

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – SUMMER • 2014****Subject Code: 163703****Date: 28-05-2014****Subject Name: Energy and Environment****Time: 10:30 am to 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)** Explain first law of thermodynamics. A gas expands isothermally against a constant external pressure of 1 atm from a volume of 10dm^3 to a volume of 20dm^3 . In this process it absorbs 800J of thermal energy from its surroundings. Calculate the change in internal energy for the process in joules. **07**
- (b)** Differentiate between following: (1) Open, closed and isolated system **07**
(2) Isobaric and isochoric processes (3) Isothermal and adiabatic processes
- Q.2 (a)** What are the seven principles of energy management **07**
- (b)** Explain strategy and principles for energy conservation **07**
- OR**
- (b)** Explain the working of solar cell with diagram **07**
- Q.3 (a)** State and explain the refining process of crude oil with diagram **07**
- (b)** Explain the principle of open cycle OTEC system with suitable Diagram. **07**
- OR**
- Q.3 (a)** What do you mean by biomass energy? What are the two types of biomass digester? Do you prefer burning cow dung directly to obtain energy or use it in biogas plant to obtain energy. Give reasons for your answer. **07**
- (b)** What are the different forms of energy available? What type of technologies can be used to convert these energies to other forms of energy. **07**
- Q.4 (a)** Define the following terms: **07**
(1) Fissile material (2) Carbonization (3) Calorific value (4) Energy policy
- (b)** Write a short note on the working of bomb calorimeter **07**
- OR**
- Q.4 (a)** Write the working of thermal power plant with diagram **07**
- (b)** What are the different types of turbines that can be used in hydel power plant. Explain the working of Kaplan type turbine with diagram. **07**
- Q.5 (a)** What are the different modes of heat transfer? Give examples of all the three modes. Calculate the heat transfer by natural convection between a shed roof of area 400m^2 . Roof surface temperature is -27°C , the air temperature is 3°C and the average convection heat transfer coefficient is $10\text{W/m}^2\text{K}$. **07**

- (b) The roof of an electrically heated home is 6 m long, 8 m wide, and 0.25 m thick, and is made of a flat layer of concrete whose thermal conductivity is $k = 0.8 \text{ W/m} \cdot ^\circ\text{C}$. The temperatures of the inner and the outer surfaces of the roof one night are measured to be 15°C and 4°C , respectively, for a period of 10 hours. Determine (a) the rate of heat loss through the roof that night and (b) the cost of that heat loss to the home owner if the cost of electricity is $\$0.08/\text{kWh}$ **07**

OR

- Q.5** (a) Write a short note on insulation **07**
(b) Write the applications of wind energy and tidal energy **07**
