

Total No. of Questions : 12]

SEAT No. :

P734

[Total No. of Pages : 3

[4659] - 35

**B.E. (Mechanical)**

**ENERGY AUDIT AND MANAGEMENT**

**(Semester - I) (2008 Pattern) (Elective - I (a))**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates :*

- 1) *Figures to the right indicate full marks.*
- 2) *Solve questions 1 or 2, 3 or 4, 5 or 6 from Section - I and 7 or 8, 9 or 10, 11 or 12 from Section - II.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables and time value of money factor table is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1)** a) Describe sector wise energy consumption pattern of India. Also draw pie chart for it. [8]

b) Describe the energy saving opportunities in cooling tower. [8]

OR

**Q2)** a) Write a short note on Indian energy scenario and energy security. [8]

b) List the energy saving opportunities in HVAC systems. [8]

**Q3)** a) What are the equipments used for energy audit? Also write which parameter is to be measured by equipment. [8]

b) Which are the types of energy audit? Describe the steps to carry out energy audit of small scale industry. [8]

OR

**Q4)** a) Explain need of energy audit and write structure of report of energy audit. [8]

b) Which information is to be collected during detailed energy audit? [8]

**P.T.O.**

**Q5) a)** Explain the following terms **[10]**

- i) Simple Payback Period
- ii) Time Value of money
- iii) Net Present Value
- iv) Return on Investment
- v) Internal Rate of Return

**b)** Describe the factors influencing costing and typical cost of following **[8]**

- i) Steam
- ii) Compressed air
- iii) Natural gas
- iv) Electricity

OR

**Q6) a)** Calculate Net Present Value and Internal rate of return for the project which has following cash flow **[10]**

Investment	Rs. 1000000
Saving in year	Cash flow (Rs)
1	200000
2	200000
3	300000
4	300000
5	350000

Discount rate is 10%

**b)** Write a note on risk and sensitivity analysis **[8]**

### **SECTION - II**

**Q7) a)** Calculate the efficiency of the boiler by direct method with the data given below: **[8]**

- i) Type of boiler: Oil fired
- ii) Quantity of dry and saturated steam generated: 6000kg/hr
- iii) Quantity of fuel consumed: 410kg/hr
- iv) Steam pressure and temperature: 10kg/m<sup>2</sup> and 180°C
- v) Feed water temperature: 70°C
- vi) Gross Calorific Value of oil: 43500kJ/kg
- vii) Enthalpy of saturated steam at 10kg/m<sup>2</sup> and 180°C: 2776 kJ/kg

- b) What are the different heat losses occurring in oil fired furnace ? Explain in brief. [10]

OR

- Q8)** a) List the energy saving opportunities in pumping system. [8]  
b) What are different types of fans? Draw system and fan curve and show operating point. Explain different flow control strategies of fan. [10]

- Q9)** a) Explain the terms [8]  
i) Power Factor  
ii) Maximum Demand  
iii) Copper losses  
iv) Luminous efficiency  
b) List the type's motors and explain the different losses occurring in electric motor. [8]

OR

- Q10)**a) The lighting connected load for the small industry consisting of 150 Fluorescent tubes of 55W each with magnetic ballast. In first option, the magnetic ballast of fluorescent tubes is replaced by electronic ballast and power consumption of same fluorescent tubes reduces to 40W. Calculate the Simple payback period of above replacement if cost of electronic ballast is Rs 150. In second option, fluorescent tubes are replaced by energy efficient fluorescent tubes of 20W and cost of Rs. 400 each. Calculate simple payback period. Which energy saving option is better and Why? Consider usage of 16 hours per day and an electrical tariff of Rs. 4 per KWh. [8]  
b) Explain the different maximum demand (MD) control methods. [8]

- Q11)**a) Explain the topping cycle and the bottoming cycle of cogeneration with two examples. [8]  
b) What are the different waste heat sources? Explain in brief. [8]

OR

- Q12)**a) Describe factors influencing cogeneration choice. [8]  
b) Write a short note [8]  
i) CDM projects.  
ii) Carbon Credit

