*Seat No.: _____* *Enrolment No._____*

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE- VII$^{th}$ 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 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 : **07**

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 $^0$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 $^0$C
Ambient air temperature = 30 $^0$C
Specific heat of flue gases = 0.23 kCal/kg$^0$C
Specific heat of super heated steam in 0.45 kCal/kg$^0$C
Radiation & convection losses = 0.38%
Losses due to incomplete combustion= 0.01%.
Find out the boiler efficiency by indirect method.

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|---|---|---|---|
| **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.<br>(i) CUSUM (ii) ROI (iii) Monitoring | **03** |
| **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.<br>Floor area of the interior room = (9 X 5) Meter$^2$.<br>Mounting Height = 2 meter<br>Total circuit watts of the installation by power meter = 990 W<br>Average maintained illuminance =700 lux<br>As per the color rendering index table ,Target load efficiency = 46 lux/W/m$^2$<br>No. of operating hrs/day =8<br>No. of operating days/annum =300.<br>Give comment on your answer. | **07** |
| | **(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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