

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech Degree S6 (R,S) / (WP), S4 (PT) Exam April 2025 (2019 Scheme)

**Course Code: EET322****Course Name: RENEWABLE ENERGY SYSTEMS**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer all questions, each carries 3 marks.*

Marks

- |    |   |     |
|----|---|-----|
| 1  | Explain the benefits of the Clean Development Mechanism under Kyoto Protocol in sustainable development.            | (3) |
| 2  | Why CO <sub>2</sub> emission reduction is prioritized in climate change mitigation strategies?                      | (3) |
| 3  | Differentiate tilt angle, solar azimuth angle, and declination angle.   | (3) |
| 4  | Draw the typical I-V and P-V characteristics of a solar cell and explain the need for Maximum Power Point Tracking. | (3) |
| 5  | Compare HAWT and VAWT in WECS.  | (3) |
| 6  | Explain the advantages and disadvantages of micro hydel projects  | (3) |
| 7  | A hybrid OTEC system is more advantageous compared to closed or open-cycle systems. Justify the statement.          | (3) |
| 8  | Enumerate the key criteria for selecting suitable sites for a tidal plant.  | (3) |
| 9  | Explain the concept of power from satellites.   | (3) |
| 10 | List and explain any three methods to produce hydrogen  | (3) |

**PART B***Answer one full question from each module, each carries 14 marks.***Module I**

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|----|--|-----|
| 11 | a) Explain how the promotion of renewable energy sources helps in attaining sustainable development goals.   | (6) |
|    | b) Describe the steps taken by the global teamwork under the UNFCCC in solving environmental problems caused by energy use and greenhouse gas emissions. | (8) |



**OR**

- 12 a) Discuss the advantages and disadvantages of any two conventional and two non-conventional energy sources. (8)
- b) Explain the key mechanisms and initiatives under the Kyoto Protocol. (6)

**Module II**

- 13 a) With a neat diagram, explain the construction and working of a parabolic dish collector and central tower collector. Compare their concentration ratios and temperature ranges. (8)
- b) With the help of I-V characteristics of a PV cell and connection diagram, how partial shading can develop hot spots in series-connected solar cells. (6)

**OR**

- 14 a) Describe the construction, working, and typical voltage and current ratings of a solar cell. How can it be used in power applications of kW ranges? (7)
- b) Explain the design steps of a stand-alone photovoltaic system with a few days of autonomy. Describe the importance of DOD of the battery. (7)

**Module III**

- 15 a) Define the power coefficient of a wind turbine. Derive the expression for its maximum value. (10)
- b) Classify small hydro projects based on their capacity and construction. (4)

**OR**

- 16 a) Compare fixed-speed and variable-speed wind energy conversion systems (WECS) in terms of their design, efficiency, and grid integration capabilities. (6)
- b) Explain the main parts of a small hydro project (SHP) with a suitable schematic diagram and describe the criteria for the selection of turbines for SHPs. (8)

**Module IV**

- 17 a) Explain the double basin schemes for the tidal energy conversion. Highlight their advantage over single basin schemes. (8)
- b) Contrast the phenomena and principles utilised for tidal energy conversion and OTEC. (6)

**OR**



- 18 a) Classify single-basin tidal power generation systems based on their mode of operation. Describe each mode and its relevance in terms of power generation. (6)
- b) Compare the construction, working, and advantages of Anderson and Claude cycle OTEC systems. (8)

**Module V**

- 19 a) Explain different stages of biogas formation. Discuss the factors that affect the formation of biogas. (10)
- b) Explain the working of a fly-wheel energy storage system. (4)

**OR**

- 20 a) Compare the constructional difference between floating drum type and fixed dome type bio-gas plant with suitable sketches. Discuss advantages and limitations. (8)
- b) With a neat diagram explain the basic working of a Phosphoric acid fuel cell. (6)

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