

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014****Subject code: 1724504****Date: 20-06-2014****Subject Name: Advanced Electrical Machines****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 construction and working of a Brushless DC motor. State its applications. **07**
- (b)** Compare conventional DC machine and Brushless DC Machine. **07**
- Q.2 (a)** Define step angle in a stepper motor. Explain in brief construction and working of hybrid stepper motor. **07**
- (b)** Explain concept of micro stepping control of stepper motor. **07**
- OR**
- (b)** Define the terms for stepper motor : (i) Detente torque, (ii) Holding torque, (iii) Pull in torque, (iv) Slewing range, (v) Pull out torque, (vi) Response range **07**
- Q.3 (a)** Derive expression of total energy supplied to the coupling field for electromechanical system with magnetic and electric field. **07**
- (b)** Derive voltage equation to represent two magnetically coupled circuits with leakage. Assume magnetic system to be linear. Draw equivalent T circuit with coil 1 as reference coil. **07**
- OR**
- Q.3 (a)** Derive the expression for winding inductances and voltage of an induction machine. Mention assumptions made for derivation. **07**
- (b)** Carry out transformation of a balanced set from (a,b,c) to (d,q,0) reference frame. **07**
- Q.4 (a)** Explain electromechanical energy conversion in S.R.M. **07**
- (b)** Discuss direct saving and pay back analysis of energy efficient motor. **07**
- OR**
- Q.4 (a)** With proper diagram explains the working of bifilar type converter used for S.R.M. **07**
- (b)** Explain the concept of energy efficient motor. Explain various efficiency evaluation techniques. **07**
- Q.5 (a)** Explain fault detection and diagnosis technique for 3 phase induction motor. **07**
- (b)** Discuss the construction and working of a linear induction motor. Compare the conventional Induction motor and Linear induction motor. **07**
- OR**
- Q.5 (a)** Discuss typical root causes and failure modes of electrical machines. How condition monitoring can help in diagnosis of machine health. **07**
- (b)** Discuss various static methods to compensate reactive power. **07**
