

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEM-IV Examination-Nov/Dec-2011

Subject code: 140904

Date: 02/12/2011

Subject Name: Energy System

Time: 02.30 pm -5.00 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) Wind at 1 bar and 20° C has a velocity of 12 m/s. **07**

Calculate:

- (1) Total power density in wind stream.
- (2) Maximum power density
- (3) A reasonable obtainable power density
- (4) Total power produced if rotor diameter is 60 m and it runs at 50 rpm.
- (5) The torque and the axial thrust produced at maximum efficiency.

(b) Explain Solar Photovoltaic System briefly. **07**

Q.2 (a) Explain the principle of ocean thermal energy conversion & discuss Claude cycle OTEC system in brief. **07**

(b) Calculate the day hours on May 02 and December 1 on surface sloping Southwards at an angle of 40° at a place of 19° 07' North latitude and 72.51 East longitudes. **07**

OR

(b) A hydrogen oxygen fuel cell operates at 25° C. Calculate the voltage output of the cell, the efficiency and the electrical work output per mole of H₂ consumed and per mole of H₂O produced. Also compute the heat transfer to the surroundings. Given: **07**

$$\Delta H^{\circ} 298 \text{ K} = - 285838 \text{ kJ/kg mole}$$

$$\Delta G^{\circ} 298 \text{ K} = - 237191 \text{ kJ/kg mole}$$

Q.3 (a) Explain Bio fuel technology. Explain biomass conversion process. **07**

(b) Explain wind to electrical energy conversion system **07**

OR

Q.3 (a) Why a dust collection system is needed in coal thermal power plants? Explain the methods used for dust collection. **07**

(b) Draw the neat sketch of a nuclear reactor and the explain function of each component. **07**

- Q.4 (a)** Write short note on selection of site for Hydro electric power station. **07**
- (b)** Explain various types of pulverized coal burners used. **07**
- OR**
- Q.4 (a)** Explain solar refrigeration and solar air conditioning with necessary figure. **07**
- (b)** Explain combined cycle power plant with necessary diagram. **07**
- Q.5 (a)** Discuss the grid connected wind energy conversion system with the help of schematic diagram. **07**
- (b)** Explain schematic arrangement of Diesel power plant. **07**
- OR**
- Q.5 (a)** Compare Steam power station with Nuclear power station. **07**
- (b)** Write short note on site selection of nuclear power plant **07**
