

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – SUMMER • 2014****Subject Code: 150906****Date: 24-06-2014****Subject Name: Electrical Power Utilization and Traction****Time: 10.30 am - 01.00 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) Classify electric drives and state the factors affecting selection of drive. **07**
 (b) State speed control methods of DC Shunt motor and explain field current control with suitable diagram. **07**
- Q.2** (a) Explain starting methods for synchronous motor. **07**
 (b) Explain regenerative braking of DC motor. **07**
- OR**
- (b) Compare slip ring induction motor with squirrel cage induction motor. Why double cage induction motor is used? **07**
- Q.3** (a) Explain the terms 'dead weight', 'accelerating weight' and 'adhesive weight'. Explain the factors affecting specific energy consumption. **07**
 (b) 400 tonne goods train is to be hauled by a locomotive up a gradient of 2% with acceleration of 1 kmph/s. Coefficient of adhesion is 20%, track resistance 40 N/tonne and effective rotating masses 10% of dead weight. Find the weight of the locomotive & number of axles if the axle load is not to increase beyond 22 tonnes. **07**
- OR**
- Q.3** (a) Derive an expression for specific energy output and specific energy consumption using a simplified speed-time curve and discuss the factors affecting specific energy consumption. **07**
 (b) An electric train has quadrilateral speed-time curve as follows: **07**
- i. Uniform acceleration from rest at 2 kmph/s for 30 seconds
 - ii. Coasting for 50 seconds
 - iii. Braking period of 20 seconds.
- The train is moving up a uniform gradient of 1%, tractive resistance is 40 newton per tonne, rotational inertia effect 10% of dead weight, duration of station stop 15 seconds and overall efficiency of transmission gear and motor as 75%. Calculate the value of its schedule speed and specific energy consumption of run.
- Q.4** (a) List various methods used for speed control of dc series motors. Explain series – parallel control method for speed control of dc series motors. **07**
 (b) Explain high frequency eddy current heating. **07**
- OR**
- Q.4** (a) Explain dielectric heating and give its applications. **07**
 (b) Explain vertical core type induction furnace. **07**
- Q.5** (a) Explain basic principle of electrolysis and Faraday's laws of electrolysis. **07**
 (b) Explain sodium- vapour discharge lamp. **07**
- OR**
- Q.5** (a) Explain power supply requirements for electrolyte processes **07**
 (b) State and explain laws of illumination. **07**
