QP Code : 5013

Duration – 3 Hours   Total Marks assigned to the paper- 80

N.B.:- (1) Question No.1 is compulsory.
       (2) **Attempt** any **three** questions out of remaining five questions.
       (3) Assume suitable data if necessary and justify the same.

Q 1.   Answer the following questions.   20
          A) What are the factors which are affecting the schedule speed?
          B) State and explain the laws of illumination.
          C) Write short note on overhead equipment used for electric traction.
          D) What are the requirements of ideal traction?

Q 2 a)   Compare the features of different types of traction.   10
Q 2 b)   With a neat diagram, explain the working principle of Incandescent lamps. Write 10
          its advantages and disadvantages.

Q 3 a)   A machine shop 30mtx15mt is to have an illumination of 150 lux on the working 10
          plane. The lamps are mounted 5mt above the working plane. Give the layout of a
          suitable installation using 80 watt fluorescent lamps. Assume suitable data and
          justify your assumption. Describe the different light controlling methods.
Q 3 b)   What is polar curve? Why it is required in illumination? Explain the working   10
          principle of integrating sphere photometer.

Q 4 a)   Draw and explain the vapor compression and vapor absorption type refrigeration 10
          cycles. Compare their features in terms of energy efficiency and applications.
Q 4 b)   Draw the power flow configurations of series and parallel type Electric hybrid 10
          vehicles.

Q 5 a)   Draw and Explain the speed control methods of DC motors.   10
Q 5 b)   A 250 ton motor coach having four motors each developing 6000 Nm torque   10
          during acceleration, starts from rest. If the gradient is 40 in 1000, gear ratio is 4,
          gear transmission efficiency is 87%, wheel radius is 40 cm, train resistance is
          50N/ton, the addition rotational inertia effect is 12%.calculate the time taken to
          attain the speed of 50kmph. If the line voltage is 3000V DC, and the efficiency of
          motors is 85%, find the current during notching period.

Q 6 a)   Analyze the quadrilateral speed time characteristic and Derive an expression for 10
          the distance in terms of V1, V2, T, α and β.
Q 6 b)   The distance between two stops is 1.2km. A schedule speed of 40kmph is   10
          required to cover that distance. The stop is 18 sec duration. The values of
          acceleration and retardation are 2kmphps and 3 kmphps respectively. Determine
          the maximum speed over the run. Assume a simplified trapezoidal speed-time
          curve.

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