

**Elective - I : Energy Management and Audit**

P. Pages : 2

Time : Three Hours

**NRJ/KW/17/4603**

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) Discuss the criteria for classification of energy into different types. 7  
b) Discuss the effects of climate change. 6

**OR**

2. a) Explain in detail the following global environmental issues. 7  
i) Global warming  
ii) Loss of biodiversity  
b) State the measures for energy conservation in domestic and commercial sectors. 6
3. a) What is energy management. Discuss the objectives of energy management. 7  
b) Discuss 'preliminary energy audit' and 'detailed energy audit'. 6

**OR**

4. a) Give a typical energy audit reporting format. 7  
b) Briefly explain with examples on fuel and energy substitution. 6
5. a) Draw and explain a typical mass and energy balance diagram indicating inputs and outputs. 7  
b) Discuss the procedure followed during energy and mass balance calculations. 7

**OR**

6. a) Draw the process flow-chart for any product manufacturing. 7

- b) Two methanol water mixtures are contained in separate flasks. The first mixture contains 50% wt. methanol and second contains 80% wt. methanol. If 200 gm of first mixture is combined with 150 gm of second, what are the mass and compositions of the product ? **7**
7. a) Discuss force field analysis for energy action planning in detail. **7**
- b) What are the responsibilities and duties of an energy manager. **6**

**OR**

8. a) Use CUSUM technique and calculate energy savings for 6 months period of the year 2003. For calculating total energy savings, average production can be taken as 4000 MT/Month. Refer the data given below : **7**

2003-month	Actual SEC kwh/MT	Predicted SEC kwh/MT
Jan	242	265
Feb	238	265
Mar	287	265
Apr	237	265
May	295	265
Jun	246	265

It may also be noted that energy saving measures were implemented prior to Jan. 2003 and retrofits were not functioning during March and May - 2003.

- b) Define energy monitoring and targeting. Discuss the benefits that arise from an effective monitoring and targeting system. **6**
9. a) Discuss the following energy management techniques. **7**
- i) Load management by time dependent tariffs.
  - ii) Rebate management.
- b) Discuss the role of demand side management. **6**

**OR**

10. a) Explain the losses in induction motor and list the energy saving opportunities. **7**
- b) What are the major sources of reactive power ? Why reactive power compensation is required. **6**
11. a) Discuss the energy conservation opportunities for a boiler system. **7**
- b) Explain the general fuel economy measures in furnaces. **7**

**OR**

12. a) Explain FBC boiler in detail. **7**
- b) Discuss shell and tube type heat exchangers. **7**

\*\*\*\*\*