# 17507

**16117**

**3 Hours / 100 Marks** Seat No. | | | | | | | | |

***Instructions :*** *(1)* ***All*** *questions are* ***compulsory****.*

*(2) Answer each next main question on a* ***new*** *page.*

*(3) Illustrate your answers with* ***neat*** *sketches* ***wherever*** *necessary.*

*(4) Figures to the* ***right*** *indicate* ***full*** *marks.*

(5) *Assume suitable data, if* ***necessary****.*

*(6) Use of non-programmable Electronic Pocket Calculator is* ***permissible****.*

*(7) Mobile Phone, Pager and any other Electronic Communication devices are* ***not*** *permissible in Examination Hall.*

**Marks**

**I.** A) Attempt **any 3** of the following : **(3×4=12)**

a) State and explain any four factors governing the selection of electric drive.

b) List any 6 desired properties of heating element material. Write the names of any two heating material.

c) Define the following terms related to illumination :

1) Luminous Intensity

2) Candle Power

3) MSCP

4) MHCP.

d) Explain any four disadvantages of low power factor.

**P.T.O.**

**Marks**

B) Attempt **any one** of the following : **(1×6=6)**

a) Explain how Rheostatic Braking is achieved in case of

1) DC series motor

2) 3 phase Induction motor.

b) For seam welding :

1) Draw its neat labelled sketch. **3**

2) Explain its working. **2**

3) Write any two applications. **1**

**II.** Attempt **any four** of the following : **(4×4=16)**

a) Compare Group Drive and Individual drive on the following parameters :

1) Definition

2) Installation cost

3) Appearance

4) Safety and flexibility.

b) Explain any four causes of failure of Heating Element.

c) Compare 1-phase 25 kV AC and DC Track electrification on any eights factors (any four point)

d) Give any four justifying features which makes DC series motor suitable for traction work.

e) Draw a neat labelled Block diagram of A. C. locomotive.

**III.** Attempt **any two** of the following : **(2×8=16)**

a) i) Give any four ideal requirements of elevators. **4**

ii) State the factors to be considered for selection of shape and size of elevator. **4**

b) i) Draw a neat labelled sketch to show construction of Ajax Wyatt furnace. **3**

ii) Explain its working. **3**

iii) Any 2 advantages and any 2 application of Ajax Wyatt furnace. **2**

**Marks**

c) i) Describe the concept of load cycle with their graphical representation :

1) Continuous operation with Short Time Rating

2) Continuous operation with intermittent Rating. **4**

ii) A motor has to perform the following duty cycle :

1) 100 HP for 10 minutes

2) No load for 5 minutes

3) 50 HP for 8 minutes

4) No load for 4 minutes

The duty cycle is repeated indefinitely. Draw the curve for the load cycle. Assuming that the heating is proportional to the square of load. Determine the suitable size of continuously rated motor. **4**

**IV.** A) Attempt **any three** of the following : **(3×4=12)**

a) List any four welding equipment and Accessories used for protection and safety and describe each of them in brief.

b) Draw a neat labelled sketch to show the construction of sodium vapour lamp and explain its working.

c) i) Define Tariff. **2**

ii) State any 4 desirable characteristics of tariff. **2**

d) Show the derivation for most economical power factor.

B) Attempt **any one** of the following : **(1×6=6)**

a) For metal arc welding :

1) Draw its neat labelled sketch. **2**

2) Explain its operation. **3**

3) Any 2 applications. **1**

b) Explain the following Tariff in brief :

1) Two Part Tariff

2) Time of Day Tariff.

**Marks**

**V.** Attempt **any four** of the following : **(4×4=16)**

a) Draw a neat labelled diagram of fluorescent Tube and give the function of the following :

1) Choke

2) Starter present in it.

b) With the help of neat diagram, explain Tapped Reactor method for current control in Welding Transformer.

c) Compare urban service, suburban service and main line service on the following parameters : -

1) Value of Acceleration

2) Value of Retardation

3) Maximum speed

4) Distance between stations.

d) Draw the typical speed time curve for main traction line. Show the different time periods on it.

e) With the help of sketches, explain the various steps required for bridge transition system.

**VI.** Attempt **any two** of the following : **(2×8=16)**

a) A 20 kW single phase 220 V resistance oven employs a circular nichrome wire for its heating element. If wire temperature is not to exceed $1170^{\circ}C$ and temperature of charge to be $500^{\circ}C$, calculate the diameter and the length of the wire, Take K = 0.57, e = 0.95 and $\rho = 1.09 \times 10^{-6}$ ohm meter.

b) The distance between two stations is 2 KM. It is desired to have scheduled speed of 40 km/hr with duration of stop of 20 seconds. Assuming, trapezoidal speed time curve, Calculate :

1) The maximum speed required when the acceleration is to be limited to 1.2 km/hr/sec and braking retardation to 3 km/hr/sec.

2) The distance covered during acceleration and retardation.

c) A 300 HP, 3000 V, 50 c/s, 3 phase star connected induction motor has full load efficiency of 86% and pf of 0.707 lagging. If it is desired to improve the pf to 0.95 lagging by a bank of three capacitors, find out the :

1) KVA Rating of the capacitor bank.

2) Capacitance of each unit when connected in i) Mesh ii) in star.