C.U.SHAH UNIVERSITY
Winter Examination-2019

Subject Name: Energy Conservation and Audit
Subject Code: 4TE08ECA1   **Branch: B.Tech (Mechanical)**
Semester : 8   **Date : 01/10/2019**   **Time : 10:30 To 01:30**   **Marks : 70**

Instructions:
  (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  (2) Instructions written on main answer book are strictly to be obeyed.
  (3) Draw neat diagrams and figures (if necessary) at right places.
  (4) Assume suitable data if needed.

Q-1		**Attempt the following questions:**	**(14)**
	a)	What are the functional areas where an Energy Manger is essentially required?	**01**
	b)	What are the purposes of the Performance Test for boilers?	**01**
	c)	What is the role of an Energy Manager?	**01**
	d)	Define: "Cumulative Sum (CUSUM)"	**01**
	e)	Define: "Bench Marking"	**01**
	f)	What is APFC?	**01**
	g)	Write the names of two lighting method to compute lighting energy requirement.	**01**
	h)	Give two examples of waste heat recovery.	**01**
	i)	How Sankey diagram is useful for energy analysis?	**01**
	j)	Explain the term heat-to-power ratio.	**01**
	k)	What are the benefits of benchmarking energy consumption?	**01**
	l)	Why fresh investments are needed for energy conservation in industry?	**01**
	m)	Define 'Law of conservation of matter'.	**01**
	n)	A 55 kW motor is drawing 35 kW of power at a given point of time. Calculate the motor loading at full load if the efficiency of the motor is 95%.	**01**

Attempt any four questions from Q-2 to Q-8

Q-2		**Attempt all questions**	**(14)**
	a)	Explain the reporting format of a typical energy audit.	**07**
	b)	What are the baseline data that an audit team should collect while conducting detailed energy audit?	**07**

Q-3		**Attempt all questions**	**(14)**
	a)	(i) Draw a process flow chart for Pulp & Paper Industry. (ii) How to Carryout Material and Energy (M&E) Balance?	**08**
	b)	If 35,000kg of whole milk containing 4% fat is to be separated in a 6 hour period into skim milk with 0.45% fat and cream with 45% fat, what are the flow rates of the two output streams from a continuous centrifuge which accomplishes this separation?	**06**

Q-4   **Attempt all questions**   **(14)**

a) In a brewery chilling system, ethylene glycol is used a secondary refrigerant. The   **07**
designed capacity is 40 TR. A test was conducted to find out the operating capacity
and energy performance ratios. The flow was measured by switching off the
secondary pump and measuring the tank level difference in hot well.

Measurements data:

Temperature of ethylene glycol entering evaporator	$= (-) 1 \,^oC$
Temperature of ethylene glycol leaving evaporator	$= (-) 4 \,^oC$
Ethylene glycol flow rates	$= 13200$ kg/hr
Evaporator ethylene glycol pressure drop (inlet to outlet)	$= 0.7$ kg/cm^2
Power input to compressor electrical power, kW	$= 39.5$ kW
Specific heat capacity of ethylene glycol	$= 2.34$ kCal/kg$\,^oC$

b) Explain briefly the essential elements of a monitoring and targeting system.   **07**

Q-5   **Attempt all questions**   **(14)**

a) Explain how a CUSUM chart is drawn with an example.   **07**
b) List down the responsibilities and duties of an energy manager in an industry Under   **07**
The Energy Conservation Act, 2001.

Q-6   **Attempt all questions**   **(14)**

a) What are the benefits of blowdown? Also state it's limitations.   **07**
b) What are the advantages and benefits of CFBC Boilers?   **07**

Q-7   **Attempt all questions**   **(14)**

a) Explain the steps involved in the force field analysis. Taking your own industry as   **08**
an example, list down the positive and negative forces?
b) An industry is having contract demand of 1000 kVA. The minimum billing demand   **06**
is 75% of the contract demand. The connected load of the plant is 2000 kVA. The
recorded demand and power factor for the month of March 2003 is 1200 kVA and
0.8. The monthly consumption is 2.0 lakh units. The average load and maximum
load of the industry is 700 kW and 900 kW respectively. Calculate
1. Minimum billing demand of the industry
2. Load factor of the plant
3. Demand factor of the plant

Q-8   **Attempt all questions**   **(14)**

a) Give classification of Cogeneration Systems.   **07**
b) Discuss in detail the scope of energy audit activities.   **04**