

**RENEWABLE ENERGY TECHNOLOGY
(BIOT 4241)**

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 4 (four) from Group B to E, taking one from each group.*

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

Group – A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) Which component in a Biomass will be the easiest one to be pyrolysed
 - (a) Cellulose
 - (b) Lignin
 - (c) Hemicellulose
 - (d) Proteins
- (ii) High quality oil is comprised of
 - (a) High sulphur content and low weight
 - (b) Low sulphur content and high weight
 - (c) High sulphur content and high weight
 - (d) Low sulphur content and low weight
- (iii) Biogas is mainly made up of
 - (a) methane
 - (b) oxygen
 - (c) carbon-dioxide
 - (d) nitrogen
- (iv) Name the first step of anaerobic digestion of biomass
 - (a) hydrolysis
 - (b) acidogenesis
 - (c) acetogenesis
 - (d) methanogenesis
- (v) Which of the following country generate all their electricity using renewable energy?
 - (a) Iceland
 - (b) England
 - (c) USA
 - (d) China
- (vi) Which of the following is an example of passive solar technology?
 - (a) Photovoltaic
 - (b) Solar-furnace
 - (c) Active solar water heating systems
 - (d) Solar thermo mechanical systems
- (vii) Why are antifreeze solutions used as coolants in freezing climates?
 - (a) To increase boiling point of water
 - (b) To decrease boiling point of water
 - (c) Completeness
 - (d) All of these

- (viii) Which one of the following energy resources produces radioactive waste?
 (a) Tidal (b) Nuclear
 (c) Wave (d) None of the above
- (ix) Which of the following is the most prospective renewable energy source in India?
 (a) Solar Energy (b) Wind Energy
 (c) Geothermal Energy (d) None of the above
- (x) Which wind turbines have higher efficiency?
 (a) Vertical axis wind turbines (b) Horizontal axis wind turbines
 (c) Both (a) and (b) (d) None of (a) and (b)

Fill in the blanks with the correct word

- (xi) Indirect bio-photolysis is also known as _____.
- (xii) The process of converting the starch solution into viscous suspension is known as _____.
- (xiii) Bio-oil product is maximum in _____pyrolytic process.
- (xiv) The majority of charge carriers in an N-type semiconductor are _____.
- (xv) The nuclear radiation unit is _____.

Group - B

2. (a) Describe the different areas where Renewable Energy can be used. [[CO1](Remember/LOCQ)]
- (b) What do you mean by Heat of combustion in a Biomass? What role does it play in combustion of biomass? How can you determine the Heat of combustion in a Biomass? [[CO2](Remember/LOCQ)]
- (c) What is a slow pyrolysis? [[CO2](Apply/IOCQ)]
- 4 + (1.5 + 1.5 + 2) + 3 = 12**
3. (a) 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? [[CO1](Analyse/IOCQ)]
- (b) Write down some applications of renewable energy technologies in transportation? [[CO1](Remember/LOCQ)]
- (1.5 + 1.5 + 3) + 6 = 12**

Group - C

4. (a) Briefly describe the mechanism of Microbial Enhanced Oil Recovery. [[CO4](Describe/HOCQ)]
- (b) Explain the hydrogen production by microbial electrolytic cell. [[CO3](Explain/HOCQ)]
- 7 + 5 = 12**
5. (a) Explain the statement “high-sulfur crude oil is of lower quality”. [[CO2](Analyse/IOCQ)]

- (b) Describe the process of concentrating the bio-ethanol after it's production? [[C03](Describe/IOCQ)]
6 + 6 = 12

Group - D

6. (a) What is photovoltaic effect? Explain the use of semi-conductors in photovoltaic cells. [[C05](Analyze/HOCQ)]
 (b) Why doping is necessary for semi-conductors? [[C05](Apply/IOCQ)]
 (c) Distinguish between solar cells, arrays and modules. [[C05](Apply/IOCQ)]
4 + 4 + 4 = 12
7. (a) Illustrate the working principle of a solar pond? [[C05](Apply/IOCQ)]
 (b) Discuss in detail the various applications of solar ponds. [[C05](Understand/LOCQ)]
 (c) Analyse the difference between working of a fuel cell and chemical batteries. [[C05](Analyze/IOCQ)]
4 + 4 + 4 = 12

Group - E

8. (a) Discuss in detail how geothermal energy can be used directly in terms of heat and electricity purposes. [[C06](Analyze/IOCQ)]
 (b) Distinguish between flash and binary cycle plants. [[C06](Remember/LOCQ)]
 (c) Explain the difference between nuclear fission and nuclear fusion. Why hasn't nuclear fusion being used as a source of renewable energy alternative? [[C06](Apply/IOCQ)]
4 + 4 + 4 = 12
9. (a) What are different types of radioactive decay? [[C06](Remember/LOCQ)]
 (b) Discuss the various methods of measuring radiation decay. [[C06](Apply/IOCQ)]
 (c) Distinguish between linear and threshold model of radiation exposure. [[C06](Apply/IOCQ)]
4 + 4 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	28.13	55.21	16.66

