[4958]-1070

T.E.(Electrical.)

UTILIZATION OF ELECTRICAL ENERGY

(2012 Pattern)(Semester-II) (End sem)

Time :2½Hours] *[Max. Marks : 70*

Instructions to the candidates:
1) *Neat diagrams must be drawn wherever necessary.*
2) *Figures to the right side indicate full marks.*
3) *Use of logarithmic tables,slide rule, Mollier charts, electronics pocket calculator is and steam table is allowed.*
4) *Assume suitable data if necessary.*

Q1) a) Define: **[6]**

     i) Solid Angle

     ii) Reflection factor

     iii) Coefficient of Utilization

   b) Write a note on Anodizing. **[6]**

   c) A piece of an insulating material is to be heated by dielectric heating. The size of the piece is 12 cm X 12 cm X 3 cm. A frequency of 30 MHz is used and the power absorbed is 500 watt. If material has relative permittivity of 5 and power factor of 0.05. Calculate. **[8]**

     i) The voltage necessary for heating

     ii) Current flowing through the material

     iii) Frequency to get the same loss if voltage were limited to 1700 V.

OR

Q2) a) Explain construction and working of

     i) Push button

     ii) Contactor **[6]**

   b) With suitable diagram explain mercury vapour lamp. **[6]**

   c) An electric furnace consuming 5 KW takes 15 minutes to just melt 4lbs of aluminium, the initial temperature being 15°C. Find the efficiency of the furnace. Specific heat of Aluminium is 0.212, melting point is 658°C and latent heat of fusion is 76.8 cal per gram. 860 K cal = 1KWH. **[8]**

P.T.O.

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

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

OR

Q4) a) Draw and explain block diagram of electric locomotive. **[8]**

b) Explain functions of following equipments in traction substation. **[8]**

    i) Circuit breaker.

    ii) Interrupter

Q5) a) Define: **[8]**

    i) Average Speed

    ii) Schedule speed

    iii) Coefficient of adhesion

    iv) Tractive effort

b) A train is required to run between two stations 1.6 km apart at an average speed of 40 kmph. The run is to be made to a simplified quadrilateral speed-time curve. If the maximum speed is to be limited to 64 kmph, acceleration to 2 kmphps and coasting and breaking retardation to 0.16 kmphps and 3.2 kmphps respectively. Determine the duration of acceleration, coasting and breaking periods. Also draw speed- time curve. **[8]**

OR

Q6) a) Derive the expression for simplified quadrilateral speed time curve. **[8]**

b) An electric train weighing 200 tonne has eight motors geared to driving wheel, each wheel is 90 cm diameter. Determine the torque developed by each motor to accelerate the train to a speed of 48 kmph in 30 seconds up a gradient of 1 in 200. The tractive resistance is of 50 N/tonne. The effect of rotational inertia is 10% of the train weight, the gear ratio is 4 to 1 and gearing efficiency is 80%. **[8]**

Q7) a) Explain French method of Regenerative braking. **[6]**

b) What are the desirable characteristics of motor for traction purpose. **[6]**

c) A motor coach weighing 150 tonne is equipped with 4,600 V motors for series parallel control. The current per motor is 300 A. Calculate **[6]**

   i) Duration of starting period

   ii) Speed of the train at transition

   At 300 A, 600 V, tractive effort is 15000 N per motor and the train speed is 30 kmph. Assume that train is started up a gradient of 1% and train resistance is 10N per tonne. Allow 10% for the effect of rotational inertia. Each motor has a resistance of 0.1 ohm.

<div align="center">OR</div>

Q8) a) How A.C series motor is suitable for traction. **[6]**

   b) Explain transition methods with neat diagram. **[6]**

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

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