

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. SEMESTER I (old course)–EXAMINATION (Remedial) – WINTER 2015

Subject code: 713907N

Date: 14/12/2015

Subject Name: Renewable Energy systems

Time: 10:30 AM to 1:00 PM

Total Marks: 70

### Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q1 A] Discuss present scope of Solar Energy [7]  
B] How wind is generated? [7]

- Q2 A] Prove that for a horizontal axis propeller type wind mill  $P_{\max} = 0.595 P_{\text{total}}$ . [7]  
B] Wind at 1.0325 bar and 20°C has a velocity of 15 m/s. calculate: [7]  
a) Total power density in the wind stream  
b) The maximum obtainable power density.  
c) The Obtainable power density at 40% efficiency  
d) The total power  
e) The torque and axial thrust.

Take: turbine diameter = 12 m, operating speed=60 r.p.m at maximum efficiency  
Propeller type wind turbine is considered.

**OR**

- B] Determine solar time and azimuth angle for sunset on September 7<sup>th</sup> for Ahmedabad (23° N 72° ó 40øE) and also find day-length also. [7]

- Q3 A] Describe with the neat sketch the working of wind energy conversion system (WECS) with main components [7]  
B] With the help of a diagram, a) discuss the power versus wind speed characteristic of a wind turbine b) discuss  $C_p$  versus to tip speed ratio diagram. [7]

**OR**

- Q3 A] Explain with neat sketch the working of pyranometer and pyrhemliometer? [7]  
B] Explain solar constant? What is the standard value of solar constant? Also explain terrestrial radiations [7]

- Q4 A] Explain the mechanism of photoconduction in a PhotoVoltaic cell. [7]  
B] Explain the fixed dome biogas plant with neat sketch [7]

**OR**

- Q4 A] What is biomass? What is the difference between biogas and biomass? Why biogas should be adopted as a source of energy in a country like India? [7]  
B] Explain the fuel properties of a bio-gas [7]

- Q5 A] Explain the type of geothermal resources in detail. [7]  
B] Explain the single basin and double basin tidal power plant [7]

**OR**

- Q5 A] Explain the solar air heater [7]  
B] Explain the single basin tidal power plant [7]

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