



# 17507

15116

**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) *Mobile Phone, Pager and any other Electronic Communication devices are **not** permissible in Examination Hall.*
  - (6) *Preferably, write the answers in sequential order.*

**Marks**

1. A) Attempt **any three** : **(3×4=12)**
- a) Compare a group drive and an individual drive.
  - b) State various applications of dielectric heating.
  - c) Define the following terms :
    - i) Luminous Intensity
    - ii) Lumen
    - iii) Candle power
    - iv) Waste light factor.
  - d) Explain any three disadvantages of low power factor and state three methods to improve it.
- B) Attempt **any one** : **(1×6=6)**
- a) What is electrical braking ? Explain regenerative braking for D.C. series motor.
  - b) Describe any two methods of current flow control in welding transformers.
2. Attempt **any four** : **(4×4=16)**
- a) What is load equalization ? Explain with neat diagram and graphs, the process of the load equalization.
  - b) State the principle and application of eddy current heating.
  - c) Compare AC and DC system of traction.
  - d) Write any eight desirable characteristics of traction motors.
  - e) State the difference between actual speed and schedule speed of train. State the factors affecting schedule speed of a train.
3. Attempt **any two** : **(2×8=16)**
- a) A motor has to perform the following duty cycle :
    - 1) Load rising from 200 kW to 500 kW in 4 minutes.
    - 2) Uniform load of 350 kW for 2 minutes.
    - 3) Regenerative braking power returned to supply from 150 kW to zero in 2 minutes.
    - 4) Remains ideal for 1 minute. Determine power rating of motor.
  - b) A 50 kW, three phase, 440 V resistance oven is to provide nickel-chrome strip 0.3 mm thick, for the three-star connected heating elements. If the temperature of the wire is to be 1500° C and that of the charge is to be 1000° C, calculate a suitable width of the strip. Take emissivity as 0.91 and radiation efficiency as 0.6. The specific resistance of nichrome alloy is  $1.016 \times 10^6$ . What would be the temperature of the element, when charge is cold at 20° C ?
  - c) What are the different safety and protective devices used in elevators ? Also state functions of each device.

**P.T.O.**

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

- a) Write classification of electric welding and its advantages.
- b) Explain the operating principle and working of a fluorescent lamp. Mention the function of following components :
  - i) Electrodes
  - ii) Choke
  - iii) Capacitor in glow type starter.
  - iv) Capacitor connected across input terminals.
- c) Write short notes on the following :
  - i) Two part tariff.
  - ii) Power factor tariff.
- d) Derive an expression for the most economical value of power factor.

B) Attempt **any one**:

(1×6=6)

- a) With the help of neat sketch explain construction and working of spot welding machine.
- b) The monthly reading of a Consumer's meter are as follow :  
 Maximum demand = 50 kW  
 Energy consumed = 36,000 kWh  
 Reactive energy = 23,400 KVAR.  
 If the tariff is Rs. 80 per kW of maximum demand plus 8 paise per unit plus 0.5 paise per unit for each 1% of power factor below 86%, calculate the monthly bill of the consumer.

5. Attempt **any four**:

(4×4=16)

- a) Draw the following types of lamp fittings and lighting systems with the help of light distribution graphs and its applications.
  - i) Direct lighting
  - ii) Indirect lighting
  - iii) Semi-direct lighting
  - iv) Semi-indirect lighting.
- b) Describe carbon arc welding with neat sketch.
- c) What are the requirements of ideal traction system ? What are the different traction systems ?
- d) Draw a neat diagram of A.C. electric locomotive and explain function of each part in it.
- e) With a suitable diagram explain series-parallel control of D.C. series motor.

6. Attempt **any two**:

(2×8=16)

- a) Describe the core type (Ajay Wyatt) induction furnace with a neat sketch and state its application and advantages.
- b) The speed-time curve of a train consists of :
  - i) Uniform acceleration of 5 km phps for 30 Sec.
  - ii) Free running for 10 min.
  - iii) Uniform retardation of 6 km phps to stop the train.
  - iv) A stop time of 5 min.
 Find the distance between the stations, the average and schedule speed.
- c) A 3-phase, 50 Hz, 400 V motor develops 100 HP, the power factor being 0.75 lagging and efficiency 93%. A bank of capacitors is connected in delta across the supply terminals and power factor raised to 0.95 lagging. Each of the capacitance unit is built of four similar 100 V capacitors. Determine the capacitance of each capacitor.