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NON-CONVENTIONAL ENERGY SOURCES

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 :

 $10 \times 1 = 10$

- i) The cause of Greenhouse effect is
 - a) depletion of ozone layer
 - b) decrease in N_2
 - c) increase in CO₂
 - d) depletion of H₂O layer.
- ii) Sagar Island is renowned for its
 - a) Tidal power plant
 - b) Solar power plant
 - c) Geothermal power plant
 - d) Hydel power plant.
- iii) Example of conventional energy source is
 - a) Coal

b) Wind

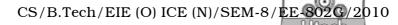
c) Tidal

d) Solar.

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- iv) A full tidal cycle is of the duration of
 - a) 6 hours
 - b) 12 hours
 - c) 12 hours 25·2 minutes
 - d) 24 hours.
- v) Output of the wind turbine depends on air velocity
 - a) proportionally
- b) exponentially
- c) cubically
- d) to the power 4.
- vi) The maximum efficiency of a silicon solar cell is achieved when the cell is fabricated from
 - a) Monocrystal Si
- b) Polycrystal Si
- c) Amorphous Si
- d) any other Si.
- vii) The production of biogas through anaerobic digestion depends on slurry
 - a) temperature
 - b) temperature and pH value
 - c) pH value only
 - d) pressure.
- viii) For wind power generation, it is possible to use
 - a) only induction generator
 - b) only synchronous generator
 - c) either induction or synchronous generator
 - d) dc generator.
- ix) Fossil fuel will soon be exhausted because
 - a) it has limited storage
 - b) it is renewable
 - c) it is commercially used
 - d) thermal power plants use it.



- x) Biomass energy is obtained from
 - a) inorganic matter
- b) crude material
- c) organic matter
- d) radioactive material.
- xi) Tidal energy is one type of
 - a) Renewable energy
- b) Cosmic energy
- c) Conventional energy
- d) Ocean thermal energy.

GROUP - B

(Short Answer Type Questions)

Answer any three of the following.

 $3 \times 5 = 15$

- 2. Draw and explain the equivalent circuit of an ideal & practical solar PV cell.
- 3. Define the following parameters used in rotor design :
 - a) Pitch angle
 - b) Solidity
 - c) Tip speed ratio.
- 4. What are the advantages and limitations of non-conventional energy sources?
- 5. Why is coal not considered as biomass energy source though it is originated from biomass?
- 6. What is geothermal energy? What are geothermal fields?

1 + 4

GROUP - C

(Long Answer Type Questions)

Answer any three of the following.

 $3 \times 15 = 45$

- 7. a) Derive the expression for power developed due to wind.
 - b) What factors are taken onto consideration in site selection for wind power generation?
 - c) Discuss the advantages and disadvantages of wind power generation. 4+6+5

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- 8. a) Classify solar photovoltaic systems.
 - b) Explain various types of solar cells based on the type of active material and the type of junction structure.
 - c) Explain the I-V characteristics of a solar cell and define fill factor. What is the significance of fill factor?

8 + 4 + 3

- 9. a) Make a comparison between floating drum type and fixed dome type biogas plants with suitable diagrams.
 - b) How is ethanol produced from various types of biomass?
 - c) Explain the principle of operation of a biomass gasifier.

8 + 3 + 4

- 10. a) Discuss environmental effects and economics of non-conventional energy sources.
 - b) What are energy sources? Classify them.
 - c) Discuss potential of non-conventional energy generation in India. 5 + 5 + 5
- 11. Write short notes on any *three* of the following: 3×5
 - a) Vertical Axis Wind Turbrine (VAWT)
 - b) Hot Dry Rock (HDR) resources
 - c) Shadowing effect on solar cell
 - d) Vapour dominated geothermal system.

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