



17506

15162

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) *All questions are compulsory.*
 - (2) *Illustrate your answers with neat sketches wherever necessary.*
 - (3) *Figures to the **right** indicate **full** marks.*
 - (4) *Assume suitable data, if **necessary**.*
 - (5) *Use of Non-programmable Electronic Pocket Calculator is **permissible**.*
 - (6) *Mobile Phone, Pager and any other Electronic Communication devices are **not** permissible in Examination Hall.*

Marks

1. A) Attempt **any three** of the following : **12**
- a) State four salient features of Energy Conservation Act 2003.
 - b) Define the following terms :
 - i) Colour Rendering Index
 - ii) Luminous Efficacy
 - iii) Luminous flux
 - iv) Illumination.
 - c) Draw and explain power flow diagram of three phase induction motor.
 - d) Explain the following energy conservation methods of electrical motor.
 - i) Minimizing idle and redundant running of motor.
 - ii) Matching motor rating with required load.
- B) Attempt **any one** of the following : **6**
- a) State the need of energy conservation in transformer. Explain the use of Epoxy Resin Cast/ Encapsulated dry type transformer from energy conservation point of view.
 - b) An illumination on the working plane of 75 lux is required in a room 72 m × 15 m size. The lamps are required to be hung 4 m above the work bench. Assuming a suitable space-height ratio, a utilization factor of 0.5, a lamp efficiency of 14 lumens per watt and a candle power depreciation of 20%. Estimate the number and rating of the lamps.
2. Attempt **any four** of the following : **16**
- a) Explain the procedure for assessing existing lighting system in a facility.
 - b) Explain the energy conservation techniques in lighting system by installation of separate transformer/servo stabilizer for lighting.
 - c) Write any four comparison between energy efficient motor with conventional induction motor.
 - d) State and explain any two energy conservation measures for T and D system related to administrative loss.
 - e) State the opportunities for energy conservation techniques in transformer.
 - f) Define both laws of illumination.

P.T.O.



3. Attempt **any four** of the following :

16

- a) State any four objectives of tariff systems.
- b) State any four causes of technical losses in transmission and distribution system. Also state techniques to reduce it.
- c) With an example explain how energy flow diagram helps in energy audit procedure.
- d) Explain energy conservation technique in induction motor by operating I.M. in star mode.
- e) Explain the need of co-generation plants helps for energy conservation.

4. A) Attempt **any three** of the following :

12

- a) State any four merits of co-generation system.
- b) What is ABC analysis ? State its three advantages referred to energy audit projects.
- c) Why soft starter used for motor ? State its two advantages.
- d) State the incentives and penalty related with P.F. tariff.

B) Attempt **any one** of the following :

6

- a) What is phase balancing system ? Explain in detail how it is used to conserve energy in distribution system.
- b) Define energy conservation equipment. Draw block diagram of microprocessor based centralised control equipment of energy conservation and explain it in details.

5. Attempt **any four** of the following :

16

- a) Explain the working principle of automatic power factor controller.
- b) Explain energy conservation technique in induction motor by improving power quality method.
- c) Explain energy conservation in transmission and distribution system by using compensating reactive power. How ?
- d) Define the following terms :
 - i) Electricity tax ii) Electricity duty iii) Connected load iv) Load factor tariff
- e) List name of eight industries suitable for cogeneration.
- f) Explain following energy audit instrument and their use.
 - i) Lux meter ii) Tri Vector meter

6. Attempt **any four** of the following :

16

- a) Draw layout of steam turbine cogeneration system and label it.
 - b) A consumer requires 50×10^6 kWh per annum. The tariff is Rs. 100/kW of maximum demand per year plus 20 paise per unit. Calculate the annual cost of supply at load factor 50%. Also estimate the saving in annual cost its load factor is improved to 100%.
 - c) State any four advantages of energy audit.
 - d) State two benefits and two applications of variable frequency drives.
 - e) Explain two part tariff with its advantages and disadvantages.
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