

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur (GIET University)



B. Tech (Sixth Semester - Regular) Examinations, April 2026

23BELOE36011 – Renewable Energy Sources

(EE & EEE)

Time: 3 hrs

Maximum: 60 Marks

Answer ALL questions
(The figures in the right-hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

	CO #	Blooms Level
a. Explain the concept and significance of fill factor in a solar cell.	CO1	K2
b. Discuss the importance of aerodynamics in wind turbines.	CO2	K2
c. Illustrate the process of fermentation in energy production.	CO3	K2
d. Summarize the working principle of Ocean Thermal Energy Conversion	CO4	K2
e. Explain the major limitations of electric vehicles.	CO5	K2

PART – B

(10 x 5 = 50 Marks)

Answer **ALL** the questions

	Marks	CO #	Blooms Level
2. a. Define renewable energy sources and discuss the different types of renewable energy sources along with their features, merits, and demerits	5	CO1	K2
b. Discuss conventional energy sources and their environmental impacts	5	CO1	K2
(OR)			
c. Discuss flat plate and concentrating solar collectors along with their features.	5	CO1	K2
d. Illustrate the functions of on-grid and off-grid solar PV systems along with their features	5	CO1	K2
3.a. Distinguish between horizontal-axis and vertical-axis wind turbines with relevant parameters.	5	CO2	K3
b. Summarize pitch control and yaw control, with their working principles.	5	CO2	K2
(OR)			
c. Develop an expression for the available power in the wind.	5	CO2	K3
d. Outline the concept of reactive power compensation in wind energy systems.	5	CO2	K2
4.a. Explain the process of bio-digestion (anaerobic digestion) and describe the composition and uses of biogas.	5	CO3	K2
b. Describe the different biomass conversion technologies with suitable examples.	5	CO3	K2
(OR)			
c. Explain the applications of geothermal energy in electricity generation and direct heating systems	5	CO3	K2
d. Describe different geothermal sources used for energy generation.	5	CO3	K2
5.a. Explain wave energy and describe the working principle of wave energy conversion devices.	5	CO4	K2

- | | | | | |
|------|--|---|-----|----|
| b. | Explain the basic principle of tidal energy generation with a neat diagram. | 5 | CO4 | K2 |
| (OR) | | | | |
| c. | Describe the working of a single basin tidal power plant and explain its operation. | 5 | CO4 | K2 |
| d. | Explain the double basin tidal power plant and discuss its advantages over the single basin arrangement. | 5 | CO4 | K2 |
| 6.a. | Explain the different methods of hydrogen storage and discuss the various applications of hydrogen energy. | 5 | CO5 | K2 |
| b. | Describe the types of fuel cells with their operating temperatures and applications. | 5 | CO5 | K2 |
| (OR) | | | | |
| c. | Explain the working principle of a Wind–PV hybrid energy system with a neat diagram | 5 | CO5 | K2 |
| d. | Describe the working principle of hybrid electric vehicles (HEVs) and explain the different operating modes. | 5 | CO5 | K3 |

--- End of Paper ---