

17507

11819

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 : 12

- (a) Enlist any two functions of bearings. State and explain the types of bearings.
- (b) State the advantages and applications of dielectric heating.
- (c) Define :
 - (i) Luminous intensity
 - (ii) Illumination
 - (iii) Space to height ratio
 - (iv) Luminous efficiency
- (d) Enlist any four disadvantages of low power factor.

(B) Attempt any ONE : 6

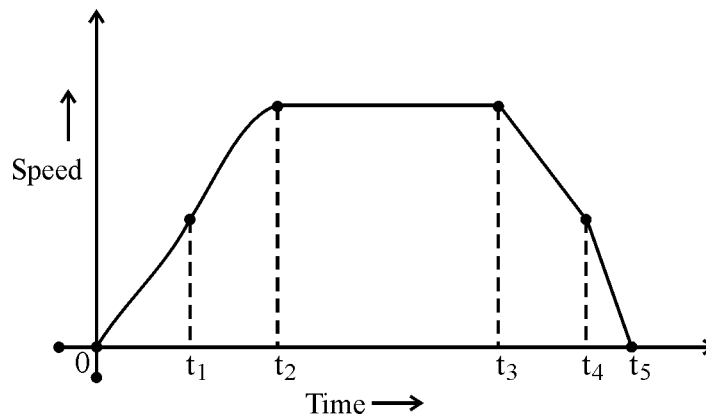
- (a) With the help of neat figure, describe the regenerative braking for D.C. shunt motor.
- (b) With the help of neat figure, explain ultrasonic welding. State its applications.

2. Attempt any FOUR :**16**

- (a) What is group drive ? State its four disadvantages.
- (b) What are the requirements to heating elements materials ? Enlist four names of heating material.
- (c) Refer the Fig. below, which is a speed time curve of a train and answer the questions :

- (i) The curve is of which type of train service.
- (ii) Give the names of following time periods :

(1) $0 - t_1$ (2) $t_2 - t_3$ (3) $t_4 - t_5$



- (d) State and explain in short any four desirable characteristics of traction motors.
- (e) Draw the diagram of AC electric locomotive and explain the function of each part.

3. Attempt any TWO :**16**

- (a) A certain motor has to perform the following duty cycle :
- (i) 100 kW for 10 min
 - (ii) 50 kW for 8 min
 - (iii) No load for 10 min
 - (iv) 150 kW for 5 min

The above duty cycle is repeated continuously. Assuming heating is proportional to square of the current, calculate the suitable size of a motor fitting the above requirement in HP.

- (b) Explain with neat sketch the construction, working principle and two applications of “Ajax Wyatt” vertical core furnace.
- (c) With proper justification suggest suitable enclosures to be used for electric drives in following locations of industries.
 - (i) Chemical plant (non-explosive)
 - (ii) General industrial installation (non-explosive)
 - (iii) Mines or others hazardous locations
 - (iv) General outdoor installation.

4. (A) Attempt any THREE :

12

- (a) State any four requirements of good welding.
- (b) State and explain the law of inverse squares in illumination.
- (c) Compare two part tariff and three part tariff.
- (d) What are advantages of power factor improvement ? (any four)

(B) Attempt any ONE :

6

- (a) What is resistance welding ? Write its principle of operation, applications (any two) and write its classification also.
- (b) An industrial unit has maximum demand of 250 kW with a load factor of 0.6. The following tariffs are offered :
 - (i) Two part tariff ₹ 70/kW of MD/year + 4 paisa/kWh.
 - (ii) A flat rate tariff of 10 paisa/kWh.

Which tariff is cheaper ?

P.T.O.

5. Attempt any FOUR :**16**

- (a) With the help of neat sketch, explain construction and working principle of sodium vapour lamp.
- (b) State any four safety features to be observed in welding work.
- (c) How speed control of traction motor is done using shunt transition method.
- (d) Define schedule speed and state any four factors affecting schedule speed.
- (e) Why DC series motor is preferred for traction applications ? Justify your answer with characteristics.

6. Attempt any TWO :**16**

- (a) Enlist any four electrical equipments and their functions, which are used in arc furnaces.
- (b) A trapezoidal time curve of a train consists of
 - (i) uniform acceleration of 6 kmphps for 25 sec.
 - (ii) Free running for 10 min
 - (iii) Uniform deacceleration of 6 kmphps for stopping the train.
 - (iv) Stop time of 5 min.

Find the distance between the stations, average speed and schedule speed.

- (c) An industrial unit consumes 250 kW at 110 V from a 3 phase supply and pf of 0.80 lagging. A synchronous motor is installed which takes an additional 120 kW. What must be the kVA rating of this motor to raise the pf of the system to 0.9 lagging ?
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