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) For a solar PV cell dark current is because of
(a) minority particles (b) majority particles
(c) Gamma particles (d) stream aquifers.

(ii) A full tidal cycle is duration of
(a) 6 hours (b) 12 hours
(c) 12 hours 25.2 minutes (d) 24 hours.

(iii) PV module formed by number of solar cells connected in
(a) series (b) parallel
(c) star (d) series–parallel.

(iv) Ocean wave energy can be effectively stored as
(a) hydrogen energy (b) electrical energy
(c) thermal energy (d) mechanical energy .

(v) Double basin arrangement is a class of
(a) solar pond power plant (b) biogas power plant
(c) large wind power generator (d) tidal power plant.

(vi) Fuel cells are
(a) carbon cell (b) hydrogen battery
(c) nuclear cell (d) chromium cell.

(vii) Biomass energy is obtained from
(a) inorganic matter (b) crude material
(c) organic matter (d) radioactive material.

(viii) A pyrheliometer is an instrument that measures
(a) diffuse solar radiation (b) scattered solar radiation
(c) beam solar radiation (d) total solar radiation.

(ix) The cause of greenhouse effect is
(a) depletion of ozone layer (b) decrease in N_2
(c) increase in CO_2 (d) depletion of H_2O layer.

(x) The value of solar constant is
(a) 1167 W/m^2 (b) 1367 W/m^2
(c) 1267 W/m^2 (d) 1067 W/m^2.

Group – B

2. (a) Explain the advantages and limitations of non-conventional energy sources.

(b) Discuss environmental effect of non-conventional energy sources.

(c) Distinguish between conventional and non-conventional energy sources.

5 + 5 + 2 = 12

3. (a) Discuss the uses of solar energy for heating purposes.

(b) How can solar thermal energy be used to supply potable drinking water in environmentally difficult places? Explain with neat sketch.

(c) Discuss the methods by which agriculture crops can be dried using solar energy.

3 + 5 + 4 = 12

Group – C

4. (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

5. (a) What is the condition of maximum output power from a wind turbine? Find its value.

(b) What factors are taken onto consideration in site selection for wind power generation?

(c) Discuss the advantages and disadvantages of wind power generation.

(5 + 2) + 2 + 3 = 12

Group – D

6. (a) State various biomass conversion processes.

   (b) Compare between biomass combustion and gasification.

   (c) Explain with neat sketch the working principle of fluidized bed biomass gasifier.

   (d) What do you mean by cogeneration?

3 + 2 + 5 + 2 = 12

7. (a) What are the types of fuel cell?

   (b) Discuss on hydrogen fuel cell.

   (c) What are geothermal fields?

   (d) In India, where is the geothermal energy available?

2 + 4 + 4 + 2 = 12

Group – E

8. (a) What do you understand by spring and neap tides?

   (b) Derive an expression for power generated by a tidal system.

   (c) 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 any one type in brief.

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

(2 + 6) + 4 = 12