

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- VIth SEMESTER-EXAMINATION – MAY- 2012****Subject code: 161904****Date: 17/05/2012****Subject Name: Alternate Energy Sources****Time: 10:30 am – 01:00 pm****Total Marks: 70****Instructions:**

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

- Q.1** (a) Write short notes on classification of energy resources. Also explain which type of Alternate Energy Source is the best suitable for rural and agricultural applications and why? **07**
- (b) Explain, what do you understand by energy conservation and its importance? Also discuss some of the strategy used in the process of energy conservation? **07**

- Q.2** (a) Explain the concept of “Solar Constant” and “Air mass”? What is the variation of solar Constant with time and what is the reason for this variation? **07**
- (b) Derive a general equation for flux incident on a solar collector in terms of hourly beam and diffuse radiations, tilt factors, angle of incidence, Zenith angle and absorptivity transmissivity products for beam and diffuse radiations. **07**

OR

- (b) Calculate monthly average of Daily Global Solar Radiation on a Horizontal Surface located in Ahmedabad Gujarat state (22°.00' N, 73°.10' E) for the month of April. Average Solar day hours are 10 hrs. Angstrom's constants for Ahmedabad, a = 0.28, b = 0.48 **07**
- Q.3** (a) How the solar water heating systems are classified? Explain the working of thermo-syphon solar water heating system with the help of a neat sketch. **07**
- (b) What are solar ponds? Discuss the working of a solar pond with help of a neat sketch. **07**

OR

- Q.3** (a) Prove that in case of Horizontal Axis Wind Turbine maximum power can develop when exit velocity = 1/3 of wind velocity and $P_{\max} = 8 \rho A V_i^3 / 27$ **07**
- (b) The following data refer to a wind mill of a wind farm in Gujarat. **07**
- Average wind speed = 23.5 km/hr
 Atmospheric pressure = 1.01 bar
 Atmospheric temperature = 30 °C
 Power coefficient = 0.41
 Total power output capacity of wind farm = 1 MW
 Determine,
 (1) Available power density of wind.
 (2) Actual power density of wind mill.
 (3) Number of wind mills in the farm if the rotor diameter is 25 m.

- Q.4** (a) State and explain various routes of Biomass energy conversion to other form of energy. **07**
- (b) Explain the working principle of Magneto hydrodynamic generator? Also compare with conventional power plants. **07**

OR

- Q.4** (a) Describe the working of a floating drum type KVIC biogas plant with the help of neat sketch. **07**

- (b) Draw neat sketches of Open and Closed cycle OTEC systems. 04
- (c) What is wave energy? How it can be used for power generation. 03
- Q.5** (a) A tidal power plant of single basin type, has a basin area of $25 \times 10^6 \text{ m}^2$. The tide has a range of 10 m. The turbine however, stops operating when the head on it falls below 2 m. Calculate the energy generated in one filling process, in kWh if the turbine generator efficiency is 75 %. Take density of sea water is 1025 kg/m^3 . 07
- (b) What is low temperature liquid dominated geothermal resources? How this heat can be utilized for power generation? Also, state the advantages of such a system. 07
- OR**
- Q.5** (a) Explain the working of liquid metal MHD system with help of neat sketch. 07
- (b) What do you understand by “energy management” and “energy audit”? Classify the energy audit and discuss them in brief. 07
