

Enrollment No: \_\_\_\_\_

Exam Seat No: \_\_\_\_\_

# C.U.SHAH UNIVERSITY

## Summer Examination-2017

**Subject Name: Energy Conservation and Audit**

**Subject Code: 4TE08ECA1**

**Branch: B.Tech (Mechanical)**

**Semester : 8**

**Date : 12/04/2017**

**Time : 02:30 To 05:30**

**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.
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- Q-1      Attempt the following questions:      (14)**
- a)** The judicious and effective use of energy to maximize profits and enhance competitive positions". This can be the definition of:      (01)
- |                        |                  |
|------------------------|------------------|
| a) Energy conservation | c) Energy audit  |
| b) Energy management   | d) Energy policy |
- b)** The ratio of current year's production to the reference year's production is called as.      (01)
- |                      |                       |
|----------------------|-----------------------|
| a) Demand factor     | c) Utilization Factor |
| b) Production factor | d) Load factor        |
- c)** Replacement of steam based hot water generation by solar system is an example of      (01)
- |   |
|---|
| a) Matching energy usage to the requirement |
| b) maximizing system efficiency             |
| c) Energy substitution                      |
| d) Performance improvement                  |
- d)** Lux meter is used to measure.....      (01)
- |   |
|---|
| a) Illumination level                     |
| b) Sound intensity and illumination level |
| c) Harmonics                              |
| d) Speed                                  |
- e)** Demand Side Management is required to      (01)
- |   |
|---|
| a) Reduced overall cost of installed capacity |
| b) Reduced needs for peaking station          |
| c) Ensure quality and equity of supply        |
| d) All of this                                |



- f) Cost benefit analysis will take place in which phase of audit (01)  
 a) Phase I c) Phase III  
 b) Phase II d) None of above
- g) Which kind of audit is most comprehensive and time consuming (01)  
 a) Walk through audit c) Standard energy audit  
 b) Targeted energy audit d) Detailed energy audit
- h) The tool used for performance assessment and logical evaluation of avenues for improvement in Energy management and audit is (01)  
 a) Fuel substitution c) energy pricing  
 b) Monitoring and verification d) Bench marking
- i) An energy policy does not include (01)  
 a) Target energy consumption reduction  
 b) Time period for reduction  
 c) Declaration of top management commitment  
 d) Future production projection
- j) IFMA stands for, (01)  
 a) International Facility Management Association  
 b) Indian Facility Management Association  
 c) International Facility Management Academy  
 d) Indian Facility Management Academy
- k) All of the following are basic types of heat recovery systems except: (01)  
 a) hydronic recovery systems  
 b) hygroscopic recovery systems.  
 c) heat-pump recovery systems  
 d) air-to-air recovery systems.
- l) All of the following are advantages of fire tube boilers except their (01)  
 a) Relative low operating cost  
 b) Simple and rugged construction  
 c) Good energy efficiency  
 d) Ability to meet large and sudden load fluctuation.
- m) Non-contact speed measurements can be carried out by (01)  
 a) Tachometer c) Oscilloscope  
 b) Stroboscope d) Odometer
- n) All of the following can be handled by an EMS (energy management system) (01)  
 except:  
 a) lighting demands and security systems.  
 b) monitoring carbon dioxide in garages.  
 c) controlling sensitivity adjustment.  
 d) preheating or precooling.



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

- Q-2**            **Attempt all questions**            **(14)**
- (a) What is energy management? Write down benefits of energy management.            (05)
  - (b) Why energy management is crucial in current scenario?            (04)
  - (c) How can we conserve energy in HVAC ?            (05)
- Q-3**            **Attempt all questions**            **(14)**
- (a) What is energy audit? Explain types of energy audit in detailed.            (09)
  - (b) Explain bench marking in detail.            (05)
- Q-4**            **Attempt all questions**            **(14)**
- (a) What is plant energy performance ? write down the methods for improve energy performance.            (08)
  - (b) Write down the duties and responsibilities of energy auditor.            (06)
- Q-5**            **Attempt all questions**            **(14)**
- (a) What do you mean by energy balance? Explain with appropriate example.            (06)
  - (b) Write down the method of preparing process flow chart. Draw a process flow chart for any product manufacturer.            (08)
- Q-6**            **Attempt all questions**            **(14)**
- (a) Define energy monitoring. State the benefits of energy monitoring.            (04)
  - (b) Write a note on essential elements of energy monitoring and targeting.            (06)
  - (c) Write in brief about “Data and Information Analysis” in energy monitoring and targeting.            (04)
- Q-7**            **Attempt all questions**            **(14)**
- (a) What is energy demand? Discuss end-use method for forecasting energy demand.            (07)
  - (b) What is load management.? Explain in detail with relevant sketches.            (07)
- Q-8**            **Attempt all questions**            **(14)**
- (a) The following are the data collected for a boiler using coal as a fuel. Find out the boiler efficiency using indirect method.            (09)
- |                                  |                       |
|----------------------------------|-----------------------|
| Fuel firing rate                 | 6500 kg/ hr           |
| Steam generation rate            | 30000 kg/hr           |
| Steam Pressure                   | 50 kg/ m <sup>3</sup> |
| Steam temperature                | 96 °C                 |
| % of CO <sub>2</sub> in fuel gas | 16                    |
| % of CO in fuel gas              | 0.55                  |
| Average flue gas temperature     | 250 °C                |
| Ambient temperature              | 31 °C                 |
| Humidity in Ambient air          | 0.0204 kg/ kg dry air |
| Surface temperature of boiler    | 75 °C                 |
| Wind velocity around the boiler  | 4 m/s                 |
| Total surface area of boiler     | 100 m <sup>3</sup>    |
| GCV of bottom ash                | 900 kcal/ kg          |



GCV of fly ash	455 kcal/kg
Ration of bottom ash to fly ash	90:10
<u>Fuel analysis in %</u>	
Ash content in fuel	9
Moisture in coal	26.4
Carbon content	45
Hydrogen content	2
Nitrogen content	1.6
Oxygen content	16
GCV of coal	4000 kcal/ kg

- (b) What do you mean by co-generation? Classify cogeneration system and explain Heat Pipe. (05)

