

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2013****Subject code: 1724504****Date: 03-06-2013****Subject Name: Advance Electrical Machines****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)** Explain construction and principle of operation of Permanent Magnet Hybrid Stepper Motor. Draw static characteristics of PMH stepper motor (both torque-angle and torque-current). **07**
- (b)** With help of suitable block diagram, explain closed loop control of a Brushless DC motor with voltage-fed inverter. **07**
- Q.2 (a)** Describe various types of stepper motor. **07**
- (b)** Define following terms for a stepper motor: micro-stepping, holding torque, detent torque, pull in torque, pull out torque, slew rate, step position error, step angle. **07**
- OR**
- (b)** Compare radial and axial permanent magnet BLDC motors. **07**
- Q.3 (a)** Briefly explain switched reluctance motor control scheme using asymmetric bridge converter. **07**
- (b)** Illustrate principle of operation of a linear induction motor and its applications. **07**
- OR**
- Q.3 (a)** Compare direct measurement method with loss segregate method of efficiency evaluation of a motor. **07**
- (b)** Define condition monitoring. How it is beneficial for electrical assets? **07**
- Q.4 (a)** How wind mill generator differs from a synchronous alternator? **07**
- (b)** Illustrate fault detection and diagnosis techniques used for transformer. **07**
- OR**
- Q.4 (a)** How an energy efficiency motor differs from standard motor. **07**
- (b)** In a factory a 4-pole, 400V, 3-phase, 37.38 H.P. Induction motor is operated for 16 hrs per day and 325 days per year at full load. The electricity tariff rate is Rs. 1.80/kWh. Take rate of interest and depreciation @12%. Determine:
- a. Saving in the cost of energy by use of EEM,
 - b. Pay-back period in months,
 - c. ROI (Return on investment).
- Q.5 (a)** Derive relation between Magnetic Field Energy and Mechanical Force considering non-linearity of magnetic core. **07**
- (b)** Transform stationary variable the rotating reference frame for an inductive element. **07**
- OR**
- Q.5** Write short notes on:
- (a)** Equation of transformation in reference frame theory. **07**
- (b)** Magnetically coupled circuits. **07**
