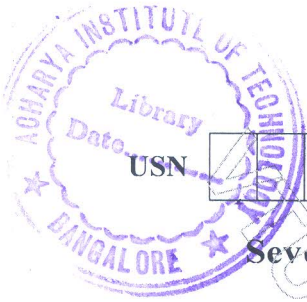


CBCS SCHEME



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 $12\text{cm} \times 12\text{cm} \times 3\text{cm}$. 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 $\epsilon_0 = 8.854 \times 10^{-12} \text{F/m}$. 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 $1.0384 \times 10^{-8} \text{kg/C}$. (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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. $42+8=50$, will be treated as malpractice.

- 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/tonne 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)
