[4759]-34

B.E. (Mechanical Engineering)

ENERGY AUDIT AND MANAGEMENT

(2008 Course) (Semester - I) (Elective - I)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate answer books.*

2) *Answer any three questions from each section.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right side indicate full marks.*

5) *Use of calculator is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Discuss aspects of energy policy and strategy in energy conservation system. **[8]**

     b) Explain indian Energy Scenario and draw Pi-chart. **[8]**

OR

Q2) a) Write short notes on: **[8]**

         i) Commercial energy and non-commercial energy.

         ii) Renewable and non-renewable energy.

     b) Explain energy consumption pattern of Indian and global industry. **[8]**

Q3) a) What are energy conservation opportunities in refrigeration and HVAC systems? **[8]**

     b) Explain following instruments used for energy audit with their application **[8]**

         i) Water flow meter

         ii) Electrical measuring instruments

OR

Q4) a) Define energy management and state the objectives of energy management. Also explain need of energy audit. **[8]**

b) How to conduct a detailed energy audit? **[8]**

Q5) a) Define and explain following: **[10]**

  i) Net present value (NPV)

  ii) Internal rate of return (IRR)

b) A company borrows Rs. 30,00,000 to finance a new boiler installation. If the interest rate is 12% per annum and the repayment period is 6 years. Calculate the value of total repayment and monthly repayment value for**[8]**

  i) Simple interest

  ii) compound interest

OR

Q6) a) Explain following financial analysis methods. **[10]**

  i) Simple payback period

  ii) Profitability index

b) What is sensitivity and risk analysis? Explain factors affecting sensitivity and risk analysis. **[8]**

SECTION - II

Q7) a) Explain advantages and disadvantages of direct and indirect methods used for calculating boiler efficiency. **[8]**

b) Explain energy saving measures for DG sets. **[8]**

OR

Q8) a) Explain energy saving opportunities in cooling tower [8]

b) in the leakage test in a process industry, following results were observed [8]

Compressor capacity (m^3/minute) = 40

Cut in pressure, kg/cm^2 (g) = 5.8

Cut out pressure, kg/cm^2(g) = 8.5

Load kW drawn = 190 kW

Unload kW drawn = 60 kW

Average 'Load' time, T = 2.5 minutes

Average 'Unload' time, t = 12.5 minutes.

Calculate:

i) Leakage quantity/min and leakage quantity/day

ii) Specific power for compressed air generation

iii) Energy loss due to leakages/day

Q9) a) What are different types of motors? Explain in detail the energy efficiency improvement in electric motors. [8]

b) What are different types of lamps used in lighting systems? Write their features and applications. [8]

OR

*Q10)*a) Describe the factors included in tariff structure of electricity billing. [8]

b) Explain the following basic terms in lighting system: incandescent lamps, luminaire, reflector lamps and gas discharge lamps. [8]

*Q11)*a) Explain the following waste heat recovery devices [10]

     i) Recuperators

     ii) Regenerators

     b) What is cogeneration? Explain technical options for cogeneration. [8]

<div align="center">OR</div>

*Q12)*Write short note on: [18]

     a) Indirect benefits of waste heat recovery.

     b) Carbon credits.

     c) Heat wheels.

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