

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EE367

**Course Name: NEW AND RENEWABLE SOURCES OF ENERGY
 (EE)**

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks.

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|---|--|-------|
| 1 | What is the present status of various modes of renewable power generations in India. Explain. | (5) |
| 2 | Define and explain the following angles as related to solar geometry:
(i) Surface azimuth angle (ii) Declination angle (iii) Latitude angle | (5) |
| 3 | Draw and Explain the VI characteristics of a solar cell. How does temperature affect the performance of solar cell? | (5) |
| 4 | List out any five merits and demerits of OTEC. | (5) |
| 5 | Discuss the different types of wind turbine rotors used to extract wind. | (5) |
| 6 | Explain the terms solidity, pitch angle, tip speed ratio, cut-in speed and cut speed of wind turbine | (5) |
| 7 | With a neat diagram, explain the working of biogas plant | (5) |
| 8 | What are the components of a micro hydel power plant | (5) |

PART B

Answer any two full questions, each carries 10 marks.

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| 9 | a) Explain various energy storage systems. Give advantages and disadvantages of each. | (6) |
| | b) List the merits and de-merits of non-conventional energy resources | (4) |
| 10 | a) Find the hour angle at the sunrise and the sunset on March 22 for a surface inclined at an angle of 20° facing south at New Delhi ($28^{\circ} 35' N$, $77^{\circ} 12' E$). | (6) |
| | b) Explain the principle, working and components of a solar flat plate collector | (4) |
| 11 | a) Explain the principle and working of the following solar radiation measuring instruments:
(i) Pyranometer (ii) Pyrheliometer and (iii) Sunshine recorder | (7) |
| | b) What is solar constant? Explain. | (3) |

PART C

Answer any two full questions, each carries 10 marks.

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| 12 | Discuss the basic principle of OTEC. Describe a closed cycle OTEC with its advantages and disadvantages. | (10) |
| 13 | a) Explain various types of tidal power plants. | (5) |
| | b) Classify solar cell based on the type of material used. Explain each one. | (5) |
| 14 | a) Draw and explain the block diagram of a standalone solar PV power system | (5) |
| | b) A certain PV cell is illuminated with an irradiance of 1000 W/m^2 . If the cell is $100 \text{ mm} \times 100 \text{ mm}$ in size and produces 3 A at 0.5 V at the maximum power point. What is the conversion efficiency? | (3) |
| | c) What is maximum power point tracking? | (2) |

PART D

Answer any two full questions, each carries 10 marks.

- 15 a) Prove that the maximum wind turbine output can be achieved when $V_d = 1/3 V_u$, (6)
where V_d and V_u are down-stream and up-stream wind velocity respectively.
- b) What is pitch control of wind turbine? Explain. (4)
- 16 a) Explain any two types of biogas plants? Discuss the factors which decide the (5)
quality of biogas.
- b) Determine the power output of a wind turbine whose blades are 12 m in diameter (5)
and when the wind speed is 6 m/s, the air density is about 1.2 kg/m^3 and the
maximum power coefficient of the wind turbine is 0.35.
- 17 a) With a neat schematic diagram, explain the biomass gasification based electric (5)
power generation system.
- b) Describe the working and constructional features of PEM fuel cell. (5)

