

**SAMPLE PAPERS**  
**DIPLOMA FIFTH SEMESTER EXAMINATION 2025 ( JUT )**  
**RENEWABLE ENERGY TECHNOLOGY**  
**DIPLOMA WALLAH**

[CLICK HERE TO VISIT DIPLOMA WALLAH WEBSITE](#)

---

Full Marks: 70 marks | Time: 3 Hours

**Instructions:**

- Question No. 1 is compulsory.
- Answer any **FOUR** questions from the remaining (Q.2 to Q. 7 marks ).

---

**Q.1 Multiple Choice Questions (Compulsory) [2 × 7 = 14]**

(i) Solar cells are made of:

- (a) Conductor
- (b) Insulator
- (c) Semiconductor
- (d) Superconductor



(ii) The local solar time depends on:

- (a) Latitude
- (b) Longitude
- (c) Altitude
- (d) None of the above

(iii) The rotor blades of a wind turbine convert wind energy into:

- (a) Electrical Energy
- (b) Mechanical Energy
- (c) Heat Energy
- (d) Chemical Energy

(iv) Which fuel cell is most suitable for electric vehicles?

- (a) Molten Carbonate (MCFC)
- (b) Proton Exchange Membrane (PEMFC)

- (c) Solid Oxide (SOFC)
- (d) Phosphoric Acid (PAFC)
  
- (v) Gasification of biomass produces a gas mixture called:
  - (a) Biogas
  - (b) Producer Gas / Syngas
  - (c) Natural Gas
  - (d) LPG

- (vi) Which of the following is a disadvantage of Tidal Energy?
  - (a) Pollution free
  - (b) Renewable
  - (c) Intermittent (only during tides)
  - (d) High efficiency

- (vii) In a PV system, the function of a 'Charge Controller' is:
  - (a) To convert DC to AC
  - (b) To protect the battery from overcharging
  - (c) To track the sun
  - (d) To increase voltage

Q.2

- (a) Explain the difference between Focusing Type and Non-Focusing Type solar collectors with examples. [7 Marks]
- (b) Define Declination Angle, Hour Angle, and Zenith Angle in solar geometry. [7 Marks]

Q.3

- (a) Explain the Variable Speed and Constant Frequency scheme in wind power generation. Why is it used? [7 Marks]
- (b) List the important considerations for Site Selection for a Wind Power Plant. [7 Marks]

Q.4

- (a) Compare Hydrogen with other conventional fuels. What are the advantages and disadvantages of using Hydrogen as a fuel? [7 Marks]
- (b) Explain the methods of Hydrogen Storage (Gas, Liquid, and Solid state). [7 Marks]

Q.5

(a) Explain the process of Anaerobic Digestion in detail. What are the different stages involved? [7 Marks]

(b) Draw a neat diagram of a Pragati Biogas Plant and explain its working briefly. [7 Marks]

Q.6

(a) Explain the working principle of Ocean Thermal Energy Conversion (OTEC) using a Closed Cycle (Anderson Cycle) or Open Cycle diagram. [7 Marks]

(b) List the major components of a Small Hydroelectric Power Plant (SHP) and explain the function of the Penstock and Turbine. [7 Marks]

Q.7 Write Short Notes on (Any FOUR):  $[3.5 \times 4 = 14]$

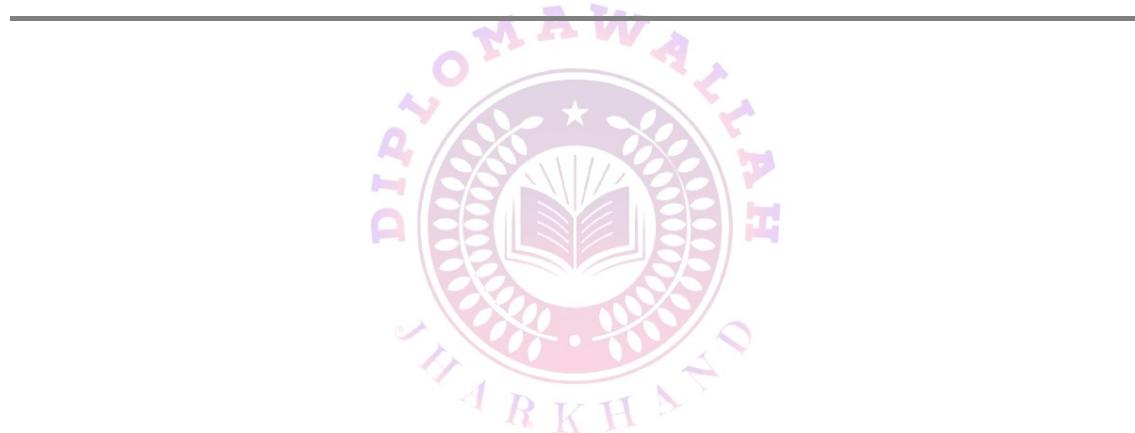
(a) Solar Azimuth Angle

(b) DFIG (Doubly Fed Induction Generator)

(c) Pyrolysis

(d) Wet vs Dry type Geothermal Plants

(e) Betz Limit



**SOLUTIONS FOR PAPER - 3**

MCQ Answers:

(i) c, (ii) b, (iii) b, (iv) b, (v) b, (vi) c, (vii) b

**Brief Hints for Theory:**

- **Q2(a): Focusing:** Concentrates light (e.g., Parabolic trough), high temp. **Non-focusing:** Absorbs as is (e.g., Flat plate), low temp.
- **Q3(b):** High wind speed, open terrain, near transmission lines, soil strength, away from migratory bird paths.
- **Q4(b):** Compressed Gas (Cylinders), Liquid H<sub>2</sub> (Cryogenic tanks, very cold), Metal Hydrides (Absorbed in metal lattice).
- **Q5(a):** Stages: Hydrolysis --> Acidogenesis --> Acetogenesis --> Methanogenesis.
- **Q6(a):** OTEC uses temp difference between warm surface water and cold deep water to vaporize a fluid (Ammonia) to turn a turbine.

