

22626

12223

3 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Answer each next main Question on a new page.
(3) Illustrate your answer 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 inverse square Law of illumination.
 - b) List two applications of each of spot welding and seam welding.
 - c) State any two advantages and two disadvantages of individual drive.
 - d) Define :–
 - i) Average speed
 - ii) Schedule speed
 - e) Compare urban and mainline services on the following points:
 - i) Spacing between substation
 - ii) Value of acceleration
 - f) State any four desirable characteristics of tariff.
 - g) List any four disadvantages of Low P.F.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Describe with a neat labelled diagram, working of high pressure mercury vapour lamp.
 - b) For carbon arc welding only D.C. supply is used. Justify.
 - c) i) State the purpose of enclosure.
ii) Recommended suitable type of enclosure for the following application:
 - 1) Coal mines
 - 2) Chemical industries
 - d) Describe any four advantages of 25 kV A.C. traction system.
- 3. Attempt any THREE of the following:** **12**
- a) State various types of lighting schemes. Explain the features and application of any one type.
 - b) Explain with neat sketch working of coreless induction furnace.
 - c) Explain with necessary circuit diagram rheostatic braking applied to D.C. series motor.
 - d) Describe in brief :-
 - i) KVA maximum demand tariff.
 - ii) Time of day tariff.
- 4. Attempt any THREE of the following:** **12**
- a) Explain with neat labelled diagram construction and working of indirect arc furnace.
 - b) D.C. series motor is used for traction purpose. Justify with relevant two characteristics.
 - c) Compare electric locomotive over diesel locomotive on the basis of following points :-
 - i) Initial cost
 - ii) Starting time
 - iii) Efficiency
 - iv) Running and maintenance cost.

d) An electric motor has load as given below:

- i) Torque 150 N.M. for 20 minutes.
- ii) Torque 50 N.M. for 10 minutes.
- iii) Torque 220 N.M. for 10 minutes.
- iv) Torque 120 N.M. for 20 minutes.

If the speed of the motor is 750 r.p.m. Find the power rating of motor if the efficiency is 85%.

e) A 440 V, 50 Hz, 3 phase line delivers 250 kW at 0.707 p.f lagging. It is desired to improve the p.f to unity by using shunt capacitor. Calculate the value of capacitance of each until if they are connected in star.

5. Attempt any TWO of the following:

12

a) i) State the types of elevator based on :-

- 1) Speed
- 2) Capacity. State any two functions of elevator.

ii) State any three safety and protective devices and their function used in elevator.

b) A train has a schedule speed of 70 kmph between stops which are 7 km. apart. Determine the crest or maximum speed over the run. Assuming :-

- i) Duration of stops 50 seconds
- ii) Acceleration 2 kmphs.
- iii) Retardation 3 kmphs.

The speed time curve is trapezoidal.

c) A resistance oven employing Nichrome wire is to be heated from 220 V, 1 ϕ a.c. supply and is rated at 16 kw. If the temperature of the heating element is to be heated to 1170°C and average temperature of the charge is 500°C. Find the diameter and length of the wire. Given radiating efficiency $k = 0.6$, emissivity = 0.9

Specific resistance = $1.09 \times 10^{-6} \Omega \text{ m}$.

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

- a) i) Explain the basic principle of dielectric heating.
 - ii) State any six applications of it.
 - b) State the need of load equalization in drive. Describe the common method to achieve load equalization in industry.
 - c) Describe the working of Faively type pantograph with a neat sketch.
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