CBCS SCHEME

15EE742

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Utilization of Electrical Power

Time: 3 hrs.

Max. Marks: 80

Note: *Answer FIVE full questions, choosing one full question from each module.*

Module-1

1   a. Discuss the AJAX WYATT furnace with neat diagram. **(05 Marks)**
    b. Discuss the principle of dielectric heating and obtain expression for dielectric power loss. **(05 Marks)**
    c. A 15 kW, 220 V, single phase resistance oven employes nickel-chrome wire for its heating elements. If the wire temperature is not to exceed 1000°C and the temperature of the charge is to be 600°C, calculate the diameter and length of the wire. Assume radiating efficiency to be 0.6 and emissivity as 0.9. For nickel chrome resistivity is 1.016×10^{-6} Ω-m. **(06 Marks)**

OR

2   a. State and explain Faraday's law of electrolysis. **(05 Marks)**
    b. What is electro-deposition? Discuss factors which affect quality of electro deposition. **(05 Marks)**
    c. A 20 cm long portion of a circular shaft having 10 cm diameter is to be coated with a layer of 1.5 mm nickel. Determine the quantity of electricity in Ah and the time taken for the process. Assume a current density of 195 A/m^2 and a current efficiency of 92%. Specific gravity of nickel is 8.9 gm/cm^3 and its ECE is 1.0954 kg per 1000 Ah. **(06 Marks)**

Module-2

3   a. Discuss the laws of illumination. **(05 Marks)**
    b. Define the following terms and their units:
       (i) Luminous flux   (ii) Luminous intensity   (iii) Illumination
       (iv) Mean horizontal candle power   (v) Mean spherical candle power   **(05 Marks)**
    c. Two lamp posts are 16 m apart and are fitted with a 100 CP lamp each at a height of 6 m above ground. Calculate the illumination on the ground.   (i)   Under each lamp
       (ii) Midway between the lamps. **(06 Marks)**

OR

4   a. Explain the working of sodium vapour lamp with neat circuit diagram. **(05 Marks)**
    b. Explain requirement of good lighting system. **(05 Marks)**
    c. Discuss the measurement of mean spherical candle power by integrating sphere with neat diagram. **(06 Marks)**

Module-3

5   a. Using a trapezoidal speed time curve, derive an expression for its maximum speed. **(05 Marks)**
    b. Discuss the factors affecting specific energy consumption. **(05 Marks)**
    c. 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 2.0 kmphps and coasting and braking retardation to 0.16 kmphps and 3.2 kmphps respectively, determine the duration of acceleration, coasting and braking periods. **(06 Marks)**

1 of 2

OR

6 a. With relevant graph, explain traction motor characteristics. (05 Marks)
   b. Explain series parallel control of dc motors. (05 Marks)
   c. The supply fed to the series connection is 650 V. If the first motor is geared to driving wheels of radius 45 cms and other to 43 cms and if speed of first motor when connected in parallel to second motor across the main supply lines is 400 rpm, determine speeds of motors when connected in series. Assume armature current to remain same and armature voltage drop of 10% at this current. (06 Marks)

Module-4

7 a. Explain (i) Plugging (ii) Rheostatic braking (iii) Regenerative braking as applied to dc motor. (08 Marks)
   b. A train weighing 400 tonnes has speed reduced by regenerative braking from 40 to 20 kmph over a distance of 2 km along down gradient of 2%. Calculate the electrical energy and average power returned to the line. Tractive resistance is 40 N/tonne and allow rotational inertia of 10% and efficiency of conversion 75%. (08 Marks)

OR

8 a. Write a note on : (i) The Tramway and (ii) Trolley bus. (08 Marks)
   b. Explain the function of a negative booster in a framway system. (08 Marks)

Module-5

9 a. Explain configurations of Electric vehicles with neat diagram. (08 Marks)
   b. Discuss the energy consumption in electric vehicles. (08 Marks)

OR

10 a. Discuss the hybrid electric vehicle-working principle, with relevant block diagram. (08 Marks)
   b. Write a note on:
      (i) Series hybrid drive trains.
      (ii) Parallel hybrid drive trains. (08 Marks)

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