

Elective - I : Energy Management and Audit

P. Pages : 2

Time : Three Hours



NKT/KS/17/7464

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Diagrams and chemical equations should be given whenever necessary.
 11. Illustrate your answers whenever necessary with the help of neat sketches.
 12. Use of non programmable calculator is permitted.

1. a) Explain the concept of Energy Management with example. 7
- b) What are the energy conservation opportunities in Lighting and HVAC systems in buildings? 7

OR

2. a) Discuss in brief about global environmental concerns and their remedies. 7
- b) Explain in brief about carbon Trading and Carbon foot prints. 7
3. a) What is Energy Audit? Explain how the detailed Energy Audit is carried out. 7
- b) What are the benefits of benchmarking energy consumption? 6

OR

4. a) Explain the highlights of Energy conservation Act 2001. 7
- b) What are the duties and responsibilities of Energy auditors? 6
5. a) Explain with example how sankey diagram is useful for energy analysis. 7
- b) In the carbonation of a soft drink, the total quantity of carbon dioxide required is the equivalent of 3 volumes of gas to one volume of water at 0°C and atmospheric pressure. Calculate (a) the mass fraction and (b) the mole fraction of CO₂ in the drink, ignoring all components other than CO₂ and water. 6

OR

6. a) Draw a typical input-output diagram for a process and indicate various energy inputs. Explain the diagram with example. 7

- b) A textile dryer is found to consume $4\text{m}^3/\text{hr}$ of natural gas with a calorific value of 800kJ/mole . If the throughput of the dryer is 60kg of wet cloth/hour, drying it from 55% moisture to 10% moisture, estimate the overall thermal efficiency of the dryer taking into account the latent heat of evaporation only. (Latent heat of evaporation = 2257 kJ/kg) 6
7. a) Explain the prerequisites of the successful energy management program in brief. 7
- b) Explain the duties and responsibilities of Energy Manager. 6

OR

8. a) Explain Energy Management information system in brief. 7
- b) What are the benefits of motivation of employees and their training in Energy Management? 6
9. a) Discuss techniques to be adopted for reducing supply – demand gap for electrical energy. 7
- b) A 415V , 15kW , 3-ph, 50Hz induction motor operates at full load with 88% efficiency and 0.85 pf lagging. 7
- a) Find current drawn by the motor.
- b) If this motor is replaced by 92.5% energy efficient motor with 0.92 power factor, what will be the power savings in terms of kW and kVA ?

OR

10. a) Explain how energy conservation can be carried out in fans and pumps. 7
- b) What are the advantages of improving power factor at load side? Explain with example. 7
11. a) Explain the energy conservation opportunities in industrial heating furnaces. 7
- b) Explain how performance evaluation of a turbine is carried out? 6

OR

12. Write short notes on **any two** of the following. 6
- i) Energy conservation opportunities in boilers. 6
- ii) Performance analysis of furnaces. 6
- iii) Heat exchangers and heat pumps. 7
