17507

11718

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 of the following : **12**

(a) State any four factors to be considered while selecting electric drives (motor) for a particular application.

(b) State any two applications of each for the following types of electrical heating :

(i) Direct resistance heating (ii) Indirect induction heating

(iii) Direct arc heating (iv) Dielectric heating

(c) Define following terms referred to illumination :

(i) Space-height ratio (ii) Utilization factor

(iii) Maintenance factor (iv) Waste light factor

(d) State the four causes of low (poor) power factor.

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

(a) Draw the graph load vs. time and estimate suitable HP rating of electric drive (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 HP for – 1 minute

(iv) Idle for – 1 minute.

(b) Compare between Resistance welding and Arc welding on any six points.

2. Attempt any FOUR of the following : **16**

(a) State four advantages and four disadvantages of electrical braking over mechanical braking.

(b) Derive an expression for design of heating element when heating element is circular wire.

(c) State eight requirements of an ideal traction system.

(d) State various systems of track electrification.

(e) Compare between urban line, sub-urban line and mainline services on following points :

(i) Distance between two Railway Station.

(ii) Acceleration

(iii) Retardation

(iv) Maximum Speed

(v) Specific energy consumption

(vi) Free running period absent or present

(vii) Coasting period absent or present

(viii) Shape of speed time curve

3. Attempt any TWO of the following : **16**

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

(ii) Draw graphical representation of load cycle :

(i) Continuous loading

(ii) Short time loading

(iii) Long time (intermittent) loading

(iv) Continuous operation with short time loading

(b) 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 °C and temperature of charge is to be 500 °C. Calculate diameter and the length of wire. Take k = 0.57, e = 0.95 and Resistivity = 1.09×10^{-6} ohm-mtz.

(c) (i) Compare individual and group drive on any four points.

(ii) Why noise of motor is produced ? How it can be reduced ?

4. (A) Solve any THREE of the following : **12**

(a) Give classification of electrical welding.

(b) State the two laws of illumination.

(c) Following two tariffs are offered to consumers :

(i) ₹ 150 + 20 paise per unit.

(ii) A flat rate of 40 paise per unit.

State at what consumption which tariff is economical.

(d) State disadvantages of low power factor.

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

(a) Draw figure of

(i) Seam welding and

(ii) Flash Butt welding and

write two applications of each type.

(b) (i) State the four requirements of Tariff.

(ii) State two advantages of P.F. tariff and TOD tariff for the power system concern.

5. Solve any FOUR of the following : **16**

(a) Compare sodium vapour lamp and metal halide lamp on following points :

(i) Luminous efficiency, (ii) life of lamp, (iii) re-strike time, (iv) cost of installation.

(b) State any factors to be considered while selecting electrical welding system.

(c) Sketch the various steps required for bridge transition system.

(d) Compare AC and DC system of track electrification on any four points.

(e) State any four desirable characteristics of ideal traction motor. State the names of different traction motor used.

6. Solve any TWO of the following : **16**

(a) (i) Give the definition of (1) Average Speed, (2) Schedule speed in a traction system.

(ii) Draw figure of indirect arc furnace. State why indirect arc furnace is not built of large capacity.

(b) A train runs between two station is 2 km apart at average speed of 40 kmphr. Train accelerates at 2 kmphrpsec. and retards at 3 kmphrpsec. Assume trapezoidal speed time curve. Calculate :

(i) Draw speed time curve and mark all.

(ii) Maximum speed

(iii) Distance travelled by train before the breaks are applied.

(c) A three phase, 440 V, 50 Hz, 40 kW load has a P.F. 0.85 lagging. Calculate kVAR rating of capacitor required to improve P.F. to 0.95 lagging.

What will valve of capacitor per phase, if

(i) capacitors connected in Star ?

(ii) capacitors connected in Delta ?
