CBCS SCHEME

USN | | | | | | | | | | 17EE742

Seventh Semester B.E. Degree Examination, July/August 2021
Utilization of Electrical Power

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

1 a. What are the advantages of Electrical heating? **(04 Marks)**

b. Derive and explain the design procedure of circular heating element. **(08 Marks)**

c. A piece of insulating material is to be heated by dielectric heating. The size of piece is 12cm × 12cm × 3cm. A frequency of 20MHz is used and power is absorbed is 450W. If the material has a relative permittivity of 5 and a power factor of 0.05. Calculate the voltage necessary for heating and current that flows in the material, assume $\epsilon_0 = 8.854 \times 10^{-12} F/m$. If the voltage were limited to 1700V, what will be the frequency to get the same loss. **(08 Marks)**

2 a. State and explain Faraday's laws of electrolysis. Define Current efficiency and Energy efficiency. **(08 Marks)**

b. What is electrodeposition? Mention any two factors which affect the quality of electrodepositing. **(08 Marks)**

c. Calculate the maximum voltage required for electrolysis of water if one Kg of hydrogen on oxidation to water liberates 13.985×10^7 joules and E.C.E of hydrogen is 1.0384×10^{-8} kg/C. **(04 Marks)**

3 a. Define the terms i) Solid angle ii) Plane angle. State and explain the laws of illuminations. **(08 Marks)**

b. If the Lamp of 200cp is placed 1 meter below a plane mirror which reflects 90% of light falling on it. Determine illumination at a point 3 meters away from foot of lamp, which hung 4 meters above the ground. **(08 Marks)**

c. Mention the importance of polar curve. **(04 Marks)**

4 a. Discuss the requirement of good lighting. **(08 Marks)**

b. With a neat diagram, explain the construction and working of sodium vapour lamp. **(08 Marks)**

c. Mention the factors to be considered while designing lighting schemes. **(04 Marks)**

5 a. Mention the significance of speed time curve. Derive the expression for total distance traveled between two stations and the velocity at braking. Assume quadrilateral speed time curve. **(08 Marks)**

b. Define co-efficient of adhesion and mention the factors on which it depends. **(04 Marks)**

c. A train is required to run between two stations 2kms apart at a schedule speed of 36km/hr, the duration of stops being 20seconds. The braking retardation is 2.7km/h/s. Assuming a trapezoidal speed time curve, calculate the acceleration if the ratio of maximum speed to average speed is 1.2. **(08 Marks)**

6 a. What is tractive effort? Derive an expression for tractive effort of train considering the gradient and train resistance. **(10 Marks)**

b. Explain with the aid of diagrams, series parallel control of motors. **(10 Marks)**

7 a. Explain with figures, braking methods with single phase series motors. **(08 Marks)**

b. Explain the compressed air brake system. **(04 Marks)**

c. A 355 tonne train has its speed reduced from 85.5 to 48.3 kmph is traveling 1525mt down a uniform gradient of one in ninety (i,e 1 in 90). If regenerative braking is used, determine the energy in KWH returned to line take 10% allowance for rotational inertia, 53N/tone for tractive resistance and the overall efficiency as 80%. **(08 Marks)**

8 a. Explain the systems of Electric traction. **(08 Marks)**

b. Explain the function of Negative booster in a tramway system. **(08 Marks)**

c. Mention the different types of Diesel – Electric traction used in practice. **(04 Marks)**

9 a. Explain the conceptual illustration of general EV configuration. **(08 Marks)**

b. With relevant graph, explain train motor characteristics. **(08 Marks)**

c. Mention the need for Electric Vehicles. **(04 Marks)**

10 a. Explain the configuration of series hybrid electric drive train. **(08 Marks)**

b. Explain the conceptual illustration of hybrid electric drive train. **(08 Marks)**

c. Mention the disadvantages of series hybrid electric drive trains. **(04 Marks)**

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