SAMPLE PAPERS

DIPLOMA FIFTH SEMESTER EXAMINATION 2025 (JUT)

RENEWABLE ENERGY TECHNOLOGY

DIPLOMA WALLAH

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Full Marks: 7 marks 0 | 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) A Pyranometer measures:

(a) Only Beam Radiation

(b) Only Diffuse Radiation

(c) Global (Total) Radiation

(d) Wind Direction

(ii) The angle between the sun's rays and the vertical direction is called:

(a) Zenith Angle

(b) Declination Angle

(c) Hour Angle

(d) Azimuth Angle

(iii) Which type of wind turbine is independent of wind direction?

(a) Horizontal Axis Wind Turbine (HAWT)

(b) Vertical Axis Wind Turbine (VAWT)

(c) Propeller type

(d) Multi-blade type

(iv) The process of splitting water into Hydrogen and Oxygen using electricity is called:

(a) Pyrolysis

(b) Gasification

(c) Electrolysis

(d) Fermentation

(v) Which of the following is NOT a biomass conversion process?

(a) Digestion

(b) Photosynthesis

(c) Gasification

(d) Fermentation

(vi) Small Hydro Power (SHP) plants typically have a capacity of:

(a) > 100 MW

(b) Up to 25 MW

(c) Up to 1000 MW

(d) None of these

(vii) OTEC stands for:

(a) Ocean Thermal Electric Conversion

(b) Ocean Tidal Energy Conservation

(c) Ocean Temperature Energy Cycle

(d) Ocean Thermal Energy Conservation

Q.2

(a) Differentiate between a Pyrheliometer and a Pyranometer. Explain their working principles briefly. [7 Marks]

(b) Explain the working principle of Solar Air Heaters. How are they different from liquid collectors? [7 Marks]

Q.3

(a) Define the following terms related to wind energy: Cut-in Speed, Cut-out Speed, Power Coefficient (Cp), and Betz Limit. [7 Marks]

(b) Draw the block diagram of a Wind Energy Conversion System (WECS) and explain the function of the Gearbox and Yaw Control mechanism. [7 Marks]

Q.4

(a) Explain the method of Hydrogen production using Electrolysis of water with a neat diagram. [7 Marks]

(b) What is Polarization in Fuel Cells? Briefly explain Resistance (Ohmic) Polarization. [7 Marks]

Q.5

(a) With a neat schematic diagram, explain the construction and working of a Floating Drum type (KVIC) Biogas plant. [7 Marks]

(b) Explain the difference between Batch type and Continuous type biogas plants. [7 Marks]

Q.6

(a) Explain the working principle of a Tidal Power Plant with a general arrangement diagram. [7 Marks]

(b) How are Small Hydroelectric Power Plants (SHP) classified into Micro, Mini, and Small? Explain their general arrangement. [7 Marks]

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

(a) Solar Photovoltaic (PV) Module

(b) Hazards of handling Hydrogen

(c) Geothermal Energy sources

(d) Lift and Drag forces on Wind Turbine Blades

(e) Solar Concentrating Collectors

SOLUTIONS FOR PAPER - 2

MCQ Answers:

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

Brief Hints for Theory:

- **Q2(a):** Pyrheliometer = Direct beam (uses long tube). Pyranometer = Global (uses glass dome).
- **Q3(a):** Cut-in: speed where generation starts. Cut-out: speed where turbine stops for safety. Cp: Ratio of output power to wind power.
- **Q5(a):** Diagram: Floating steel drum on top of slurry. Drum moves up/down based on gas volume. Constant pressure.
- **Q4(a):** Diagram: Tank with water + electrolyte, Anode, Cathode, DC supply. H_2 at Cathode, O_2 at Anode.
- **Q6(b):** Micro (<100kW), Mini (100kW-2MW), Small (2MW-25MW).
