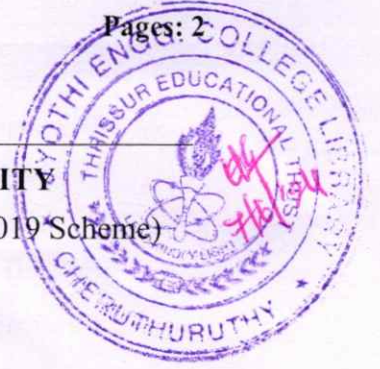


Reg No.: \_\_\_\_\_

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech Degree S6 (R,S) / S4 (PT) (R,S) Examination May 2024 (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  | Carbon monoxide is one of the most dangerous pollutants. Justify.             | (3) |
| 2  | List the disadvantages of conventional energy sources.                        | (3) |
| 3  | Define beam radiation, diffuse radiation, and global radiation                | (3) |
| 4  | Calculate the hour angle at 2:30 p.m.   | (3) |
| 5  | Explain the output power versus wind speed characteristics of a wind turbine. | (3) |
| 6  | Explain the term capacity factor for a wind power plant.                      | (3) |
| 7  | Where do you find the occurrence of biofouling? How it can be eliminated?     | (3) |
| 8  | Discuss the factors that influence the site selection for wind power plants.  | (3) |
| 9  | List three types of fuel cells.   | (3) |
| 10 | Write down the advantages of hydrogen energy.                                 | (3) |

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

- |    |  |     |
|----|--|-----|
| 11 | a) What do you mean by carbon credits related to the Kyoto Protocol? Which are the options to earn carbon credit? Explain the options briefly. | (8) |
|    | b) Write down the disadvantages of solar power and wind power generation.  | (6) |

**OR**

- |    |   |     |
|----|---|-----|
| 12 | a) What do you mean by the Green House Effect? List any three greenhouse gases. Explain how these gases cause Global warming. | (8) |
|    | b) Write notes on the current Indian and World Energy Scenario.   | (6) |

**Module II**

- |    |   |     |
|----|---|-----|
| 13 | a) With a neat diagram explain the construction and working of a pyranometer. | (8) |
|    | b) Calculate the declination angle for March 31 in a leap year.               | (6) |

**OR**

- 14 a) With relevant diagrams write notes on the flat plate collector and evacuated tube collector. (8)
- b) Design a solar PV system with a base load condition of 2 CFL (18 W each) and 2 fans (60 W each) working for 6 hours. Take the PV panel rating as 40 W and the operating factor as 0.75. (6)

**Module III**

- 15 a) With neat diagrams, differentiate between Horizontal Axis Wind Turbine and Vertical Axis Wind Turbine. Also, compare their relative advantages and disadvantages. (10)
- b) Determine the power in the wind if the wind speed is 20 m/s and the blade length is 50 m. (4)

**OR**

- 16 a) Discuss the various classifications of turbines for small hydro plants. (8)
- b) A wind turbine has 3 blades that are 1m long each. The air density at the site is  $1.23 \text{ kg/m}^3$ . The wind is blowing with a velocity of 12m/s. What is the theoretical power contained in the wind? Calculate the coefficient of power of the turbine, if the maximum power output of the turbine is 392 watts. (6)

**Module IV**

- 17 a) A separate working fluid such as ammonia, propane, or freon is used in addition to water for closed-cycle OTEC. With a neat diagram explain the working of the closed cycle OTEC highlighting the advantage of using the additional working fluid. (8)
- b) Classify tidal power plants based on the type of basin used with relevant figures. (6)

**OR**

- 18 a) A hybrid cycle combines the features of both the closed-cycle and open-cycle systems. Justify. (8)
- b) List any 3 advantages and 3 disadvantages of OTEC systems (6)

**Module V**

- 19 a) With a neat diagram explain the construction and working of Floating Drum type or KVIC model biogas plant. (10)
- b) What are the factors that necessitate energy storage? (4)

**OR**

- 20 a) With a neat diagram explain the construction and working of hydrogen fuel cells. (10)
- b) Write short notes on satellite-based solar power. (4)

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