

Total No. of Questions : 10]

SEAT No. :

P2226

[Total No. of Pages : 4

[5254]-559

B.E. (Mechanical S/W)
ENERGY AUDIT AND MANAGEMENT
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Neat diagram must be drawn wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

Q1) a) Write a short note on: [6]

- i) Primary & Secondary energy sources.
- ii) Primary energy consumption & final energy consumption.

b) Explain targeted energy audit & its importance. [4]

OR

Q2) a) Explain detailed energy audit. [6]

b) Explain following instruments used in Energy Audit with their application: [4]

- i) Ultrasonic leak detector
- ii) Lux meter

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Q3) a) What is the NPV of an energy conservation project with cash flow given below: [6]

Initial investment	Rs.(2,000,000)
Saving in Year	Cash Flow
1	Rs.400,000
2	Rs.400,000
3	Rs.600,000
4	Rs.600,000
5	Rs.700,000

The discount rate $k = 10\%$. Is the proposal attractive?

b) Write a short note on simple payback period with the advantages of this method. [4]

OR

Q4) a) An air pre-heater costs Rs.400,000 and will last for 5 years. It will generate a saving of Rs.140,000 per year with a maintenance cost of Rs.20,000 per year. The discount rate is 10% and salvage value is Rs.10,000 at the end of 5th year. Is the proposal attractive by NPV method? [6]

b) What is return on investment? [4]

Q5) a) What are the different losses in a boiler system. which are considered in Indirect method for calculating boiler efficiency? Explain with neat sketch. Write formula for calculating boiler efficiency by Indirect method. [8]

b) What are the different opportunities for saving energy in central chilled water plant. [8]

OR

Q6) a) Explain direct and indirect method of performance evaluation of a furnace with their advantages & disadvantages. [8]

b) Find out the efficiency of the boiler by direct method with the data given below: [8]

Type of boiler: Coal fired

Quantity of dry saturated steam generated: 12TPH

Steam pressure(gauge) and Temperature: 10kg/m²(G) and 200°C

Quantity of coal consumed: 2.1 TPH

Feed water temperature: 75°C

Gross calorific value of coal: 12000 kJ/kg

Enthalpy of saturated steam at 10 kg/m² (G) pressure: 1785 kJ/kg

Enthalpy of feed water: 320 kJ/kg

Q7) a) Explain step by step approach for maximum demand control. [8]

b) Write a short note on-energy saving opportunities with electrical system. [8]

OR

Q8) a) What is power factor? What are the benefits of improving power factor? [8]

b) A 50 kW induction motor with 86% present full load efficiency is being considered for replacement by a 89% efficiency motor. What will be the savings in energy if the motor works for 6000 hours per year and cost of energy is Rs.4.50 per k Wh? [8]

- Q9)** a) Explain the concept of co-generation and its potential benefits with a neat sketch. [8]
- b) Write short note on: [6]
- i) Recuperator
- ii) Regenerator
- c) How does a shell & tube heat exchange work? [4]

OR

- Q10)**a) Explain various topping cycle cogeneration systems. [8]
- b) What are the direct and indirect benefits of Waste Heat Recovery plant? [6]
- c) Explain working heat wheel with neat sketch. [4]

