(Three Hours) **(80 Marks)**

N.B.: - (1) Question No.**1** is compulsory.
(2) **Attempt** any **three** questions out of remaining **five** questions.
(3) Assume suitable data if necessary and justify the same.

Q 1. Answer the following questions. **20**
a) What are various types of electric braking used?
b) What is Specific energy consumption and list the factors that affecting it.
c) What are the causes of low power factor?
d) What are the requirements of ideal traction?

Q 2 a) Explain methods of power factor improvement. **10**

Q 2 b) An electric train is to have acceleration and braking retardation of 0.8 km/h/s and 3.2 km/h/s respectively. If the ratio of maximum to average speed is 1.3 and time for stops 26 seconds, find schedule speed for a run of 1.5 km. Assume simplified trapezoidal speed-time curve. **10**

Q 3 a) Give classification of electric welding and explain Butt welding and Spot welding. **10**

Q 3 b) Derive an expression for trapezoidal speed time curve. **10**

Q 4 a) What are the different types of track electrification? **10**

Q 4 b) Explain traction SCADA. **10**

Q 5 a) Explain the working of Ajax Wyatt vertical core furnace with a neat sketch. **10**

Q 5 b) Derive an expression for tractive efforts produced at driving axle. Explain the terms dead weight, accelerating weight and adhesive weight. **10**

Q 6 a) Draw and explain the vapor compression and vapor absorption type refrigeration cycle with their application. **10**

Q 6 b) What are the requirements for traction motor control? Explain open circuit transition and shunt transition in series parallel control method. **10**
