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

IV B.Tech I Semester Supplementary Examinations, February - 2020

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) What are the advantages of Electric drives? [2]
   b) Distinguish between induction heating and dielectric heating. [2]
   c) Define plane angle and Solid angle. [2]
   d) What are the advantages of coiled coil filament gas filled lamp? [2]
   e) State the merits and demerits of electric traction. [3]
   f) Define specific energy output and specific energy consumption. [3]

PART–B *(4x14 = 56 Marks)*

2. a) Explain in detail the general consideration in selecting motor power ratings for industrial applications. [7]
   b) A motor fitted with a fly wheel that supplies a load of torque 500N-m for 33 sec. during no load period the fly wheel regains its original speed. The motor torque is required to be limited to 400N-m. The no load speed of the motor is 800 rpm and its full load slip is 10% determine the moment of inertia of the fly wheel. [7]

3. a) Why electric heating is preferred over other forms of heating? Explain the resistance heating and its types in detail. [7]
   b) What are the requirements of good heating material and also explain the different causes for the failure of heating elements? [7]

4. a) Explain the terms light energy, luminous flux, luminous intensity, MSCP, illumination, luminance and lamp efficiency. [7]
   b) What are polar curves, explain the construction aspect and what do you attain from them? [7]

5. a) Explain the working of Fluorescent tube and the effect of stroboscopic effect that can be minimized in this type of lamp. [7]
   b) Discuss the construction and principle of operation and applications of filament lamp and also the advantages of fluorescent lamp over filament lamp. [7]

6. a) For a trapezoidal speed-time curve of an electric train, derive expressions for maximum speed and distance between stops. [7]
   b) A train is to be run between two stations of 6 kms apart at an average speed of 50km/hr. If the maximum speed is to be limited to 70km/hr, acceleration to 2 km/hr/sec, braking retardation to 4 km/hr/sec and coasting retardation to 0.1 km/hr/sec. Determine the speed at the end of coasting, duration of coasting period and braking period. [7]

7. a) Derive the expressions for the tractive effort exerted by load wheel in terms of wheel diameter, motor torque, gear ratio and efficiency of transmission of power through gears. [7]
   b) 400 tonnes goods train is to be hauled by a locomotive up a gradient of 20%, with acceleration of 1 km/hr/sec, coefficient of adhesion is 20%, track resistance 40 N/tonnes and effective rotating masses 10% of dead weight. Find the weight of locomotive and number of axles, if axle load is not to increase beyond 22 tonnes. [7]