Code No: R1631022   **R16**   SET - 1

III B. Tech I Semester Supplementary Examinations, May - 2019
RENEWABLE ENERGY SOURCES
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
     2. Answer **ALL** the question in **Part-A**
     3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Define the terms: [2M]
   i) Altitude angle   ii)Incident angle

   b) What is the principle collection of solar energy used in a non-convective solar pond? [2M]

   c) Show that a wavelength of $\lambda = 1$ μm solar radiation corresponds to an energy of 1.24 eV. Give all assumptions made. [2M]

   d) Define the power coefficient of a wind turbine .What usually is the maximum value of this parameter? [3M]

   e) Sea waves are irregular in amplitude. How significant wave height is defined? [3M]

   f) What are the techniques suggested for maintaining bio-gas production? [2M]

PART -B

2. a) Explain in detail, the solar radiation on tilted surfaces. [7M]

   b) Calculate the angle made by the beam radiation with the normal to a flat collector on Dec 1, at 9:00 A.M. solar time for a location at $28^0 35$'N. The collector is tilted at an angle of latitude plus 10^0, with the horizontal and is pointing due south. [7M]

3. a) How solar collectors are classified? What are the main applications of a drier? [7M]

   b) Data for a flat plate collector used for heating the building are given below [7M]

Factor	Specification
Location and latitude	Baroda 22^0 00`N
Day and time	Jan 1,11.30 to12.30(IST)
Annual average intensity of solar radiation	0.5 langley/min
Collector tilt	latitude+ 15^0
Number of glass cover	2
Heat removal factor for collector	0.810
Transmittance of glass	0.88
Absorptance of the plat	0.90
U_L for collector	7.88W/m^{20}C
Collector fluid temperature	60^0C
Ambient temperature	15^0C

   Calcualte
   i) Solar attitude angle   ii) Incident angle   iii) Collector efficiency

4. a) Discuss the step-by-step procedure to execute P & O algorithm for tracking the maximum power from the sun.   [7M]
    b) What is the implication of cell mismatch in a solar module?   [7M]

5. a) Describe with a neat sketch the working of a wind energy system with main components?   [7M]
    b) Write short notes on applications of wind energy.   [7M]

6. a) What are the advantages and limitations of small scale hydro electric power generation?   [7M]
    b) A tidal power plant of the simple single basin type has a basin area of 30×10^6 m^2. The tide has a range of 12m. The turbine, however, stops operating when the head on it falls below 3m. Calculate the energy generated in 1 filling (or emptying) process in kWh if the turbine generator efficiency is 0.73.   [7M]

7. a) Describe the classification of fuel cell. With a neat sketch explain the working of fuel cell   [7M]
    b) What is meant by anaerobic digestion? What are the factors that effect bio-digestion? Explain briefly.   [7M]

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