

17507

14115

3 Hours / 100 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data, if necessary.
- (5) Use of Non-programmable Electronic Pocket Calculator is permissible.
- (6) 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**
- (i) State two advantages and two disadvantages of:
- 1) Group drive and
  - 2) Individual drive
- (ii) State the causes of failure of heating element.
- (iii) Describe with neat diagram construction and working of high pressure mercury vapour discharge lamp.
- (iv) Describe the static capacitor method of power factor improvement.

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**Marks****b) Attempt any ONE of the following:****6**

- (i) Describe any six factors governing selection of a motor for a particular application.
- (ii) Compare A.C. welding with D.C. welding on the basis of:
  - 1) Equipment,
  - 2) Operating efficiency,
  - 3) Cost,
  - 4) No-load voltage,
  - 5) Heating and
  - 6) Arc stability

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

- a) State the factors to be considered for selection of shape and size of the car of elevator.
- b) State two advantages and two applications of dielectric heating.
- c) Draw a typical speed time curve for main traction line service. Show different time periods on it.
- d) Compare electric locomotive over diesel locomotive on the basis of:
  - (i) Centre of gravity,
  - (ii) Running / maintenance cost,
  - (iii) Starting time and
  - (iv) Regenerative braking.
- e) Describe the following terms with respect to traction mechanics:
  - (i) Average speed and
  - (ii) Schedule speed

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

- a) What is electric braking? State the advantages of electric braking. Compare Rheostatic and Regenerative braking.
- b) Describe the construction and working of direct arc heating furnace. Compare direct arc furnace with indirect arc furnace on the basis of:
- (i) Temperature,
  - (ii) Size,
  - (iii) Applications and
  - (iv) Power requirement.
- c) (i) Suggest suitable electric drive for following application:
- 1) Paper mills,
  - 2) Stone crusher,
  - 3) Textile mills and
  - 4) Electric traction.
- (ii) Draw the curve and estimate suitable H.P. of motor having following duty cycle:
- 1) Rising load from 200 to 400 H. P. - 4 minute
  - 2) Uniform load of 300 H.P. - 2 minute
  - 3) Regenerative braking from 50 to zero H.P. - 1 minute
  - 4) Idle for - 1 minute

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- 4. a) Attempt any THREE of the following:** **12**
- (i) Define electric welding. State the factors deciding selection of electric welding system.
  - (ii) State and explain laws of illumination.
  - (iii) Define the following terms related to illumination:
    - 1) Utilization factors
    - 2) Maintenance factors
    - 3) Depreciation factor and
    - 4) Luminous efficiency
  - (iv) State four requirements of Tariff.
- b) Attempt any ONE of the following:** **6**
- (i) Describe with neat sketch, construction and working of seam welding machine.
  - (ii) What are the different tariffs used by electricity supply authority? Describe any two of them in brief.
- 5. Attempt any FOUR of the following:** **16**
- a) A 400 V, 50 Hz, 3-phase line delivers 200 KW at 0.7 p.f. lagging. It is desired to improve the line power factors to unity by using shunt capacitors. Calculate value of capacitance of each unit if they are connected in delta.
  - b) “Precautions are taken for ill effects due to negative resistance characteristics of an electric arc in electric arc welding.” Justify the statement.
  - c) Draw a labelled block diagram of A.C. electric locomotive.
  - d) Describe any four point that proves the suitability of D.C. series motor in traction system.
  - e) Describe with neat sketch series-parallel control of traction motor.

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**Marks****6. Attempt any TWO of the following:****16**

- a) Draw the neat sketch of Ajax Wyatt Furnace. Describe its operation. State its four advantages.
  - 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 sec. Assuming trapezoidal speed - time curve calculate:
    - (i) The maximum speed required when the acceleration is to be limited to 1.2 km/hr./sec. and braking retardation to be 3 km/hr./sec. and
    - (ii) The distance covered during acceleration and retardation.
  - c) A consumer draws 500 KW power steadily at 0.8 p.f. lagging for 3650 hours per annum. The tariff is Rs. 1300 per KVA of maximum demand plus Rs. 1.00 per kwh. The annual cost of phase advancing plant is Rs. 150 per KVAR. Find the annual saving if the power factor of load is improved.
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