

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Energy Conservation and Audit

Subject Code: 4TE08ECA1

Branch: B.Tech (Mechanical)

Semester: 8

Date: 24/04/2018

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.

Q-1 Attempt the following questions: (14)

- (a) What are the functional areas where an Energy Manager is essentially required? (1)
- (b) What are the purposes of the Performance Test for boilers? (1)
- (c) What is the role of an Energy Manager? (1)
- (d) Define: "Cumulative Sum (CUSUM)" (1)
- (e) A 45 kW motor is drawing 30 kW of power at a given point of time. Calculate the motor loading at full load if the efficiency of the motor is 90 %. (1)
- (f) What is APFC? (1)
- (g) Write down the name of two lighting method to compute lighting energy requirement. (1)
- (h) Which instrument is used to monitor O₂, CO in the flue gas? (1)
- (i) Which is the nodal agency for monitoring climate change in India? (1)
- (j) What are the sources of waste heat in a diesel engine? (1)
- (k) What is the difference between conservation and conversion? (1)
- (l) Define: "Bench Marking" (1)
- (m) What is the need of cogeneration? (1)
- (n) What is Luminous Efficacy? (1)

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

Q-2 Attempt all questions (14)

- (a) What is the objective for an energy policy of Government of India? (02)
- (b) Explain why managerial skills are as important as technical skills in energy management? (04)
- (c) List the responsibilities and duties of an energy manager in an industry Under The Energy Conservation Act, 2001. (08)

Q-3 Attempt all questions (14)

- (a) Write short note on Combined Heat and Power. (07)
- (b) In a brewery chilling system, ethylene glycol is used a secondary refrigerant. The 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. (07)



Measurements data:

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

- Q-4** **Attempt all questions** **(14)**
- (a) A fabric filter (bag filter) is used to remove the dust from the inlet gas stream so that outlet gas stream meets the required emission standards in cement, fertilizer and other chemical industries. During an air pollution monitoring study, the inlet gas stream to a bag filter is 1, 69, 920 m³/hr and the dust loading is 4577 mg/m³. The outlet gas stream from the bag filter is 1, 85, 040 m³/hr and the dust loading is 57 mg/m³. What is the maximum quantity of ash that will have to be removed per hour from the bag filter hopper based on these test results? **(10)**
- (b) Write atleast four typical job titles for Energy Management. **(04)**
- Q-5** **Attempt all questions** **(14)**
- (a) Draw process flow chart for product manufacture as listed below(anyone): **(06)**
- (1) Papermaking Process
- (2) Penicillin-G Fermentation Process
- (3) Bolt Manufacturing Process
- (b) Explain how electronic ballast saves energy? **(06)**
- (c) Why is electricity the most convenient form of energy? **(02)**
- Q-6** **Attempt all questions** **(14)**
- (a) Write merits and demerits of Direct Method for Boiler Efficiency. **(06)**
- (b) A nuclear fission reaction power plant converts energy in matter to electrical by following energy chain: Energy in matter → Thermal energy → Mechanical energy → Electrical energy
- Calculate the quantity of matter required per day to generate 10 MW electricity. (Neglect losses in the conversion)
- (c) Enlist the categories of areas of energy efficiency improvement for obtaining details of energy savings. **(03)**
- Q-7** **Attempt all questions** **(14)**
- (a) Discuss in detail the scope of energy audit activities. **(06)**
- (b) Explain the reporting format of a typical energy audit. **(06)**
- (c) What is energy monitoring and targeting? **(02)**
- Q-8** **Attempt all questions** **(14)**
- (a) What are the baseline data that an audit team should collect while conducting detailed energy audit? **(06)**
- (b) What are the ways of reduction of steam usage? **(04)**
- (c) Should an industry have energy policy? If yes or no, explain the reason. **(04)**

