

8E4049

Roll No. : \_\_\_\_\_

Total Printed Pages : 3

8E4049

B. Tech. (Sem. VIII) (Main) Examination, May/June - 2010  
Mechanical Engg.  
(8ME1 Renewable Energy Technology)

Time : 3 Hours]

[Total Marks : 80  
[Min. Passing Marks : 24

Attempt any five questions selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Use of following supporting material is permitted during examination.  
(Mentioned in form No. 205)

1. \_\_\_\_\_ Nil \_\_\_\_\_

2. \_\_\_\_\_ Nil \_\_\_\_\_

### UNIT - I

- 1 (a) Describe with neat sketches the working principle of the following :
- (i) Pyrheliometer
  - (ii) Pyranometer
  - (iii) Sunshine Recorder.

3×3=9

- (b) Determine the local solar time and declination at a given longitude of 77° 30'E ( $\phi$  23° 15') at 12.30 IST on June 19. (Take  $E = -1$  min 1 sec and  $L_{st} = 82^\circ 30'$ ).

7

OR

- 1 (a) What is the principle of photovoltaic power generation? 4
- (b) Explain the fabrication process of silicon solar cell with neat sketches. 12



## UNIT - II

- 2 (a) How are WECS classified? Discuss in brief. 8
- (b) Prove that in case of a horizontal axis wind turbine maximum power is obtained when.  
Exit Velocity =  $1/3$  Wind velocity and

$$P_{\max} = \frac{8}{27} \rho A V^3$$

All symbols have standard notations. 8

OR

- 2 (a) Wind at standard Atmospheric Pressure (1 bar) and  $15^{\circ}\text{C}$  temperature has a velocity of 10 m/s. The turbine has diameter of 120 m and its operating speed is 40 rpm at maximum efficiency. Calculate
- (i) Total power density in the wind stream
  - (ii) The maximum obtainable power density assuming  $\eta = 40\%$ .
  - (iii) The total power produced (in kW)
  - (iv) The torque and areial thrust.
- (b) Discuss briefly on Betz limit. 12

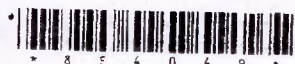
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## UNIT - III

- 3 (a) Discuss the basic principle of Ocean Thermal Energy Conversion (OTEC). 4
- (b) Discuss the working of a closed cycle OTEC with its advantages over open cycle system. 12

OR

- 3 (a) Explain the various methods of Tidal Power Generation with neat sketches. 8
- (b) The basin area of a tidal power plant is  $20 \times 10^6 \text{m}^2$ . The tidal range is 8 m, calculate the energy generated in kWh. 8



## UNIT - IV

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imum
- 4 (a) What are the various factors to be considered for site selection of a Geothermal Power Plant? 6
- (b) Classify Geothermal power plant and explain the binary cycle power plant. 10

OR

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- 4 (a) What is the difference between biomass and biogas. 4
- (b) Explain the construction and working of KVIC digester. 12
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## UNIT - V

- 5 What is a fuel cell? Explain the working of a protous exchange membrane fuel cell. 16

OR

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- 5 (a) Discuss the various hydrogen production methods. 10
- (b) What difficulties are encountered while transporting the hydrogen fuel? 6
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