

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: EE367

Course Name: NEW AND RENEWABLE ENERGY SYSTEMS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks.

- | | | Marks |
|---|---|-------|
| 1 | What are energy resources? How are they classified? | (5) |
| 2 | What is solar constant? What is the expression for solar constant? | (5) |
| 3 | Draw and explain a PV based solar pumping system. | (5) |
| 4 | What are the advantages and disadvantages of ocean thermal energy conversion systems? | (5) |
| 5 | Define the following terms i) Cut in speed ii) Pitch Control iii) Solidity | (5) |
| 6 | Give a comparison between horizontal and vertical axis wind machines. | (5) |
| 7 | What is anaerobic digestion? Explain briefly. | (5) |
| 8 | What are fuel cells? Mention few applications of fuel cells. | (5) |

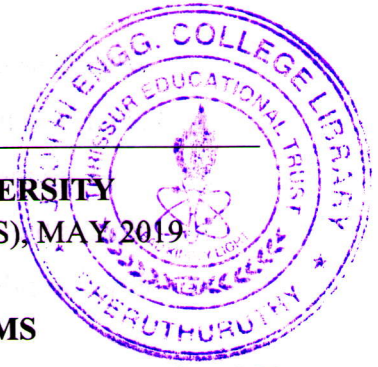
PART B

Answer any two full questions, each carries 10 marks.

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|----|--|-----|
| 9 | a) What are the different instruments used for the measurement of solar radiation? Explain in detail. | (8) |
| | b) What are the advantages and disadvantages of conventional energy resources? | (2) |
| 10 | a) What is the principle of conversion of solar energy into heat? What are solar thermal collectors? What are the characteristic features of a collector system? | (7) |
| | b) Calculate the sunset hour angle and day length at location latitude of 35 ⁰ N, on Feb 14. | (3) |
| 11 | a) Describe the energy scenario in India. What are the various non-conventional energy resources relevant to India? | (5) |
| | b) What are concentrating collectors? What is the need for orientation in concentrating collectors? Explain briefly the various types of concentrating collectors. | (5) |

PART C

Answer any two full questions, each carries 10 marks.



- 12 a) Describe a stand-alone PV system. (4)
b) Describe a hybrid cycle OTEC system. (6)
- 13 a) What are the major components of a tidal power plant? (6)
b) What is biofouling? How can it be prevented? (4)
- 14 a) How are tidal power plants classified? With neat diagrams, explain the working of each. (8)
b) What is a module, array and panel with reference to a solar PV system. (2)

PART D

Answer any two full questions, each carries 10 marks.

- 15 a) The following data relate to a wind turbine: (6)
Velocity of wind at 15°C = 10 m/s
Turbine diameter = 10m
Operating speed of the machine = 35 rpm at maximum efficiency of 40%
Calculate: i) total power density in the wind stream
ii) The maximum power density
iii) The actual power density
iv) Power output of the turbine
- b) Prepare a brief note on emerging technologies in the field of renewable energy. (4)
- 16 What are biomass resources? Enumerate the processes which are used for biomass conversion. (10)
- 17 a) What are the two fundamental mechanisms to produce force from the wind? (5)
What are the advantages and disadvantages of a wind energy conversion system?
- b) What is small hydro power? How is it classified? Obtain an expression for the power that can be generated from a small hydro power station. (5)
