesel production.

12

5. (a) What do you mean by Pyrolysis?

(b) Briefly describe the different processes of production of bioethanol from corn?

2 + 10 = 12

Group - D

6. (a) What are solar cells composed of? Why are these semi-conductor materials needed for construction of solar cells?

(b) Give an account of the different applications of solar cells.

(3 + 3) + 6 = 12

7. (a) How parabolic mirrors can be used to trap solar energy?

(b) What is the main principle mechanism behind working of a fuel cell.

6 + 6 = 12

Group - E

8. (a) Write an account of how (i) Flash Steam Plants and (ii) Binary Cycle Plants work for geothermal energy.

(b) Describe about Geothermal's positive effects.

(3 + 3) + 6 = 12

9. (a) What are CANDU reactors and give an account of its hazardous waste.

(b) Write an equation for fission of Uranium – 235.

(c) How do nuclear reactors work?

(3 + 3) + 3 + 3 = 12