Total No. of Questions : 12]

SEAT No. :

P2664

[Total No. of Pages : 3

[5154]-34
B.E. (Mechanical)
ENERGY AUDIT AND MANAGEMENT
(2008 Pattern) (Semester - I) (Elective - I) (402044A)

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

Instructions to 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 right side indicate full marks.***
5) ***Use of logarithmic tables, Slide rule, electronic pocket calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) What are the various steps in the implementation of energy management in an organization? **[8]**

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

OR

Q2) a) State the importance of energy policy for industries. **[8]**

b) What are the benefits of benchmarking energy consumption? **[8]**

Q3) a) List an energy efficiency improvement options in a refrigeration plant. **[8]**

b) What do you understand by the term "benchmarking" and list its benefits? **[10]**

OR

Q4) a) Write short note on energy conservation opportunities in boiler. **[8]**

b) In 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 tank level difference in hot well. The measured data are as follows:

Temperature of ethylene glycol entering and leaving the evaporator is -1°C and -4°C respectively. Ethylene glycol flow rates is 13200 kg/hr,

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pressure drop of ethylene glycol in evaporator is 0.7 Kg/cm^2, electrical power input to compressor is 39.5 kW, specific heat capacity of ethylene glycol is 2.34 kcal/kg°C. Estimate (i) Net refrigeration capacity, (ii) kW/ton rating (iii) COP and (iV) EER. **[10]**

Q5) a) Which are the important technical parameters for cogeneration? **[8]**

b) Explain in detail with suitable examples the following terms. **[8]**

i) Simple Payback Period(SPP)

ii) Return of Investment(ROI)

iii) Internal Rate of Return(IRR)

OR

Q6) a) Write a short note on Net Present Value (NPV) and Cash Flow. **[8]**

b) Explain in detail the basic criteria for financial investment appraisal. **[8]**

SECTION - II

Q7) a) A chemical plant operates a cooling water pump for process cooling and refrigeration applications. During the performance testing the following operating parameters were measured.

Pump flow, Q = 0.4 m^3/s, power absorbed, P (motor input) = 325 kW, Suction head (Tower basin level), h_1=1m, delivery head, h_2= 50 m, type of drive = direct coupled, motor efficiency at the operating loading = 88%, density of water = 996kg/m^3. Calculate pump efficiency. **[10]**

b) Describe energy saving opportunities in steam system. **[8]**

OR

Q8) a) Write a note on industrial steam traps. **[10]**

b) Testing coal fired boiler is more difficult than oil fired boiler. Give reasons. **[8]**

Q9) a) List the energy savings opportunities in industrial lighting systems? **[8]**

b) Name the two fixed losses in an electric motor and what are the approaches for reducing these losses? **[8]**

OR

Q10)a) Explain in detail about power factor improvement and benefits. **[8]**

b) Write step by step approach for assessing energy efficiency of lighting system. **[8]**

Q11)a) What are the direct and indirect benefits of waste heat recovery? **[8]**

b) Which are the relative merits of cogeneration systems? **[8]**

OR

Q12)a) Explain with diagrams cogeneration systems using the back pressure turbine, extraction condensing turbine and double extraction back pressure turbine. **[8]**

b) Enlist different commerical waste heat recovery devices and explain in detail any one of them. **[8]**