

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- VII<sup>th</sup> SEMESTER-EXAMINATION – MAY/JUNE- 2012****Subject code: 171907****Date: 29/05/2012****Subject Name: Energy conservation & Management****Time: 02:30 pm – 05:00 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) 1. Define energy conservation with suitable example **03**  
 2. List four important duties of energy manager in industry as per Energy conservation act-2001. **04**
- (b) Explain need of energy sector reforms in India. **07**
- Q.2**
- (a) Define following terms. **07**  
 1. Power Factor 2. Load Factor 3. Calorific Value  
 4. Latent Heat of Vaporization 5. Humidity  
 6. Commercial Energy 7. Energy Intensity
- (b) The energy consumption of a industry per month is **07**  
 2,50,000 units. The contract demand of a plant is 1200 kVA. The minimum billing demand is 75% of the contract demand. The basic tariff structure is as follows :  
 Demand Rate : 0-500 kVA = Rs. 200/kVA  
 501-1000 kVA = Rs. 180/kVA  
 Excess over 1000 kVA = Rs. 150/kVA  
 Energy Rate : Rs. 5.00 for the first one lakh units/ month  
 Rs. 4.50 above one lakh units/month  
 Fuel Surcharge : Rs. 0.20 per unit/month  
 Service Tax : Rs. 0.30 per units/month  
 Meter rent : Rs. 250/month  
 Calculate the cost of monthly electricity consumption.

**OR**

- (b) The following are the data collected for boiler using furnace oil as a fuel. **07**  
 Carbon content in fuel =84%  
 Hydrogen content in fuel =12%  
 Moisture content in fuel =0.5%  
 GCV of fuel = 10000 kCal/kg  
 Surface temperature of boiler = 80 °C  
 Humidity in ambient air = 0.025 kg/kg of dry air  
 Mass of dry flue gases =21.36 kg/kg of oil  
 Actual mass of air supplied/kg of fuel = 21.49 kg/kg of fuel  
 Flue gas temperature =190 °C  
 Ambient air temperature = 30 °C  
 Specific heat of flue gases = 0.23 kCal/kg°C  
 Specific heat of super heated steam in 0.45 kCal/kg°C  
 Radiation & convection losses = 0.38%  
 Losses due to incomplete combustion= 0.01%.  
 Find out the boiler efficiency by indirect method.

- Q.3 (a)** List the elements of monitoring & targeting system with its function. **07**
- (b)** Explain Simple pay back method with its advantage & limitation. **07**

**OR**

- Q.3 (a)** Explain Sensitivity Analysis & List the micro & macro factors. **07**
- (b)** 1. Explain the role of Energy service companies. (ESCOs.) **04**  
2. Define following terms. **03**  
(i) CUSUM (ii) ROI (iii) Monitoring

- Q.4 (a)** 1. Define energy audit as per the energy conservation act-2001. **02**  
2. Explain why compact fluorescent lamp is used for energy efficient lighting controls. **05**
- (b)** What do you mean by cogeneration? Classify cogeneration system & Explain bottoming cycle. **07**

**OR**

- Q.4 (a)** Classify the energy audit & Explain the three phases of detailed energy audit. **07**
- (b)** 1. List the benefits of heat recovery system. **03**  
2. List the energy saving opportunities in refrigeration Air-conditioning plant area. **04**

- Q.5 (a)** Calculate ILER value & annual energy wastage for the following. **07**  
Floor area of the interior room = (9 X 5) Meter<sup>2</sup>.  
Mounting Height = 2 meter  
Total circuit watts of the installation by power meter = 990 W  
Average maintained illuminance =700 lux  
As per the color rendering index table ,Target load efficiency = 46 lux/W/m<sup>2</sup>  
No. of operating hrs/day =8  
No. of operating days/annum =300.  
Give comment on your answer.
- (b)** 1. List the various types of heat losses in furnace. **03**  
2. Classify the different types of steam traps with their principle. **04**

**OR**

- Q.5 (a)** List the suggestions for improving the efficiency in compressed air system. **07**
- (b)** List the seven important suggestions for energy saving in pumps & fans. **07**

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