

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – SUMMER • 2015****Subject Code: 150906****Date: 15/05/2015****Subject Name: Electrical Power Utilization and Traction****Time: 02.30 pm - 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Discuss the advantages of electric drives over other drives and factors affecting on selection of electrical drives for particular service. **07**
- (b) State the main requirements for an ideal traction system. Name the different traction systems. Give the merits and demerits of electric traction over steam engine traction. **07**

- Q.2** (a) What are various types of electric braking used for D.C machines? Explain how rheostatic braking is done in D.C. shunt motors and D.C. series motors. **07**
- (b) A 3-phase, 8 pole, 50c.p.s. induction motor equipped with a flywheel supplies a constant load torque of 100 N-m and at wide intervals an additional load torque of 300N-m for 6 Sec. The motor runs at 735r.p.m., at 100N-m torque. Find moment of inertia of the flywheel, if the motor torque is not to exceed 250N-m. **07**

OR

- (b) What is the need of starter for 3-phase induction motor? Discuss various types of starters used for 3-phase induction motors. **07**

- Q.3** (a) What are the various electric traction systems in India? Compare them. **07**
- (b) An electric train has an average speed of 45 kmph on a level track between stops 1500m apart. It is accelerated at 1.8 kmphps and is braked at 3 kmphps. Find out Maximum speed, Acceleration period, Braking period and free running period. **07**

OR

- Q.3** (a) Write short notes on (i) Factors affecting specific energy consumption in propelling a train (ii) Tractive effort for propulsion of train. **07**
- (b) Explain characteristics of DC series motors and also explain how they are suitable for electric traction work. **07**

- Q.4** (a) State the advantages of electric heating over other types of heating. **04**
- (b) Give the comparison between A.C. and D.C. welding. **04**
- (c) Determine the efficiency of a high-frequency induction furnace which takes 10 minutes to melt 2 kg of a aluminium initially at a temperature of 20° C. The power drawn by the furnace is 5 kw, specific heat of aluminium=0.212, melting point of aluminium=660° C and latent heat of fusion of aluminium=77kcal/kg. **06**

OR

- Q.4** (a) What is fundamental difference between electric arc welding and resistance welding? Explain with neat sketch how the spot welding is carried out by spot welding machine. **04**
- (b) With simple sketches describe the working of a coreless-type induction furnace. **04**
- (c) Dielectric heating is to be employed to heat a slab of insulating material 20 mm thick and 1530 mm² in area. Power required is 200watts and a frequency of 3Mhz is to be used. The material has a permittivity of 5 and a power factor of 0.05. Determine the voltage necessary and the current which will flow through **06**

the material.

- Q.5** (a) Define the following terms: (i) candle power (ii) Luminous intensity (iii) Illumination (iv) Luminance. **08**
- (b) With the help of circuit diagram explain the working of following light sources **06**
(i) Fluorescent tube (ii) High pressure mercury vapour lamp.

OR

- Q.5** (a) Write short note on (i) Electrolysis and it's laws (ii) current efficiency and energy efficiency (iii) Polarisation and throwing power (iv) Application of electrolysis. **08**
- (b) What is electroplating and what for is it done? Describe the various operations involved in electro-plating. **06**
