

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – III • EXAMINATION – SUMMER • 2014

Subject code: 730704**Date: 05-06-2014****Subject Name: Advanced Electrical Drives****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) Obtain the d-q model of Induction motor in rotor reference frame. Explain each term thus involved. **07**
- (b) Explain the basics construction of Brushless DC motor. Also explain how BLDC motor rotates. Support your answer with diagrams **07**
- Q.2** (a) Draw and explain the block diagram of synchronously rotating frame machine model with input voltage and output current transformation. **07**
- (b) Explain the necessity of transformation in vector control and mention the different types of transformations thus employed. Also explain that how is decoupling achieved using transformations **07**
- OR**
- (b) Explain Direct Torque control of IM. Support your answer with necessary vector and block diagrams **07**
- Q.3** (a) Derive the torque equation of induction motor in d_e - q_e reference frame. Explain how this equation is different from the torque expression of IM in steady state **07**
- (b) Explain the space vector theory as applied to rotating machines **07**
- OR**
- Q.3** (a) Explain the sensorless vector control of Induction motor. Explain any one technique thus adopted in practice. **07**
- (b) Draw the block diagram of sensorless vector control of PMSM. And explain the important of PI Controller in this control scheme. **07**
- Q.4** (a) Explain the open loop flux control with indirect vector control with suitable block diagram. **07**
- (b) Draw the inductance profile of Switched Reluctance Motor. Explain the each step of this profile in detail. **07**
- OR**
- Q.4** (a) Develop the mathematical model of Permanent Magnet Synchronous Motor with proper assumptions **07**
- (b) How the rotor position of Permanent Magnet Synchronous is sensed using optical encoder? **07**
- Q.5** (a) Explain the control strategy for Linear Induction motor. **07**
- (b) Explain the different commutation techniques for permanent magnet motor. **07**
- OR**
- Q.5** (a) Explain the control strategy for Stepper motor. **07**
- (b) Compare PMBLDC motor and PMSM motor with their construction and working criteria **07**
