



17507

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) *Preferably write the answers in sequential order.*

Marks

1. A) Attempt any three:

(3×4=12)

- a) Define electric drive. State advantages and disadvantages of electric drive.
- b) Explain in brief the causes of failure of heating elements.
- c) Define :
 - i) Luminous flux
 - ii) Luminous intensity
 - iii) Space to height ratio
 - iv) Utilization factor.
- d) State any four causes of low power factor.

B) Attempt any one :

(1×6=6)

- a) Define group drive and individual drive. State the advantages and disadvantages of each drive.
- b) Define electric arc welding. How arc is formed ? State the characteristics of electric arc.

2. Attempt any four :

(4×4=16)

- a) Compare electric braking over mechanical braking.
- b) Define electric heating. Classify the electric heating methods in detail.
- c) State any six requirements of an ideal traction system.
- d) Write the different systems of track electrification.
- e) Draw speed time curve. Show and list various time periods associated with it.

3. Attempt any two :

(2×8=16)

- a) i) Define :
 - i) Continuous rating
 - ii) Continuous maximum rating
 - iii) Short time rating.
- ii) Classify electric elevators on the basis of :
 - i) Service
 - ii) Capacity
 - iii) Speed
 - iv) Power unit.
- b) i) Compare direct resistance heating and indirect resistance heating with suitable diagram.
- ii) Explain the principle of dielectric heating.

P.T.O.



c) A electric motor has load variations as given below :

- i) Torque 250 Nm for 20 min.
- ii) Torque 150 Nm for 10 min.
- iii) Torque 300 Nm for 10 min.
- iv) Torque 200 Nm for 20 min.

If speed of the motor is 750 rpm find the power rating of the motor.

4. A) Attempt **any three** :

(3×4=12)

- a) Define welding. State the requirements of good weld.
- b) State the laws of illumination.
- 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) Define resistance welding. State the types of resistance welding and explain any two in brief.
- b) A factory has a maximum demand of 250 kW with a load factor of 0.6.
The following tariffs are offered.
 - a) Two part tariff ₹ 70/kW of M.D./Year + 4 paise/kWh.
 - b) A flat rate of 10 paise/kWh.

Calculate tariff in both the cases and state with the reason which of the two will be cheaper.

5. Attempt **any four** :

(4×4=16)

- a) Explain in brief the construction and working of sodium vapour lamp.
- b) Compare ac welding to dc welding (any four points).
- c) Draw a neat labelled diagram of AC electric locomotive. State the function of each part.
- d) "DC series motor is used for traction purpose". Justify your answer with any four characteristics.
- e) Write any six desirable characteristics of traction motors.

6. Attempt **any two** :

(2×8=16)

- a) A resistance oven employing Nichrome wire is to be heated from 220V, 1-phase, supply and is rated at 16 kW. If temperature of element is to be limited to 1170°C and average temperature of charge is 500°C, find diameter and length of wire. Radiating efficiency, $K = 0.57$

Emissivity $e = 0.9$

Specific resistance of Nichrome = $109 \times 10^6 \Omega \text{ cm}$.

- b) A trapezoidal time curve of train consists of :
 - i) Uniform acceleration of 6 kmphps for 25 seconds
 - ii) Free running for 10 minutes
 - iii) Uniform deceleration of 6 kmphps to stop the train
 - iv) A stop time of 5 minutes.

Find the distance between the stations, average and scheduled speed.

- c) i) Derive the equation of most economical power factor.
- ii) State the methods of power factor improvement. Explain any one of them.