22626

23124

3 Hours / 70 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. Attempt any FIVE of the following: **10**

a) State Lambert's Cosine Law.

b) Define the following terms:

i) Utilisation factor

ii) Illumination

c) Classify electric heating on basis of power frequency heating.

d) State any two advantages and disadvantages of Group Drive.

e) List any four characteristics of tariff.

f) List various voltage levels used for Electrical Traction.

g) Write any four causes of low power factor.

Marks

2. Attempt any THREE of the following: **12**

a) Describe with a neat labelled diagram working of high-pressure mercury lamp.

b) Compare core type of furnace and coreless type of furnace (Induction) on the following points.

i) Weight and size

ii) Frequency

iii) Leakage flux

iv) Crucible shape

c) Describe with neat sketch regenerative braking applied for d.c. shunt motor.

d) State the types of Track Electrification used in India. Explain any one type.

3. Attempt any THREE of the following: **12**

a) Estimate the number and wattage of lamps which would be required to illuminate a workshop 80 m by 20 m, spaced 60 × 15 m by means of lamps mounted 6 m above the working plane. The average illumination required is about 100 lux, coefficient of utilisation is 0.4, luminous efficiency is 16 lumens per watt. Assume a space height ratio of unity and a candle power depreciation of 20%.

b) Explain with neat labelled diagram construction and working of carbon arc welding.

c) Recommend relevant motor for the following application

i) Refrigerators and air conditioners

ii) Electric clock

iii) Vacuum cleaner

iv) Washing machine

d) Derive the equation for most economical power factor.

Marks

4. Attempt any THREE of the following: **12**

a) Explain with neat labelled diagram construction and working of direct resistance heating.

b) State the factors to be considered for selection of motor.

c) Compare electric locomotive over non-electric locomotive for the following points.

i) Starting Torque

ii) Regenerative braking

iii) Starting Time

iv) Maintenance

d) A single phase 400 V, 50 Hz motor takes a supply current of 50 A at a power factor of 0.8 lag. The motor pf has been improved to unity by confectioning a condenser in parallel. Calculate the capacity of the condenser required.

e) Draw the block diagram of 25 KV, 1ϕ; 50 Hz AC locomotive used for traction system. State the function of each part.

5. Attempt any TWO of the following: **12**

a) Describe with neat sketch Ajax Watt Furnace.

b) Write the function of bearings and its types.

c) A train has a schedule speed of 80 Kmph between are 8 km apart. Determine the crest or maximum speed over the run. Assuming:

i) Duration of stops 50 seconds

ii) Acceleration 2 kmphps

iii) Retardation 3 kmphps

The speed time curve is trapezoidal.

Marks

6. Attempt any TWO of the following: **12**

a) A 40 KW, 3-phase, 400 V resistance oven uses nickel-chromium strip of 0.3 mm thickness. The heating element are star connected. The wire temperature is to be 1127°C and that of charge is to be 727°C, estimate the width and length of the wire required.

Given : radiation efficiency = 0.6, specific resistance of Ni-Cr = 1.03×10^{-6} ohm-m, emissivity = 0.9.

b) Describe the need of load eqilisation in motors.

c) Explain with neat sketch, the construction and working of Faiveley type pantograph.
