



22525

12223

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Assume suitable data, if necessary.
 - (5) Preferably write the answers in sequential order.

Marks

1. Attempt any FIVE of the following :

10

- (a) State the full form of BEE and MEDA.
- (b) List out any two energy conservation equipments used with Induction Motor.
- (c) Interpret the Aggregated Technical and Commercial losses (ATC) in power system at state level.
- (d) State the classification of cogeneration system based on sequence of energy generation.
- (e) Define peak-off-day tariff.
- (f) Define 'energy audit instruments'.
- (g) Define 'specific energy consumption' of an electrical apparatus.

2. Attempt any THREE of the following :

12

- (a) Identify the role of MEDA in implementation of E.C. Act, 2001.
- (b) Explain the need of energy conservation techniques for induction motor.
- (c) Summarise the commercial losses in Electrical Installation System and state the causes, effect and remedy related to any two types.
- (d) Explain the 'incentive' and 'penalty' related to power factor tariff.



3. Attempt any THREE of the following :**12**

- (a) Suggest the suitable energy conservation equipment in following cases :
 - (i) Controlling of Lamp output
 - (ii) Increase/decrease the Fan output
 - (iii) Smooth starting of I.M.
 - (iv) Filter out the harmonic currents from main supply current.
- (b) Illustrate with neat sketch the working of APFC (Automatic P.F. Controller).
- (c) Explain the functioning of Gas turbine cogeneration system with the help of block diagram.
- (d) Develop a questionnaire for the energy audit project of a small scale industry.

4. Attempt any THREE of the following :**12**

- (a) List out the main features of Energy Conservation Act-2001.
- (b) Suggest energy conservation technique for following loading condition of Induction Motor :
 - (i) Driving load is more than motor rating.
 - (ii) Motor is loaded between 70% to 80% of its rating.
 - (iii) Motor is 50% loaded always.
 - (iv) Motor is running with less than 30% loaded condition but sometimes load reaches to 50%.
- (c) With the help of case study, explain the effect of 'replacement of Lamps by EEF Lamps' in an Energy Audit Project (Any two).
- (d) How penalty charges are calculated for exceeding contract demand in energy bill ?
- (e) List out the informations that can be obtained from 'Energy Flow Diagram'.

5. Attempt any TWO of the following :**12**

- (a) Describe the following energy conservation technique used to improve the performance of transformer.
- Load sharing
 - Parallel Operation
 - Isolating Technique
- (b) A factory has a max. load of 300 kW at 0.85 P.F. lagging with an annual consumption of 40,000 units. Applied tariff is ₹ 4.5 per kVA of MD plus 2 paise per unit plus 0.5 paise per unit of each 1% of P.F. below 0.9. Calculate the annual saving if P.F. is raised to 0.9.
- (c) State the advantages of adoption of co-generation system in a chemical industry. (Any six)

6. Attempt any TWO of the following :**12**

- (a) Describe the work details of 'Detailed Energy Audit' procedure of its Phase-I, Phase-II and Phase-III.
- (b) Exterior lighting of a housing complex is provided with 20 number of Tubelight (40 W + 17 W ballast) and 10 no. of CFL (20 W) Lamps. It is recommended to replace them by T₅ tubelight (32 W + 8w ballast). Calculate the simple payback period.

Data given :

Working hours per day = 10

Working days per month = 25

Cost of T₅-Tubelight = ₹ 150 per piece

Energy cost = ₹ 4 per unit

- (c) Explain any three types of energy efficient light control devices used in energy conservation project.
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