Total No. of Questions :10]

P3270

[5670]-539 B.E. (Mechanical Engineering) ENERGY AUDIT & MANAGEMENT

(2015 Pattern) (Semester-I) (Elective-II) (402045C) (End Sem.)

Time : 2½ Hours]

[Max. Marks : 70

[5]

[5]

[Total No. of Pages :3

SEAT No. :

Instructions to the candidates.

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.
- 2) Draw near diagrams wherever necessary.
- 3) Figures in the right indicate full marks.
- 4) Use of Scientific Calculator is allowed.
- 5) Assume suitable data whenever necessary.

Q1) a) Discuss environmental impacts due to conventional energy use.
b) Write short note on Energy Audit Software.

Q2) a) Write a short note on Energy Policy.

b) Explain Energy Audit Methodology in Ice Factory.

- Q3) a) A typical manufacturing facility has a 200JP compressor (which requires 215 bhp) that operates for 7200 hrs annually. It is fully loaded 85% of the time (motor efficiency=95%) & unloaded the rest of the time(25% full-load bhp & motor efficiency=90%). The aggregate electric rate is Rs. 3.5/kWh. Calculate COE.
 - b) Consider 2 projects, A&B with the initial investment Rs. 80000. The project life times are 5 years in case. The saving in each of the 5 years for the two projects are as shown in following table ROI = 20%. [5]

	Project A	Project B
Capital Cost (Rs.)	Rs.80000	Rs.80000
Year	Cash flow (Rs.)	Cash flow (Rs.)
1	10000	50000
2	20000	40000
3	30000	30000
4	40000	20000
5	50000	10000

Q4) a) Calculate internal rate of return for the project which has following cash flow, discount rate is 10%. [6]

Investment	Rs.	10,00,000
Saving in year	Cash	flow (Rs.)
1	2	,00,000
2	2	,00,000
	3	,00,000
4 9	3	,00,000
5	3	,50,000

b) A company borrows Rs. 30000 to finance a new boiler installation. If the interest rate is 12% per annum & repayment period is 6 years. Calculate the value of total repayment & monthly repayment value for [4]

- ii) Compound interest
- Q5) a) What are the different heat losses occurring in oil fired furnace? Explain in brief.[8]
 - b) A centrifugal pump is pumping 85m³/hr of water and pressure rise in the pump is 6kg/cm². If power drawn by motor is 25KW. Find out the pump efficiency. Assume motor efficiency as 90% & water density as 998 Kg/m³.
- Q6) a) Explain the energy saving opportunities in compressed air system. [8]
 b) Calculate pump efficiency from the data given: pump flow is 0.40 m³/s, power absorbed: 325 KW, suction head+1m, Delivery head 55m, motor
 - efficiency 88%, type of drive: direct coupled, density of water 996 kg/m³. [10]
- Q7) a) The connected load for the hostel are as below.
 - i) 190 Fluorescent tubes of 55W each with magnetic ballast.
 - ii) 20 Fluorescent tubes of 40W each with electric ballast.
 - iii) 20 old fan of 100W each.

It is decided to replace the all tubes of 20W 7 old fan by a new fan of 80W. Considering usage of 6Hrs per day & an electrical tariff of Rs. 4per KWh. Calculate energy saving of tubes & fans replacement. [8]

b) What are the factors affecting energy efficiency of electrical motor? [8]

OR

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i) Simple Interest

Q8) a) Explain the following terms. [8] Power factor Maximum Demand **i**) The lighting connected load for the small industry consisting of 140 b) Fluorescent tubes of 55 W each with magnetic ballast. In first option, the magnetic ballast of Fluorescent tubes is replaced by electronic ballast & power consumption of same fluorescent tubes reduces to 40W. Calculate the simple payback period of above replacement if cost of electronic ballast is Rs. 110. In second option, fluorescent tubes are replaced by energy efficient fluorescent tubes of 20 W & cost of Rs. 450 each. Calculate simple payback period. Which energy saving option is better & why? Consider usage of 16 hrs per day & an electrical triff of Rs. 4 per KWh. [8] **Q9)** a) Explain the topping cycle & the bottoming cycle of co-generation with 2 examples. [8] [8] Explain benefits of Waste heat recovery system. b) Explain cogeneration cycle with suitable examples. [8] *010*)a) Write a short note on b) i) CDM projects 3 [5670]-539