Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EE/Electrical & Electronics)
B.Tech.(Electronics & Electrical) (2011 Onwards)
B.Tech.(Electronics Engg.)/(Electrical Engg. & Industrial Control)
(2012 Onwards) (Sem.–6)

ELECTRIC POWER UTILIZATION

Subject Code : BTEE-601

M.Code : 71147

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

   a. Compare a group drive and an individual drive.

   b. Classify load torques depending on the speed.

   c. State the requirements of an ideal traction system.

   d. Give the general features of motors in traction service.

   e. List the properties of good heating elements.

   f. Give the demerits of eddy current heating.

   g. Define the term Annealing.

   h. State the laws of illumination.

   i. Explain the Stroboscopic effect.

   j. Give the purpose of electroplating.

SECTION-B

2. Derive an expression for moment of inertia of flywheel for intermittent loading.

3. Derive the relation between the principle quantities of quadrilateral speed time curve.

4. Discuss the various aspects of residential lighting, street lighting & flood lighting.

5. Describe butt welding and its various applications.

6. Define Air Conditioning. How is air purified from micro-organism, gaseous contaminates and odours?

SECTION-C

7. a. What are the various methods of speed control of series motors and their scope of speed range?

   b. A 20 kW induction motor has a final steady temperature of 40°C when running at its rated output. Calculate its half hour rating for the same temperature rise if the copper losses at the rated output are 1.2 times its constant losses. The heating time constant is 90 minutes. Derive the expression used.

8. a. Explain the energy losses in separately excited motor during braking and compare dynamic braking with plugging.

   b. A single phase full wave converter is used to control the speed of a 10kW, 230V, 1200 rpm, separately excited dc motor. The supply voltage of the converter is 240V, 50Hz. The motor parameters are $R_a = 0.5\Omega$, $L_a = 5mH$, voltage constant ($k\Phi$) = 0.175 V/rpm.

   (i) If the motor runs at 1000 rpm and takes an armature current of 30A (assumed to be ripple free), determine the firing angle a.

   (ii) If the polarity of the field excitation is reversed under motoring condition, determine the firing angle α to keep motor running at 1000 rpm and taking armature current of 30A.

9. a. Explain the working of core type induction furnace with a neat sketch.

   b. A 7KW, 440 volts, 3-phase resistance oven is to have a 3-star connected nichrome strip of 0.4 mm thick heating element. If the wire temperature is to be 1500°C and that of the charge 1000°C, estimate the suitable width of the strip. Resistively of nichrome alloy is 1.016×10^{-6}. Assume the radiating efficiency and emissivity of the element as 0.6 and 0.91 respectively.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.