Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐   **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(Electrical & Electronics) (2011 & 2012 Batch E-II)
B.Tech.(EE) (2011 Onwards E-II)   (Sem.–7,8)
ENERGY AUDITING AND MANAGEMENT
Subject Code : BTEE-804B
Paper ID : [A3036]

Time : 3 Hrs.   **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

   a. Why energy auditing is important?

   b. Discusses advantage and disadvantage of renewable energy systems. What is the need of integrated energy systems?

   c. Explain the limitations and advantages of *'Simple Payback Period'* technique.

   d. Explain the concept of Cash flow diagram.

   e. Explain the concept of Energy Service Companies (ESCOs).

   f. What are the different components of Material and Energy Balance of a process or unit?

   g. What are the commonly used refrigerants for vapour compression chillers?

   h. Based on capacity, classify air compressors.

   i. Give major classifications of compressors and the basic principle of its working.

   j. Highlight advantages of CFL lamp (compact fluorescent lamp) over incandescent lamps.

SECTION-B

2. Differentiate between following with the help of suitable example.

   a. Primary and Secondary energy.

   b. Commercial and Non-commercial energy.

   c. Renewable and Non-Renewable energy.

3. Draw a typical input output diagram of a process and indicate the various energy input. In a textile mill, an evaporator concentrates a liquor containing solids of 6% by w/w (weight by weight) to produce an output containing 30% solids w/w. Calculate the evaporation of water per 100 kg of feed to the evaporator.

4. Name the instrument to measure each of the following in an energy audit :

   a. O_2, CO, CO_2 and temperature in flue gas.

   b. Illumination levels.

   c. Non-contact type speed measurement.

   d. kW, kWh, kVAr, kVArh, kVA, kVAh and power factor.

   e. Non-contact type surface temperature measurement.

5. Describe the Energy Conservation Act, 2001 and its features.

6. Explain the principle of *'vapor compression'* system with a neat sketch.

SECTION-C

7. Write the step wise methodology of performing detailed energy audit.

8. a. Discuss the disadvantages of a low power factor. Explain the causes of low power factor of the supply system.

   b. A single phase motor connected to 400 V, 50 Hz supply takes 31·7A at a power factor of 0·7 lagging. Calculate the capacitance required in parallel with the motor to raise the power factor to 0·9 lagging.

9. A Proposed energy efficiency improvement project requires an initial investment of Rs.5,00,000 and generates cash flow as shown in table. Calculate IRR of the project by interpolation method by taking initial discount rate as 11%.

Year	Net Annual Saving (Rs.)
1	120000
2	115500
3	130000
4	116500
5	117250
6	200000