Code No: **R1641021** **R16** **Set No. 1**

IV B.Tech I Semester Advanced Supplementary Examinations, May - 2022

UTILIZATION OF ELECTRICAL ENERGY

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
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PART–A *(14 Marks)*

1. a) Explain the significance of heating and cooling curves of motors [3]
   b) List the advantages of Electric heating over other types of heating [3]
   c) Define the terms Space height ratio and Utilization factor w.r.t Illumination [2]
   d) List the characteristics of Incandescent lamps [2]
   e) Distinguish between Non- electric traction system and Electric traction system with an example of each [2]
   f) Define the term Tractive Effort [2]

PART–B *(4x14 = 56 Marks)*

2. a) Distinguish between Group drive and Individual drive along with its advantages and disadvantages. [7]
   b) A series motor with series field and armature resistance of 0.08 Ω and 0.05 Ω respectively is connected across 220V DC mains. The armature takes 35A and its speed is 1000 rpm. Determine its speed when the armature takes 50A from this very machine and the excitation is increased by 12%. [7]

3. a) Explain the following modes of transferring the heat: [7]
   i) Conduction ii) Convection and iii) Radiation
   b) Explain the process of Electric arc welding and also explain the various types of Electric arc welding [7]

4. a) State and explain two laws of illumination [7]
   b) When a 220 V lamp takes a current of 1.2 A, it produces a total lumen of 3600 lumens. Calculate the i) MSCP of the lamp and ii) the efficiency of the lamp. [7]

5. a) Explain in detail about the Factory lighting and Flood Lighting [7]
   b) A building 100m x 30 m is to be illuminated by flood light projectors situated 30m away. If the illumination is 250 lux, coefficient of utilization is 0.5, depreciation factor is 1.5 and waste light factor 1.25, estimate the number, size and angle of the projectors. [7]

6. a) List and explain the various requirements of Ideal traction system [7]
   b) Explain the various time periods considered in a speed – time curve for a train running on suburban service [7]

7. a) Explain the factors that affect the Specific energy consumption [7]
   b) An electric train of weight 300 ton has eight motors geared to driving wheels, each is 90 cm diameter. The tractive resistance is of 60 N/ton. The effect of rotational inertia is 7 % of the train weight, the gear ratio is 4:1, and the gear efficiency is 80 %. Determine the torque developed by each motor to accelerate the train to a speed of 60 kmph in 30 seconds up a gradient of 1 in 200. [7]