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

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EE) PT (Sem.–7)

ELECTRIC POWER AND UTILIZATION

Subject Code : BTEE-601

Paper ID : [74090]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS 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. List the factors governing the choice of a drive.

b. Differentiate active loads and passive loads.

c. Enumerate the types of motors find its application in traction.

d. Explain tramways in brief.

e. Explain Resistance heating.

f. List the types of electrodes used in arc furnaces.

g. Define Dielectric heating.

h. Define temperature radiators.

i. List out the demerits of Discharge lamps.

j. Give the advantages of reverse current plating.

SECTION-B

2. Explain the series and parallel control DC motor.
3. Derive an expression for tractive effort for propulsion of a train up and down a gradient.
4. Explain the principle of street lighting. Show different types of lighting with neat sketches.
5. Explain in detail the metallic arc welding.
6. With the help of a circuit diagram, explain the working of a water cooler.

SECTION-C

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

   b. A 6-pole induction motor has a flywheel of 1200 kg/m^2 as moment of inertia. Load torque is 980 Nm for 10 secs. No-load period is long enough for the flywheel to regain its full speed. Motor has a slip of 6% at a torque of 490Nm. Calculate:

      i) Maximum exerted by the motor.

      ii) Speed at the end of deceleration period.

8. a. A 4-pole, 50 Hz, 3-phase slip ring induction motor when fully loaded runs with a slip of 4%. Determine the value of resistance to be inserted in series per phase in the rotor circuit to reduce the speed by 12% and the new slip. The rotor resistance per phase is 0.25 ohms. Assume constant input power.

   b. Speed of a dc series motor coupled to a fan load is controlled by variation of armature voltage. When armature voltage is 400V, motor takes 20A and the fan speed is 250rpm. The combined resistance of armature and field is 1Ω. Calculate

      i) Motor armature voltage for the fan speed of 350*rpm*.

      ii) Motor speed for the armature voltage of 250V.

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

   b. A 5 KW, 440 volts, 3-phase resistance oven is to have a 3-star connected nichrome strip of 0.3mm 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 x 10^{-6}. Assume the radiating efficiency and emissivity of the element as 0.6 and 0.91 respectively.