Enrolment No./Seat No_____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2024**

**Subject Code:3170116 Date:07-12-2024**

**Subject Name:Solar and wind Energy**

**Time:10:30 AM TO 01:00 PM Total Marks:70**

**Instructions:**

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

| | | | MARKS |
|---|---|---|---|
| **Q.1** | **(a)** | State advantages and limitations of Renewable Energy. | **03** |
| | **(b)** | Define solar altitude angle, solar zenith angle, solar azimuth angle and declination angle. | **04** |
| | **(c)** | With a neat sketch explain the solar still. | **07** |
| **Q.2** | **(a)** | With a neat sketch, explain working of sunshine recorder. | **03** |
| | **(b)** | Explain criteria for site selection of wind energy conversion system. | **04** |
| | **(c)** | Discuss present energy scenario of renewable sources in India. What are the initiatives taken by Government of India to develop RE sources? | **07** |
| | | **OR** | |
| | **(c)** | Describe working of a flat plate collector using air as working fluid with a neat sketch. | **07** |
| **Q.3** | **(a)** | Compare solar flat plate and concentric collectors. | **03** |
| | **(b)** | Explain basic operational principles of solar cell. | **04** |
| | **(c)** | What is an hour angle? Determine the number of daylight hours in Gandhinagar on 22 December 2023, take latitude = 23 º 23’N. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Write a Short note on Solar Refrigeration system. | **03** |
| | **(b)** | Explain the working of solar drying system with neat sketch. Also discuss the advantages. | **04** |
| | **(c)** | With neat sketch explain solar heating system using water heating solar collectors. What are advantages and disadvantages of this system? | **07** |
| **Q.4** | **(a)** | Define following terms: Annual cost, present worth value, life cycle cost. | **03** |
| | **(b)** | Define following terms: Payback period, Inflation, benefit cost ratio | **04** |
| | **(c)** | How solar radiations are measured? Explain construction and working of Pyranometer with neat sketch. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Explain working of solar cooker. | **03** |
| | **(b)** | Describe classification of wind power plants. | **04** |
| | **(c)** | What is Betz limit? Prove that maximum power coefficient is Cp = 0.593 | **07** |
| **Q.5** | **(a)** | Explain in brief passive solar heating system. | **03** |
| | **(b)** | Advantages of photovoltaic solar energy conversion. | **04** |
| | **(c)** | Give step by step procedure for the design of a solar photovoltaic power plant. | **07** |

**OR**

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|---|---|---|---|
| **Q.5** | **(a)** | Explain the different heat losses in Flat plate Collector. | **03** |
| | **(b)** | With neat sketch explain drag and lift forces in wind power generation. | **04** |
| | **(c)** | What are solar ponds? Discuss the working of a solar pond with help of a neat sketch. | **07** |

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