QUESTION BANK

ENERGY MANAGEMENT (BELE0-F97)

CHAPTER 1-ENERGY SCENARIO

1. Define the following terms with three examples for each -

a) Primary and Secondary Energy.

b) Commercial and Non-commercial Energy.

c) Renewable and Non-renewable Energy

2. In terms of coal reserve India's position in the world is

(a) 10th (b) 17th (c) 4th (d) 26th

3. The world oil reserves is expected to last another

(a) 300 years (b) 45 years (c) 600 years (d) forever

4. Of the total primary energy consumption in India coal accounts for

(a) 35% (b) 46% (c) 55% (d) 75%

5. List atleast five States where coal deposits are concentrated in India.

6. How much % of our Country's oil consumption is imported and how much does it cost (approximately) per year?

7. Name any three places of oil reserves located in India.

8. What is the hydro power generation potential available in India, and how much is exploited so far?

9. What are the % shares of commercial energy consumption in industrial and agricul tural sectors?

10. How is economic growth linked to energy consumption?

11. What do you think of strategies required for long-term management of energy in India?

12. Discuss the subsidies and cross subsidies in oil sector in India.

13. Write in few words about the various reforms in the energy sector.

14. Though Plant Respiration and Decomposition release more than ten times CO_2 released by human activities, explain why CO_2 is regarded as a potential threat to the planet.

15. The contribution of CO_2 to the green house gases is

(a) 23% (b) 95% (c) 54% (d) 0%

16. What are the implications of Global warming?

17. Describe the Greenhouse effect.

18. The excess of which gas in the atmosphere is the main cause for greenhouse effect?

19. Name three greenhouse gases. Which one of them produces the maximum green house effect?

20. What are the major pollutants in burning fossil fuels?

21. Differentiate between energy conservation and energy efficiency.

22. What are the benefits for industry through implementing energy efficiency programme?

23. Why energy conservation is important in the prevailing energy scenario?

24. The energy conservation act requires that all designated energy consumers should get energy audits conducted by

(a) Energy manager (b) accredited energy auditor (c) managing director (d) char tered accountant

25. Name five designated consumers under the energy conservation act.

26. Name any three main provisions of the EC act, 2001 as applicable to the designated consumers.

27. List the incorrect statement and correct the same.The Energy Conservation Act, 2001 requires that

a) designated consumer to furnish to the designated agency, in such form and man ner and within such period as may be prescribed the information with regard to the energy purchased and action taken on the recommendation of energy auditor.b) direct, if consider necessary, for efficient use of energy and its conservation, to get energy audit conducted by a certified energy auditor.

CHAPTER 2(A)- ELECTRICAL SYSTEM

Name different types of power generation sources.

2. The temperatures encountered in power plant boilers is of the order of

a) 8500C b) 3200°C c) 1300°C d) 1000°C

3. What do you understand by the term "Heat Rate"?

4. Explain why power is generated at lower voltage and transmitted at higher voltages.

5. The efficiency of steam based power plant is of the order of

a) 28-35% b) 50-60% c) 70-75% d) 90-95%

6. The technical T & D loss in India is estimated to be

a) 50% b) 25% c) 17% d) 10%

7. What are the typical billing components of the two-part tariff structure of industrial utility?

8. Define contract demand and billing demand.

9. What are the areas to be looked into for maximum demand reduction in industry?

10. A trivector-meter with half-hour cycle has the following inputs during the maximum demand period:

MD Drawn Duration

kVA in Minutes

100 10

200 5

50 10

150 5

What is the maximum demand during the half-hour interval?

11. Power factor is the ratio of

a) kW/kVA b) kVA/kW c) kVAr/kW d) kVAr/kVA

12. A 3-phase, 415 V, 100 kW induction motor is drawing 50 kW at a 0.75 PF Calculate the capacitor rating requirements at motor terminals for improving PF to 0.95. Also calculate the reduction in current drawn and kVA reduction, from the point of installation back to the generated side due to the improved PF.

13. A process plant consumes of 12500 kWh per month at 0.9 Power Factor (PF). What is the percentage reduction in distribution losses per month if PF is improved up to 0.96 at load end?

14. What is the % loss reduction, if an 11 kV supply line is converted into 33 kV supply system for the same length and electrical load application?

15. The efficiency at various stages from power plant to end-use is given below. Efficiency of power generation in a power plant is 30 %. The T & D losses are 23 %. The distribution loss of the plant is 6 %. Equipment end use efficiency is 65 %. What is the overall system efficiency from generation to end-use?

16. A unit has a 2 identical 500 kVA transformers each with a no load loss of 840 W and

full load copper loss of 5700 watt. The plant load is 400 kVA. Compare the transformer losses when single transformer is operation and when both transformers are in parallel operation.

17. Explain how fluctuations in plant voltage can be overcome.

18. What are Total Harmonic Distortion and its effects on electrical system?

19. What are the equipments / devices contributing to the harmonics?

20. Select the location of installing capacitor bank, which will provide the maximum energy efficiency.

a) Main sub-station b) Motor terminals c) Motor control centers

d) Distribution board

21. The designed power transformers efficiency is in the range of

a) 80 to 90.5 % b) 90 to 95.5 % c) 95 to 99.5 % d) 92.5 to 93.5 %

22. The power factor indicated in the electricity bill is

a) Peak day power factor b) Power factor during night c) Average power factor

d) Instantaneous power factor

CHAPTER 2(B)- ELECTRIC MOTORS

1. Name three types of motors in industrial practice.

2. What is the relation between RPM (speed) and frequency of an induction motor?

3. A 4-pole squirrel case induction motor operates with 5 % slip at full load. What is the full load RPM you may expect, if frequency is changed by a V/F control to:

(a)40 c/s (b) 45 c/s (c) 35 c/s

4. List the losses in induction motors and their expected percentage out of the total losses.

5. List the factors affecting energy efficiency of electric motors?

6. The power factor of an induction motor

a) increases with load b) decreases with load c) remains constant with load d) has no relation to load

7. List factors affecting windage and friction losses while rewinding.

8. What are the factors affecting core losses while rewinding?

9. List methods by which speed control of motor can be achieved.

10. Explain the ways by which efficiencies of energy efficient motors are increased.

11. How does efficiency loss occur in a rewound motor?

12. How do you check the efficacy of rewound motor?

13. A 50 kW induction motor with 86 % present full load efficiency is being considered for replacement by a 89 % efficiency motor. What will be the savings in energy if the motor works for 6000 hours per year and cost of energy is Rs. 4.50 per kWh?

CHAPTER 2(C)- LIGHTING SYSTEM

1. What are the types of commonly used lamps?

2. What do the following terms mean?

– Illuminance

– Luminous efficacy

– Luminaire

– Control gear

– Colour rendering index

3. What is the function of ballast in a lighting system?

4. Rate the following with respect to their luminous efficacy

– GLS lamp

– FTL

– CFL

– HPSV

– LPSV

5. Rate the following with respect to colour rendering index

– GLS lamp

– HPSV lamp

– Metal halide lamps

– LPSV lamp

6. Briefly describe the methodology of lighting energy audit in an industrial facility?

7. List the energy savings opportunities in industrial lighting systems.

8. Explain how electronic ballast saves energy?

9. A CFL can replace

a) FTL b) GLS c) HPMV d) HPSV

10. Explain briefly about various lighting controls available?

CHAPTER 3- ENERGY MANAGEMENT AND AUDIT

1. List down the objective of energy management..

2. What are the managerial functions involved in energy management?

3. Explain why managerial skills are as important as technical skills in energy management?

4. What are the various steps in the implementation of energy management in an organization?

5. State the importance of energy policy for industries.

6. Explain the role of training and awareness in energy management programme?

7. What is an energy audit?

8. Explain briefly the difference between preliminary and detailed energy audits?

9. What is the significance of knowing the energy costs?

10. What are the benefits of benchmarking energy consumption?

11. Explain the implications of part load operation of energy equipment with examples?

12. What do you understand by the term fuel substitution? Give examples.

13. What are the parameters that can be measured by on line power analyser?

14. Name the one instrument used to measure CO2 from boilers stack is

(a) Infrared thermometer (b) Fyrite (c) Anemometer (d) Pitot tube

15. Non contact flow measurement can be carried out by

(a) Orifice meter (b) Turbine flow meter (c) Ultrasonic flow meter (d) Magnetic flow meter

16. Non contact speed measurements can be carried out by

(a) Tachometer (b) Stroboscope (c) Oscilloscope (d) Odometer

CHAPTER 4- FINANCIAL MANAGEMENT

1. Why fresh investments are needed for energy conservation in industry?

2. Name at least three selling points to top management for investing in energy efficiency over other competitive projects.

3. Cost of an heat exchanger is Rs.1.00 lakhs .Calculate simple pay back period considering annual saving potential of Rs.60,000/- and annual operating cost of Rs.15,000/- .

4. What is the main draw back of simple pay back method?

5. Calculate simple pay back period for a boiler that cost Rs.75.00 lakhs to purchase

and Rs.5 lakhs per year on an average to operate and maintain and is expected to annually save Rs.30 lakhs.

6. What are the advantages of simple pay back method?

7. A project entails an investment for initial cost of installation and series of annual costs and/or cost savings through out the life of project.. Recommend a suitable financial analysis techniques and explain.

8. What do you understand by the term " present value of money"?

9. What do you understand by the term " discounting"?

10. ROI stands for

(a) return on investment (b) rotating on investment (c) realization on investment (d) reality only investment?

11. Define ROI .

12. Investment for an energy proposal is Rs.10.00 lakhs. Annual savings for the first three years is 150,000, 200,000 & 300,000. Considering cost of capital as 10%, what is the net present value of the proposal?

13. What are the advantages of net present value?

14. Internal rate of return of a project is the discount rate which makes its net present value equal to zero. Explain

15. What are the advantages of discounted cash flow method?

16. What is the main limitation of discounted cash flow method?

17. What is the objective of carrying out sensitivity analysis?

18. Name at least three financing options for energy management.

19. What is role of an ESCO?

20. What is performance contracting?