

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

Principles of Alternative Energies

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks, L: Bloom's level, C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Define the following : (i) Solar declination (ii) Solar constant (iii) Solar altitude angle (iv) Zenith angle	10	L1	CO1
	b.	Sketch and explain the working of an Angstrom compensation pyrheliometer.	10	L2	CO2
OR					
Q.2	a.	Classify solar energy collectors. Explain the construction and working of a liquid flat plate collector.	10	L1	CO3
	b.	Sketch and explain the construction and working of a solar pond.	10	L2	CO2
Module – 2					
Q.3	a.	Classify wind energy conversion system. Explain the working of a Darrius type wind mill.	10	L2	CO3
	b.	Derive an expression for power developed due to wind, starting from the fundamentals. Determine the percentage change in theoretical power if the wind velocity is halved.	10	L3	CO4
OR					
Q.4	a.	Sketch and explain the working of a horizontal axis wind turbine.	10	L2	CO3
	b.	Determine (i) tip speed ratio (ii) torque coefficient (iii) torque available at rotor shaft of a wind turbine of 5 m rotor diameter, rotating at 130 rpm, at 10 m/s wind velocity. Consider the density of air as 1.24 kg/m ³ and C _p = 0.35	10	L3	CO4
Module – 3					
Q.5	a.	With an illustrative sketch the nature of geothermal field. Mention different geothermal sources.	10	L2	CO2
	b.	Sketch and explain a vapour dominated geothermal plant.	10	L3	CO3

OR					
Q.6	a.	How heat extraction is done from hot dry rocks? Discuss with schematic sketch.	10	L2	CO2
	b.	List out and discuss the operational and environmental problems of geothermal energy systems.	10	L3	CO3
Module – 4					
Q.7	a.	Sketch and explain the working of an open cycle OTEC power plant.	10	L2	CO2
	b.	With an illustrative diagram, discuss the working of a simple single pool tidal energy system.	10	L3	CO3
OR					
Q.8	a.	Draw a schematic layout of a tidal power plant and explain the major components.	10	L2	CO2
	b.	Discuss the principle of operation of wave energy. Explain the construction and working of a wave energy conversion by floats.	10	L3	CO3
Module – 5					
Q.9	a.	Explain simple electrolysis process leading to hydrogen energy generation. List and discuss any four applications of hydrogen energy.	10	L3	CO4
	b.	Briefly discuss the following : (i) Hydrogen storage methods (ii) Hydrogen transportation	10	L2	CO2
OR					
Q.10	a.	Sketch and explain the working of a bulb type turbine.	10	L2	CO3
	b.	What are the design considerations of mini and micro hydel projects on civil works?	10	L3	CO4
