

Total No. of Questions : 8]

SEAT No :

**P 2592**

**[5153]-568**

[Total No. of Pages :3

**T.E. (Electrical)**

**UTILIZATION OF ELECTRICAL ENERGY  
(2012 Pattern) (Semester-II) (End Sem.)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator and steam table is allowed.*
- 5) *Figures to the right indicate full marks.*

- Q1)** a) Explain construction, working of electromagnetic relay & pressure switch. [6]
- b) What is pinch effect? Explain construction, working of core type induction furnace. [8]
- c) A room of size 15x8 met. is to be illuminated by 22 no's of (200 W each) lamps. The MSCP of each lamp is 250. Take depreciation & utilization factor as 1.2 & 0.6 respectively. Find average illumination produced on the floor. [6]

OR

- Q2)** a) Explain briefly vapour compression refrigeration cycle. [6]
- b) Explain Sodium vapour lamp with neat diagram, construction working. [6]
- c) A low frequency induction furnace operating at 10 volts in secondary circuit, takes 500kW at 0.5 p.f. when hearth is full. If the secondary voltage be maintained at 10 volts, estimate the power absorbed & the p.f. when the hearth is half full. Assume the resistance of secondary circuit to be thereby doubled & the reactance to remain same. [8]

**P.T.O.**

- Q3)** a) Explain block diagram of electric locomotive showing various components. [8]
- b) Explain diesel electric drive with its merits & demerits. [8]

OR

- Q4)** a) Explain function of transformer & circuit breaker used in traction substation. [8]
- b) Describe composite system & its types. [8]

- Q5)** a) Derive the expression for specific energy output on level track using simplified speed time curve. [8]
- b) A 203 tone motor coach train has 4 motors. Each develops shaft torque of 5130 N-m, during the acceleration period. Calculate the time taken by a train to attain a speed of 42 kmph starting from rest on a gradient of 0.4. The motor has gear ratio of 3.5 to 1 & gear efficiency is 93%. The wheel diameter is 91.5 cm. Assume train resistance as 45 N/T & allow 10% for the effect of rotational inertia. [8]

OR

- Q6)** a) Define with units: [8]
- i) Specific energy consumption,
  - ii) Coefficient of adhesion
  - iii) Tractive effort,
  - iv) Dead weight
- b) Draw quadrilateral speed time curve & derive equation for total distance 'D'. [8]

**Q7) a)** Explain following systems of colour light signaling: [6]

- i) Two aspect colour light signaling
- ii) Three aspect colour light signaling
- iii) Four aspect colour light signaling

**b)** An electric train has quadrilateral speed time curve as follows: [8]

- i) Uniform acceleration from rest at 2 kmphs for 30 sec.
- ii) Coasting for 50 sec.
- iii) Breaking for period of 20 sec.

The train is moving a uniform up gradient of 1% , tractive resistance is 40 N/T, rotational inertia effect is 10% of dead weight, duration of station stop is 15 sec, overall efficiency of motor & transmission gear is 80%. Calculate the value of scheduled speed & specific energy consumption of run, if total distance travelled is 1.03KM.

**c)** What are desirable characteristics of motor for traction purpose. [4]

OR

**Q8) a)** Explain shunt & bridge transition with diagrams. [6]

**b)** Explain self relieving property of DC series motor. [4]

**c)** Two 600 volts motors are started by series parallel control. Each motor takes 400A during starting time of 20 sec. & has 0.1ohm resistance. Calculate

- i) Efficiency at starting,
- ii) Energy lost in controller & motor,
- iii) Motor output,
- iv) Total energy input from line. [8]

