

Elective - I : Energy Management and Audit (7S-EE-03T)

P. Pages : 2

Time : Three Hours



TKN/KS/16/7551

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. Illustrate your answers whenever necessary with the help of neat sketches.
 11. Use of non-programmable calculator is permitted.

1. a) Define the following terms with three examples of each. 7
 - i) Primary and secondary Energy.
 - ii) Commercial and Non-commercial Energy.
 - iii) Renewable and Non-renewable Energy.
 - b) What are the implications of Global warming? 6
- OR**
2. a) Why energy conservation is important in the prevailing energy scenario? 6
 - b) What do you think of strategies required for long term management of energy in India? 7
3. a) What are the various steps in the implementation of energy management in an organization? 7
 - b) Explain briefly the difference between preliminary and detailed energy audits? 6
- OR**
4. a) What are the benefits of bench marking energy consumption? 7
 - b) Explain the role of training and awareness in energy management program? 6
5. a) What is the purpose of material and energy balance? 6
 - b) How Sankey Diagram is useful for energy analysis? 7
- OR**
6. a) Draw a typical input output diagram for a process and indicate the various energy inputs. 7
 - b) An autoclave contains 1000 cans of pea soup. It is heated to an overall temperature of 100°C. If the cans are to be cooled to 40°C. before leaving the autoclave, how much cooling water is required if it enters at 15°C and leaves at 35°C? 6

The specific heats of pea soup and the can metal are respectively 4.1 kJ/kg°C and 0.50 kJ/kg°C. The weight of each can is 60g and it contains 0.45 kg of pea soup. Assume that heat content of the autoclave walls above 40°C is 1.6×10^4 kJ and there is no heat loss through walls.

7. a) What do you mean by Energy manger? List down the responsibilities and duties of an energy manager in an Industry? 7
- b) What are the benefits of monitoring and targeting system? 7
- OR**
8. a) Explain how a cusum chart is drawn with an example. 7
- b) What are the requirements of good energy action planning? 7
9. a) Explain the ways by which efficiencies of electric motors can be increased. 6
- b) What do you understand by Reactive power compensation? Why is it required? Give various methods used for Reactive power compensation. 7
- OR**
10. Motor Specification. 13
- Rated power = 34 KW /45HP
 Voltage = 415 V
 Current = 57Amp
 Speed = 1475 rpm
 Insulation Class = F.
 Frame = F
 Connection = Delta.
 No Load Test Data
-
- Voltage V = 415 volts
 Current I = 16.1 Amp
 Frequency F = 50 Hz
 Stator phase resistance at 30°C = 0.264 Ω
 No load power = 1063.74 watts.
 Calculate
- i) Iron plus friction and windage Losses.
 ii) Stator resistance at 120°C
- $$R_2 = R_1 \times \frac{235 + t_2}{235 + t_1}$$
- iii) Stator copper loss at operating temperature of resistance at 120°C.
 iv) Full load slip and rotor input assuming rotor losses are slip times rotor input.
 v) Motor Input assuming stray losses are 0.5% of motor rated power.
 vi) Motor full load efficiency and full load power factor.
11. a) What are the methods for assessing the boiler efficiency? Explain briefly. 7
- b) Write short note on 7
- i) Energy conservation in steam turbines.
 ii) Heat exchangers and Heat pumps.
- OR**
12. a) Explain the principle of modulating control in a boiler. 7
- b) Write in brief about Applications of FBC. 7
