

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014****Subject code: 1720701****Date: 02-12-2014****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) Explain working principle of BLDC machine. Explain unipolar and bipolar drive circuits used for BLDC machine. **07**
- (b) Compare BLDC and conventional dc motors. Explain Axial flux and radial flux motors **07**
- Q.2** (a) Explain energy relationship in electromechanical system. Derive the expression for energy stored in a magnetic field. Also define energy and co-energy. **07**
- (b) Explain the working, construction of Linear Induction Motor. Compare LIM and 3-phase induction motor **07**
- OR**
- (b) The number of stator pole and rotor pole in a switched reluctance motor are not same. Justify. State the merits and demerits of SRM. **07**
- Q.3** (a) Discuss various types of stepper motors. **07**
- (b) Explain concept of micro-stepping control of a stepper motor. A single-stack, 8-phase (stator) multipole, stepper motor has 6 rotor teeth. The phases are excited one at a time. Determine (a) step size, (b) steps per revolution, (c) speed, if the excitation frequency is 120 Hz. **07**
- OR**
- Q.3** (a) Develop a T equivalent circuit with one coil as the reference coil in magnetically coupled circuits. **07**
- (b) Carry out transformation of a balanced set from (a, b, c) to (d, q, 0) reference frame. **07**
- Q.4** (a) If $f_{as} = \cos t$, $f_{bs} = \frac{1}{2} t$ and $f_{cs} = -\sin t$. Carry out transformation to find out f_{qs} , f_{ds} and f_{0s} . Assume $\theta(0) = -\pi/12$ and $\omega = 1 \text{ rad/sec}$ for $t = \pi/3$. **07**
- (b) Discuss the basic concepts of energy efficient motor. State its advantages. **07**
- OR**
- Q.4** (a) Compare wind mill generator with synchronous generator. State the significance of capacitor bank in a Squirrel cage induction generator when connected to an isolated load. **07**
- (b) Discuss methods to compensate reactive power in wind mill generator. **07**
- Q.5** (a) Explain direct saving and pay back analysis of energy efficient motor. **07**
- (b) Discuss fault detection and diagnosis techniques for transformer. **07**
- OR**
- Q.5** (a) Discuss various root causes and failures of electrical rotating machines. Also discuss condition monitoring that can help in diagnosis. **07**
- (b) Define the terms (i) Pull-out torque, (ii) Pull-in torque, (iii) Pull-in rate, (iv) Pull-out rate, (v) Response range, (vi) Slewing range and (vii) Synchronism, in a stepper motor. **07**
