Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- VIIth 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.

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. (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. Floor area of the interior room = (9 X 5) Meter^2. 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^2 No. of operating hrs/day =8 No. of operating days/annum =300. 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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