

# CBCS SCHEME

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15EE742

## Seventh Semester B.E. Degree Examination, Jan./Feb. 2021 Utilization of Electrical Power

Time: 3 hrs.

Max. Marks: 80

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

### Module-1

- 1 a. Explain with a neat diagram the working of "Direct arc furnace". Mention its applications. (08 Marks)
- b. Explain :
- i) Direct resistance heating
- ii) Indirect resistance heating. (08 Marks)

OR

- 2 a. Explain first and second laws of Faraday of electrolysis. (08 Marks)
- b. Calculate the ampere hours required to deposit a coating of silver 0.05 mm thick on a sphere of radius of 5cms electrochemical equivalent of silver is 0.001118 and density of silver is 10.5 gms per cubic centimeter. (08 Marks)

### Module-2

- 3 a. State and explain the two laws of illumination. (08 Marks)
- b. Deduce the relation to find illumination at any point on the surface due to a light source suspended at a height "h" above the surface. (08 Marks)

OR

- 4 a. Mention and Briefly explain the factors to be considered in the design of lighting schemes. (08 Marks)
- b. A small assembly shop 16m long, 10m wide and 3m up to trusses is to be illuminated to a level of 200 Lux. The utilisation and maintenance factors are 0.74 and 0.8 respectively. Calculate the number of lamps required to illuminate the whole area/if the lumen output of the lamp selected is 3000 lumens. (08 Marks)

### Module-3

- 5 a. Sketch and explain typical speed –time curves for :
- i) Main line service
- ii) Suburban service
- iii) Urban service in traction services. (08 Marks)
- b. An electric train has an average speed of 42Kmph on a level track between stops 1400m apart. It is accelerated @ 1.7kmph ps and is braked at 3.3kmph ps. Draw the speed time curve for the train. (08 Marks)

OR

- 6 a. Explain the operating characteristics of DC series motors. Discuss the advantages and disadvantage of using DC series motor for traction duty. (08 Marks)
- b. Write a note on starting and speed control of DC traction motors explaining Rheostatic control and series parallel control in detail. (08 Marks)

**Module-4**

- 7 a. What are the different types of mechanical braking of electric trains? (08 Marks)  
b. What are the advantages and disadvantages of regenerative braking? (08 Marks)

**OR**

- 8 a. Explain Bow Collector and pantograph collectors used as current collectors in over head systems with suitable sketches. (08 Marks)  
b. A train weighing 500 tonnes is going down a gradient of 1 in 50. It is desired to keep train speed at 40Kmph by regenerative braking. Calculate the power fed into the line. Tractive resistance is 40N/tonne. Rotational inertia : 10% and efficiency of conversion : 75%. (08 Marks)

**Module-5**

- 9 a. Compare electric vehicles with conventional IC engine vehicles. (06 Marks)  
b. Discuss the concepts and configuration of modern electric drives in detail with suitable sketches. (10 Marks)

**OR**

- 10 a. Explain the concept and working principle of hybrid electric drive trains. With its architecture with suitable sketches. (08 Marks)  
b. Write a note on the performance of electric vehicles. (08 Marks)

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