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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (S,FE) Examinations September 2026 (2019 Scheme)

Course Code: ECT468

Course Name: RENEWABLE ENERGY SYSTEMS

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

PART A

Answer all questions, each carries 3 marks. Marks

1		Compare and contrast conventional and renewable energy sources in terms of sustainability and environmental impact	(3)
2		Discuss the role of biomass energy in sustainable energy production.	(3)
3		Describe the basic I-V characteristics of a PV cell.	(3)
4		Explain the concept of Maximum Power Point Tracking (MPPT) in PV systems.	(3)
5		What are the key factors that determine the potential of wind energy in a region?	(3)
6		How does a capacitor bank assist in fixed-speed wind power generation	(3)
7		What is the role of power control and management systems in grid integration	(3)
8		What is the influence of photovoltaic (PV) and wind energy conversion systems (WECS) on system transient response?	(3)
9		What is a smart grid? List its key features.	(3)
10		Draw the hardware architecture of smart meters	(3)

PART B

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

Module I

11	a)	Why is there an urgent need to shift from conventional to renewable energy sources.	(7)
	b)	What are conventional energy sources? Explain their advantages and disadvantages.	(7)

OR

12	a)	What are biofuels? Explain their types, benefits, and limitations.	(7)
	b)	Explain how geothermal energy is harnessed and its potential as a renewable energy source.	(7)

Module II

13 a) Explain the working principle of photovoltaic (PV) conversion with a suitable diagram (7)

b) Describe the fabrication process of thin-film PV devices using LPCVD, APCVD, and PECVD techniques. (7)

OR

14 a) Discuss the operation of PV-inverters without D.C. to D.C. converters in solar power extraction. (7)

b) Compare the advantages and challenges of grid-interfaced PV systems with isolation and without isolation. (7)

Module III

15 Compare different types of wind turbines based on their working principles and applications. (14)

OR

16 a) Illustrate the working principle of a Wind Amplified Rotor Platform (WARP) and its advantages (7)

b) Compare and contrast the performance of Synchronous Generators with external magnetization and permanent magnets in wind energy systems (7)

Module IV

17 a) Explain the basic schemes of electronic conversion systems used in renewable energy generation and their advantages (9)

b) Explain the process of synchronizing renewable energy systems with the grid. (5)

OR

18 a) Discuss various power quality management strategies in renewable energy-based power systems (7)

b) Analyze the transient response of power systems when integrated with photovoltaic (PV) and wind energy conversion systems (WECS). (7)

Module V

19 a) Describe the concept, operating principles, and models of smart grid components. (7)

b) Explain the hardware architecture and working principles of smart meters. (7)

OR

20 a) Explain the working and importance of Supervisory Control and Data Acquisition (SCADA) in power distribution. (8)

b) How do smart grids enhance energy efficiency and reliability in modern power networks? (6)

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