

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**ME - SEMESTER III- • EXAMINATION – WINTER 2014**

**Subject Code:730704****Date: 02/05 2015****Subject Name: Advanced Electric Drives****Time:****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 Direct Torque control of Permanent Magnet Synchronous Motor. Support your answer with necessary vector and block diagrams. **07**
- (b) Obtain the d-q model of Induction motor in stator reference frame. Explain each term thus involved. **07**

- Q.2** (a) Explain using the equivalent circuit diagram and vector diagram, explain the indirect vector control of induction motor. **07**
- (b) How the rotor position of Permanent Magnet Synchronous is sensed using optical encoder? **07**

**OR**

- (b) Draw the inductance profile of Switched Reluctance Motor. Explain the each step of this profile in detail. **07**

- Q.3** (a) Explain the working principle of BLDC motor. Prepare the switching table for the same. Draw the complete connection diagram of this system. **07**
- (b) Draw the block diagram schematic of direct torque induction drive. Explain each block properly. **07**

**OR**

- Q.3** (a) Explain the sensorless vector control of an IM. What are the different methods employed for speed estimation. **07**
- (b) Explain the control strategy for Hysteresis motor. **07**

- Q.4** (a) Derive the torque equation of induction motor in de-qe reference frame with all currents as state variable. **07**
- (b) Enlist the various inverter topologies for Switched Reluctance Motor. Explain the basic topology in detailed. **07**

**OR**

- Q.4** (a) Write the advantages and disadvantages of rotor flux oriented and stator flux oriented vector control. **07**
- (b) Discuss the suitability of different frames of references for IM in power system studies. **07**

- Q.5** (a) How BLDC motor is different than a conventional DC Motor ? Also compare BLDC motor with PMSM Motor. Draw the various rotor construction of PMSM Motor. **07**
- (b) Draw and explain the schematic diagram of a voltage flux estimator **07**

**OR**

- Q.5** (a) Explain the different commutation techniques for permanent magnet motor. **07**
- (b) Discuss the shortcomings of induction motor dynamic model from the view point of losses. Discuss the difference between steady state and dynamic model of Induction motor **07**

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