Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (R,S)(FT/PT/WP) Examinations April 2026 (2019 Scheme)

Course Code: MET458
Course Name: ADVANCED ENERGY ENGINEERING

Max. Marks: 100 **Duration: 3 Hours**

PART A
Answer all questions, each carries 3 marks.

		Marks
1	List any three differences between renewable and non-renewable energy sources?	(3)
2	Explain the functions of a moderator and control rod in a Nuclear Reactor	(3)
3	Define concentration ratio of a solar collector and classify solar collectors based on its value?	(3)
4	State any three applications of wind energy?	(3)
5	What is biogas? List the average composition.	(3)
6	Explain the process of pyrolysis and identify its main products.	(3)
7	Describe the environmental benefits of geothermal energy	(3)
8	What are the major challenges in hydrogen storage?	(3)
9	Define Thermal pollution? What are the main sources of thermal pollution	(3)
10	What are the different ways to mitigate ozone layer depletion?	(3)

PART B
Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	What is Nuclear Energy? Briefly describe fission and fusion reactions	(7)
	b)	With a neat sketch explain the working principle of a Boiling Water Nuclear Reactor (BWR).	(7)

OR

12		Draw a general layout of Thermal Power Plant and explain the working of different circuits	(14)

Module II

13	a)	With neat labelled schematic diagrams explain the working of a parabolic trough collector and paraboloidal dish collector.	(10)
	b)	State four advantages of photovoltaic solar energy conversion.	(4)

OR

14 a) What are the different configurations of Wind Turbines? Explain with simple sketches (10)

b) What do you mean by a) tip speed ratio b) performance coefficient, of a wind turbine. (4)

Module III

15 a) Explain the process of converting biomass into heat and electricity through direct combustion, with a neat sketch. (8)

b) List three key environmental benefits of thermochemical biomass conversion over conventional fossil fuel combustion. (6)

OR

16 a) What are the key steps involved in the Biomass gasification process, and explain how each step contribute to the formation of producer gas? (10)

b) Comment on the suitability of Biodiesel as an IC engine fuel? (4)

Module IV

17 a) Explain the working principle of MHD power generation with a neat sketch. (8)

b) State any three advantages and disadvantages of using hydrogen as a fuel. (6)

OR

18 Explain the components and working principle of a fuel cell with a neat sketch. (14)

Module V

19 a) Explain Greenhouse effect. What are the major Greenhouse gases and their sources? (10)

b) Explain the effects of acid rain. (4)

OR

20 a) What is water pollution? List five sources of water pollution. (7)

b) Write a short note on environmental impact of biomass energy (7)

****