**PVP 23**

Code: 23EE4501B

**III B.Tech - I Semester - Regular Examinations - NOVEMBER 2025**

# RENEWABLE ENERGY RESOURCES
## (ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

BL – Blooms Level CO – Course Outcome

## PART – A

| | | BL | CO |
|---|---|---|---|
| 1.a) | Explain solar insolation. | L2 | CO1 |
| 1.b) | Classify different types of concentrating collectors. | L2 | CO1 |
| 1.c) | Explain Betz's limit in Wind power. | L2 | CO1 |
| 1.d) | List out main applications of wind energy. | L3 | CO2 |
| 1.e) | Identify some organic materials used in bio-mass plant. | L2 | CO1 |
| 1.f) | Mention two operational problems in geothermal power plants. | L2 | CO1 |
| 1.g) | Explain tidal energy. | L2 | CO1 |
| 1.h) | Identify two limitations of wave energy. | L2 | CO1 |
| 1.i) | What are the advantages of MHD generation? | L2 | CO1 |
| 1.j) | Discuss two challenges in hydrogen storage. | L2 | CO1 |

## PART – B

| | | | BL | CO | Max. Marks |
|---|---|---|---|---|---|
| **UNIT-I** | | | | | |
| 2 | a) | Interpret the advantages of concentrating collectors over flat plate collectors. | L3 | CO2 | 4 M |
| | b) | Explain the I-V characteristics of a solar cell and define fill factor. What is the significance of fill factor? | L4 | CO4 | 6 M |
| **OR** | | | | | |
| 3 | a) | Interpret how solar radiation is analyzed when Incident on tilted surface. | L3 | CO2 | 4 M |
| | b) | Discuss the working principle of a solar pond and elaborate on its major applications in renewable energy systems. | L3 | CO2 | 6 M |
| **UNIT-II** | | | | | |
| 4 | a) | Discuss the nature of wind and the factors affecting the power available in the wind. | L2 | CO1 | 5 M |
| | b) | Show the disadvantages of WECS and explain briefly. | L3 | CO2 | 5 M |
| **OR** | | | | | |
| 5 | a) | Explain the operational characteristics of WECS. | L4 | CO4 | 5 M |
| | b) | Interpret the site selection considerations for setting up a Wind Energy Conversion System (WECS). | L3 | CO2 | 5 M |

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| **UNIT-III** | | | | | |
| 6 | a) | Interpret the factors affecting bio-digestion and their impact on biogas production. | L3 | CO3 | 5 M |
| | b) | Interpret about dry and wet fermentation process. | L3 | CO3 | 5 M |
| **OR** | | | | | |
| 7 | a) | Describe different types of geothermal sources and their utilization in power generation. | L3 | CO3 | 4 M |
| | b) | Interpret Mini hydel power plant with a neat sketch. | L3 | CO3 | 6 M |
| **UNIT-IV** | | | | | |
| 8 | a) | Illustrate OTEC methods with neat sketches. | L3 | CO3 | 5 M |
| | b) | Draw the schematic layout of a tidal powerhouse and interpret the power generation. | L3 | CO3 | 5 M |
| **OR** | | | | | |
| 9 | a) | Interpret in brief about wave energy conversion devices. | L3 | CO3 | 5 M |
| | b) | Discuss the prospects and potential of OTEC in India. | L2 | CO1 | 5 M |
| **UNIT-V** | | | | | |
| 10 | a) | Describe the fuel cell equivalent circuit and interpret the significance of each component. | L3 | CO3 | 6 M |

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| | b) | Interpret the advantages and limitations of fuel cells over conventional power generation methods. | L3 | CO3 | 4 M |
| **OR** | | | | | |
| 11 | a) | Describe the methods of hydrogen storage and discuss their applications in the energy sector. | L3 | CO3 | 5 M |
| | b) | Interpret the principle of operation of MHD power generation with a neat diagram. | L3 | CO3 | 5 M |