[5253] - 168

T.E. (Electrical)

Utilization of Electrical Energy

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) *Answer Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6, Q No. 7 or 8*
2) *Assume suitable data if necessary.*
3) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
4) *Figures to the right side indicate full marks.*

Q1) a) State advantages of electrical heating over other types of heating methods. **[6]**

b) A piece of an insulating material is to be heated by dielectric heating. The size of the piece is 12 cm × 12 cm × 3 cm. A frequency of 20 MHz is used and the power absorbed is 450 watt. If material has relative permittivity of 5 and power factor of 0.05. Calculate the voltage necessary for heating,current flowing through the material. If the voltage is limited to 1700 V, what will be the frequency to get the same loss? **[8]**

c) State & explain factors governing electrodeposition. **[6]**

OR

Q2) a) Explain construction and working of **[6]**
   i) Limit switches
   ii) Float switches

b) Explain factors to be considered for design of illumination scheme. **[8]**

c) Two lamp posts are 14 m apart & are fitted with 200CP lamp, each at height of 5 m, above the ground. Calculate: **[6]**
   i) Illumination midway between them.
   ii) Illumination under each lamp.

Q3) a) Compare steam engine drive and electric drive. **[8]**

b) What are the advantages & disadvantages of 25kV AC system. **[8]**

OR

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Q4) a) Discuss various current collection systems used in electric traction. **[8]**

b) Describe composite system. **[8]**

Q5) a) Derive the expression for simplified quadrilateral speed time curve. **[8]**

b) An electric train has quadrilateral speed time curve as follows:

i) Uniform acceleration from rest at 2 kmph/ps for 30 seconds.

ii) Coasting for 50 seconds,

iii) Uniform braking to rest for 20 seconds.

If the train is moving up gradient of 1 % , the train resistance is 40 N/T, rotational inertia effect is 10% of dead weight & duration of stop is 30 seconds, find the schedule speed. **[8]**

OR

Q6) a) Define with units: **[8]**

i) Average speed & Schedule speed

ii) Coefficient of adhesion

iii) Tractive effort,

iv) Specific energy consumption

b) A suburban electric train has a maximum speed of 70 kmph. The schedule speed including station stop of 30 seconds is 45 kmph. If the acceleration is 1.5 kmphps, find the value of retardation when average distance between stops is 4 KM. **[8]**

Q7) a) Explain with diagram shunt & bridge transition. **[6]**

b) Explain French method of regenerative braking. **[6]**

c) What are the desirable characteristics of motor for traction purpose? **[6]**

OR

Q8) a) Derive the expression for energy lost and efficiency for series parallel control of 4 DC series motor. **[6]**

b) Explain suitability of DC series motor for traction purpose. **[6]**

c) Write a note on anti-collision system. **[6]**

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