17507

21718

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

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

(a) Define electric drive. List atleast four advantages of electric drive.

(b) State the causes of failure of heating element.

(c) Suggest suitable electric drive for following application :

(i) Paper mills

(ii) Stone crusher

(iii) Textile mill and

(iv) Electric traction

(d) Draw the curve and estimate suitable H.P. of motor having following duty cycle :

(i)	Rising load from 200 to 400 HP	–	4 minutes
(ii)	Uniform load of 300 HP	–	2 minutes
(iii)	Regenerative braking from 50 to zero H.P.	–	1 minute
(iv)	Idle for	–	1 minute

(B) Attempt any ONE of the following : **6**

(a) Describe any six factors governing selection of a motor for a particular application.

(b) State the factors to be considered for selection of shape and size of the car of elevator.

2. Attempt any FOUR : **4 × 4 = 16**

(a) Define load equalisation for electric motors. Explain how it is obtained for electric motors.

(b) Define : (i) Continuous loading, (ii) Short time loading, (iii) Long time (intermittent) loading, (iv) Continuous operation with short time loading.

(c) State the principle of induction heating. Write four applications of induction heating.

(d) State the principle and nature of supply used for eddy current heating. State the advantages and disadvantages of eddy current heating.

(e) Compare single phase 25 kV AC and 1500 V DC track electrification.

(f) State the various types of welding.

3. Attempt any TWO : **2 × 8 = 16**

(a) (i) State advantages and disadvantages of electric braking over mechanical braking.

(ii) State any eight advantages of electric heating.

(b) A 20 kW, 220 V resistance oven uses Nickel Chromium wire. If the temp. of charge is 727 °C and it is to be heated to 1127 °C, find the suitable length and diameter of wire.

Assume : Emissivity = 0.9, Radiant efficiency = 0.6 &

Sp. resistance = 1.03×10^{-6} Ω m.

(c) What is electric welding ? Describe electric arc welding in brief. How arc is formed in electric arc welding ?

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

(a) Compare DC and AC welding on any four points.

(b) Describe with neat sketch operation of seam type resistance welding.

(c) Describe the construction of high pressure mercury vapour lamp with neat sketch.

(d) Give the two laws of illumination.

(B) Attempt any ONE : **6**

(a) Describe through illustration the following types of lighting scheme :

(i) Direct, (ii) Indirect, (iii) Semi-direct, (iv) Semi-indirect.

(b) Describe with schematic diagram steps involved in series – parallel control of traction motor.

5. Attempt any FOUR : **4 × 4 = 16**

(a) Write different systems of track electrification.

(b) Write eight desirable characteristics of traction motor.

(c) A train has schedule speed of 60 kmph between stops which are 6 km apart. Determine 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.

(d) Draw a neat labelled block diagram of 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.

(f) Draw speed time curve. Show and list various time periods associated with it.

6. Attempt any TWO of the following : 8 × 2 = 16

(a) (i) A 400 V, 50 Hz, 3 Phase line delivers 200 kW at 0.7 p.f. lagging. It is desirable to improve the line power factor to unity by using shunt capacitors. Calculate value of capacitance of each unit if they are connected in delta.

(ii) State four requirements of tariff.

(b) (i) What are different tariffs used by electricity supply authority ? Describe any two in brief.

(ii) State any four advantages of good power factor for electric supply.

(c) (i) A Factory takes 300 kW at 110 V 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 ?

(ii) Derive the equation of most economical power factor.
