

## B.Tech. VIII Semester (Main/Back) Examination, April/May - 2017

## Electrical &amp; Electronics Engineering

## 8EX4.1A Utilization of Electrical Power

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

**Instructions to Candidates:**

Attempt any **five questions**, selecting **one question from each unit**. All questions carry **equal marks**. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

**Unit-I**

1. a) Explain the principle of "Dielectric heating". Derive the mathematical expression of power consumed in such process. State important applications of dielectric heating. (8)
- b) Discuss advantages and disadvantages of electric heating over conventional methods. Briefly describe different methods of electric heating. (8)

**(OR)**

1. a) Describe with neat sketches the various methods of electric resistance welding. Give its merits or demerits with respect to arc welding. (8)
- b) Write short note on following : (2×4=8)
  - i) Electric supply for arc welding
  - ii) Welding Transformer

**Unit-II**

2. a) Discuss the laws of illumination. Also explain the construction and working of high pressure mercury vapour discharge lamp. (8)
- b) Two lamp posts are 16m apart and fitted with a 100cp lamp each at a height of 6m above ground. Calculate the illumination on ground (a) Under each lamp (b) Midway between the lamps. (8)

(OR)

2. a) Explain the working of fluorescent tube with the help of the circuit diagram giving the function of various parts. How stroboscopic effect is eliminated in fluorescent tube lighting? (8)
- b) The front of a building  $50\text{m} \times 16\text{m}$  is illuminated by sixteen 1000W lamps arranged so that uniform illumination on the surface is obtained. Assuming a luminous efficiency of 17.4 Lomens/watt and a coefficient of utilization of 0.4, determine the illumination on the surface. (8)

**Unit-III**

3. a) Explain the term "polarization"; "throwing power", and "electro-deposition". How are zinc and copper refined from their base metals electrically? (8)
- b) Discuss the objectives of electroplating and describe any one process for electroplating. (8)

(OR)

3. a) List the major applications of electrolysis. Explain the basic principle of electro deposition. Discuss in detail the power supply requirements for different electrolytic processes. (8)
- b) What is meant by anodizing? Explain the process of anodizing and describe the equipments used for it. (8)

**Unit-IV**

4. a) Discuss the locations and layout of substations with regard to ac and dc systems of electric traction. (8)
- b) Enlist the main components of electric locomotive and state their functions. (8)

(OR)

4. a) Discuss the suitability of DC series motor for its application in electric locomotives for traction duty. (8)
- b) With the help of neat diagrams. Briefly explain any two of following : (2×4=8)
- i) Pantograph
  - ii) Negative booster
  - iii) Interface effect of railway electrification on communication circuits



## Unit-V

5. a) Draw and explain a typical speed-time curve for an electric train and explain what do you understand by crest speed, average speed, and schedule speed. (8)
- b) An electric train has quadrilateral speed-time curve as follows : (6)
- Uniform acceleration from rest at 2kmphs for 30 seconds
  - Coasting for 50 seconds
  - Braking period of 20 seconds The train is moving a uniform down gradient of 1%, tractive resistance 40 newtons per tonne, rotational inertia effect 10% of dead weight, duration of stop 15 seconds and overall efficiency of transmission gear and motor as 75%. Calculate its schedule speed and specific energy consumption of run. (8)

(OR)

5. a) Discuss methods of electric braking in traction motors? Explain how regenerative braking can be obtained in dc locomotive. (8)
- b) Write short note on any two of following : (2×4=8)
- Mechanics of train movement
  - Tractive effort for propulsion of train
  - Dead weight, accelerating weight and adhesive weight of train.

