

**NON CONVENTIONAL ENERGY SOURCES
(AEIE 3243)**

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) Example of conventional energy source is
 - (a) coal
 - (b) wind
 - (c) tidal
 - (d) solar
- (ii) Which one of the following forms of energy leads to least environmental pollution in the process of its harnessing and utilisation?
 - (a) Nuclear energy
 - (b) Thermal energy
 - (c) Solar energy
 - (d) Geothermal energy
- (iii) PV module formed by number of solar cells connected in
 - (a) series
 - (b) parallel
 - (c) star
 - (d) series -parallel
- (iv) Trapped heat inside the earth is known as_____.
 - (a) Heat energy
 - (b) Kinetic energy
 - (c) Geothermal energy
 - (d) Thermal energy
- (v) The main constituent of biogas is
 - (a) methane
 - (b) carbon dioxide
 - (c) hydrogen
 - (d) hydrogen sulphide
- (vi) Ocean thermal energy is due to
 - (a) energy stored by waves in the ocean
 - (b) temperature difference at different levels in the ocean
 - (c) pressure difference at different levels in the ocean
 - (d) tides arising out in the ocean
- (vii) Output of a wind turbine varies on air velocity
 - (a) exponentially
 - (b) logarithmically
 - (c) linearly
 - (d) cubically

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- (viii) A fuel cell, in order to produce electricity, burns
(a) Helium (b) Nitrogen
(c) Hydrogen (d) None of the above
- (ix) Which of the following is a non-renewable source of energy?
(a) Wood (b) Sun
(c) Fossil fuels (d) Wind
- (x) Acid rain happens because
(a) sun leads to heating of upper layer of atmosphere
(b) burning of fossil fuels release oxides of carbon, nitrogen and sulphur in the atmosphere
(c) electrical charges are produced due to friction amongst clouds
(d) earth atmosphere contains acids

Group – B

2. (a) What are the barriers in the implementation of renewable energy system?
(b) Compare renewable and non- renewable energy sources.
 $7 + 5 = 12$
3. (a) What is solar constant? How can amount of solar radiations falling on a tilted flat surface be estimated?
(b) Write short note on:
(i) Solar water heating
(ii) Solar cooking.
 $(2 + 4) + (3 + 3) = 12$

Group – C

4. (a) What is wind energy? Describe the main components of a wind power plant.
(b) What are the factors taken onto consideration in site selection for wind power generation?
 $(2 + 5) + 5 = 12$
5. (a) Explain the I-V characteristics of a solar cell and define fill factor.
(b) What is the significance of fill factor?
(c) What are the major advantages and disadvantages of solar PV system?
 $(4 + 1) + 3 + 4 = 12$

Group – D

6. (a) With probable chemical equations describe gasification of solid biomass in an up-draft gasifier.

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- (b) Explain the process of commercial production of ethanol from biomass.

6 + 6 = 12

7. (a) What is fuel cell? What are various types of fuel cells? What are the advantages and disadvantages of a fuel cell?

- (b) What is plate tectonic theory and how is it related to geothermal energy?

(2 + 3 + 3) + 4 = 12

Group – E

8. (a) What do you understand by spring and neap tides? Derive an expression for power generated by a tidal system.

- (b) What are the factors affecting the feasibility of a tidal power plant?

(4 + 6) + 2 = 12

9. (a) What are the main types of ocean thermal energy conversion (OTEC) power plants? Describe their working of anyone type in brief.

- (b) What are the environmental impacts due to construction of OTEC?

(2 + 6) + 4 = 12

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