



17507

21415

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) Preferably write the answers in **sequential** order.

MARKS

1. A) Attempt **any three** :**(3×4=12)**

- a) Define electric drive. List atleast four advantages of electric drive.
- b) State the principle of induction heating. Write atleast four applications of induction heating.
- c) State the laws of illumination.
- d) State any four causes of low power factor.

B) Attempt **any one** :**(1×6=6)**

- a) i) State any six requirements of ideal braking system.
 - ii) State the advantages and disadvantages of electric braking over mechanical braking.
- b) i) State the principle of resistance welding.
 - ii) State the various types of resistance welding.
 - iii) Describe with neat sketch the operation of seam type resistance welding.

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**MARKS**2. Attempt **any four** :**(4×4=16)**

- a) Describe in brief the size and shape of elevator car.
- b) State the principle and nature of supply used for eddy current heating. State the advantages and disadvantages of eddy current heating.
- c) State any six requirements of an ideal traction system.
- d) Draw a neat labelled block diagram AC electric locomotive. State the function of each part.
- e) "DC series motor is used for traction purpose". Justify your answer with any six characteristics.

3. Attempt **any two** :**(2×8=16)**

- a)
 - i) State the factors governing selection of electric drive.
 - ii) Define load equalisation for electric motors. Explain how it is obtained for electric motors.
- b) A 40 kW, 3-phase, 400 V resistance oven uses nickel-chromium strip of 0.3 mm thickness. The heating elements are star connected. If wire temperature is to be 1127°C and that of charge is to be 727°C, estimate suitable width and length of the wire required.

Given : radiation efficiency = 0.6, specific resistance of Ni-Cr = $1.03 \times 10^{-6} \Omega \text{ m}$, emissivity = 0.9.

- c) Describe the concept of load cycle with their graphical representation.
 - i) Continuous loading
 - ii) Short time loading
 - iii) Long time (intermittent) loading
 - iv) Continuous operation with short time loading.

**MARKS**

4. A) Attempt **any three** : **(3×4=12)**
- a) Compare D.C. welding and a.c. welding on any six points.
 - b) Describe the construction of high pressure mercury vapour lamp with neat sketch.
 - c) Compare block rate tariff and flat rate tariff. (any four points)
 - d) State any four advantages of good power factor for electric supply system.
- B) Attempt **any one** : **(1×6=6)**
- a) Describe electric arc welding in brief. How arc is formed in electric arc welding ? State the characteristics of electric arc.
 - b) A factory has a maximum demand of 300 kW with a load factor of 0.6. The following tariffs are offered :
 - a) Two part tariff ₹ 80/kW of M.D./year + 5 paise / kWh.
 - b) A flat rate of 12 paise/kWh.Calculate tariff in both cases and write with reason. Which tariff will be cheaper ?
5. Attempt **any four** : **(4×4=16)**
- a) Compare metal arc welding and carbon arc welding. (any four points)
 - b) Describe through illustration following types of lighting scheme :
 - i) Direct lighting
 - ii) Indirect lighting
 - c) Write the different systems of track electrification.
 - d) Write any six desirable characteristics of traction motors.
 - e) Draw speed time curve. Show and list various time periods associated with it.

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**MARKS**6. Attempt **any two** :**(2×8=16)**

- a) i) State any four advantages and any two disadvantages of electric heating.
ii) Describe any four causes of failure of heating elements.
- b) A train has schedule speed of 60 kmph between stops which are 6 km apart. Determine the crest speed over the run assuming :
- i) Duration of stops as 60 sec
ii) Acceleration as 2 kmphps
iii) Retardation as 3 kmphps

The speed time curve is trapezoidal

- c) i) Derive the equation for most economical power factor.
ii) A factory takes 300 kW at 110 volts from a 3-phase supply and power factor of 0.7 lagging. A synchronous motor is installed which takes an additional 150 kW. What must be the kVA rating of this motor to raise the power factor of the system to 0.85 lagging ?