

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER V • EXAMINATION – WINTER - 2012****Subject code: 150906****Date: 23-01-2013****Subject Name: Electrical Power Utilization and Traction****Time: 02:30 pm to 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) Explain different methods of controlling speed of d.c. series motors. **07**
(b) Discuss relative advantages and disadvantages of steam, diesel-electric and electric systems of traction. **07**
- Q.2** (a) Explain with schematic diagram the methods of starting squirrel cage and wound rotor three phase induction motors. **07**
(b) Draw and explain running characteristics of d.c. shunt and d.c. series motor. **07**
- OR**
- (b) Explain how will you apply plugging, rheostatic and regenerative braking to an induction motor. **07**
- Q.3** (a) Explain the terms 'dead weight', 'accelerating weight' and 'adhesive weight' in a locomotive. Explain the factors affecting specific energy consumption. **07**
(b) A 400 tonne goods train is to be hauled by a locomotive up a gradient of 2 percent with acceleration of 1 kmphps. Coefficient of adhesion is 20 percent; track resistance is 40 N/tonne and effective rotating masses 10 percent of the dead weight. Find the weight of locomotive and number of axles, if the axle load is not to be increased beyond 19 tonnes. **07**
- OR**
- Q.3** (a) Explain briefly different systems of railway track electrification. **07**
(b) Explain series-parallel control of traction motors having two motors and hence find out overall starting efficiency. **07**
- Q.4** (a) State and explain advantages of electrically produced heat. Explain methods of transfer of heat. **07**
(b) Explain eddy current heating and its applications. **07**
- OR**
- Q.4** (a) Explain with diagram direct core type and coreless type induction furnace. **07**
Q.4 (b) Dielectric heating is to be employed to heat a slab of insulating material 20 mm thick and 1500 mm² in area. Power required is 200 watts and frequency of 3 MHz 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 the material. **07**
- Q.5** (a) State and explain laws of illumination. **04**
(b) Explain process of electroplating. **05**
(c) Explain power supply requirements for electrolyte processes. **05**
- OR**
- Q.5** (a) State and explain Faraday's laws of electrolysis **04**
(b) Explain the principle of operation of a sodium vapor lamp giving its neat sketch. **05**
(c) Explain street lighting. **05**
