

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE  
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: IV (New)	Term	: II	Academic Year	: 2018-19
Course No.	: REE 243	Title	: Fundamentals of Renewable Energy Sources		
Credits	: 3(2+1)	Time	: 14.00 to 17.00	Total Marks	: 80
Day & Date	: Saturday, 04.05.2019				

- Note :
1. Solve ANY EIGHT questions from SECTION "A".
  2. All questions from SECTION "B" are compulsory.
  3. All questions carry equal marks.
  4. Draw neat diagrams wherever necessary.

SECTION "A"

- Q.1 a) What are the benefits of renewable energy technologies over conventional energy technologies?  
b) Give obstacles or limitations to the implementation of renewable energy systems.
- Q.2 a) Classify conventional and non conventional energy sources.  
b) Describe in short various non conventional energy sources.
- Q.3 Explain various layers or regions in the structure of sun with its neat sketch.
- Q.4 Enlist different types of solar collectors and write down the advantages and disadvantages of concentrating collectors over Flat plate type collectors.
- Q.5 Classify different types of solar cookers. Explain Parabolic Dish solar cooker.
- Q.6 Explain types and different parts of basic photovoltaic system.
- Q.7 a) State the basic components of Wind Energy conversion system (WECS).  
b) Give detailed classification of Wind Energy conversion system.
- Q.8 Compute the system output and current of PV array for a 100W load needed for 24 hours at 24V, at New Delhi ( $\phi = 28^\circ 35'$ ). Mean Horizontal insolation from standard map is  $H_0 = 5.4 \text{ kwh/m}^2$ . Calculate also the system output and current if the battery charging efficiency, battery self discharge level and variability factor are 0.9, 0.9 and 0.95 respectively.
- Q.9 Enlist the different biomass conversion technologies and explain about Pyrolysis process of biomass conversion.
- Q.10 Write the parameters affecting biogas generation or bio-digestion process.

SECTION "B"

- Q.11 Fill in the blanks.
- 1) The total amount of incoming solar energy absorbed by the earth and its atmosphere in one year is \_\_\_\_\_.
  - 2) The ratio of power of wind rotor to the power available in the wind is called - \_\_\_\_\_.

(P.T.O.)

- 3) The average requirement of wind speed for wind energy conversion system should be \_\_\_\_\_.
- 4) Methane bacteria in Biogas generation works best in the temperature range of \_\_\_\_\_<sup>0</sup>C to \_\_\_\_\_<sup>0</sup>C.
- 5) The temperature around \_\_\_\_\_<sup>0</sup>C can be achieved in paraboloid type solar cooker.
- 6) The calorific value of biogas is \_\_\_\_\_ kcal/m<sup>3</sup>.
- 7) \_\_\_\_\_ which converts the solar insolation to the useful DC electric power.
- 8) \_\_\_\_\_ is the angle through which the earth must turn to bring the meridian of a point directly in line with the sun's rays.

Q.12 State True or False.

- 1) Doubling the diameter of the rotor will result in a three- fold increase in the available wind power.
- 2) The power available in wind is directly proportional to the cube of wind speed.
- 3) The gas production per unit volume of digester capacity is maximum when the diameter to depth ratio is in between 1.66 to 2.00 for KVIC type of biogas plant.
- 4) The value of the solar constant is approximately 1353W/sq.m.
- 5) The thermal efficiency of Dish type solar cooker is 70%.
- 6) Biogas is a mixture containing 30-40 per cent Methane and 55-65 per cent Carbon dioxide.
- 7) The cost of Ganesh biogas plant is 30% more than KVIC plant.
- 8) Solar still unit is used for water distillation.

