



End Term (Odd) Semester Examination November 2025

Roll no.

Name of the Course and semester: **B.TECH/5th (ME)**

Name of the Paper: **Renewable Energy**

Paper Code: **TME 509**

Time: **3 hour**

Maximum Marks: 100

Note:

- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question is 20 (twenty).
- (iv) Each sub-question carries 10 marks.

- Q1. (2X10=20 Marks)
- a. Explain the current global energy scenario and the need for renewable energy transition and Discuss environmental impacts of conventional energy use. **CO1**
 - b. Explain solar radiation components and their measurement methods. **CO2**
 - c. Explain the construction and operation of solar ponds. **CO6**
- Q2. (2X10=20 Marks)
- a. Describe the design and working of a solar thermal power generation system. **CO5**
 - b. Explain the principle and working of a horizontal axis wind turbine and describe components of a wind turbine generator system. **CO3**
 - c. Explain biochemical pathways involved in biogas formation and describe utilization of biogas for domestic and industrial applications. **CO4**
- Q3. (2X10=20 Marks)
- a. Describe geothermal energy exploration methods and compare geothermal and solar energy in terms of sustainability. **CO5**
 - b. Explain dry steam, flash steam, and binary cycle geothermal plants. **CO5**
 - c. Explain the principle and working of a tidal barrage system and discuss future scope of marine renewable energy in India. **CO6**
- Q4. (2X10=20 Marks)
- a. Explain sustainable energy development and its pillars and discuss the role of government policies in promoting renewable energy. **CO1**
 - b. Explain how wind and solar hybrid systems work and discuss control strategies for hybrid renewable systems. **CO2/ CO3**
 - c. Explain biomass gasification process and its products. **CO4**
- Q5. (2X10=20 Marks)
- a. Explain the working and applications of Ocean Thermal Energy Conversion (OTEC) and discuss economic and environmental challenges of OTEC deployment. **CO5**
 - b. Describe bioenergy conversion technologies and their classification and explain how bioenergy contributes to carbon neutrality. **CO1/ CO4**
 - c. Explain the potential of mini-hydel power plants in India and discuss technical challenges in hydel power development. **CO5/ CO6**