

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

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Fifth Semester B.Tech Degree (S,FE) Examination January 2022 (2015 Scheme)

**Course Code: EE367****Course Name: NEW AND RENEWABLE SOURCES OF ENERGY**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer all questions, each carries 5 marks.*

Marks

- |   |  |     |
|---|--|-----|
| 1 | Write the limitations of conventional energy resources.  | (5) |
| 2 | Calculate the hour angle when it is 2 hours and 10 minutes before solar noon.                                    | (5) |
| 3 | Draw sample I-V characteristic curves of a typical solar cell and explain the effect of variation in insolation. | (5) |
| 4 | Write the advantages and disadvantages of tidal power plants.  | (5) |
| 5 | Derive the expression of power in the wind.  | (5) |
| 6 | Write the advantages and disadvantages of wind energy.   | (5) |
| 7 | List any 5 factors which affect the generation of biogas from biomass.   | (5) |
| 8 | Write the advantages of fuel cells.  | (5) |

**PART B***Answer any two full questions, each carries 10 marks.*

- |    |   |      |
|----|---|------|
| 9  | Find the solar altitude angle at 2 hours after local solar noon on 1 <sup>st</sup> June 2012 for a city, which is located at 26.75°N latitude. Also find the sunrise and sunset hours and the day length. | (10) |
| 10 | Draw a neat diagram and explain any one type of energy storage method and its application in real world scenario.   | (10) |
| 11 | a) Write the comparison between conventional and non-conventional energy storage resources.   | (5)  |
|    | b) Draw a neat diagram and explain the working of any one device which is used for measurement of solar radiation.  | (5)  |

**PART C***Answer any two full questions, each carries 10 marks.*

- |    |   |     |
|----|---|-----|
| 12 | a) A solar panel consists of 24 solar cells connected in series. Each cell is rated at 0.5V and 2A at the maximum power point at irradiance of 1000W/m <sup>2</sup> . The | (4) |
|----|---|-----|

cell has dimensions 10cm×10cm. Determine the power produced by the solar panel and its conversion efficiency.

- b) Draw a neat diagram of tidal power plant and mark the components. Write the function of each component. (6)
- 13 Draw diagrams and explain any two applications of solar electric systems. (10)
- 14 What is the principle of working of an OTEC system? Draw the figure of a closed cycle OTEC and explain its working. (10)

**PART D**

*Answer any two full questions, each carries 10 marks.*

- 15 Elaborate any 5 points to be considered while selecting the right type of hydraulic turbine for small hydro power generation. (10)
- 16 a) Explain how wind energy can be harnessed to produce electrical energy. Draw a block diagram of the proposed setup. (5)
- b) Explain production process of ethanol from biomass. (5)
- 17 a) Explain the classification of Wind Energy Conversion Systems. Draw necessary diagrams. (6)
- b) The following data are given for a propellor type HAWT. (4)
- |                          |   |
|--------------------------|---|
| Speed of wind = 10m/s    | Density of air = 1.226kg/m <sup>3</sup> |
| Diameter of rotor = 120m | Rotor speed = 40rpm                     |
- Calculate,
- the total power density in the wind
  - total power available in the wind

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