

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E. SEMESTER III–EXAMINATION (Remedial)– WINTER 2015****Subject code: 730704****Date: 07/12/2015****Subject Name: Advanced Electrical Drives****Time: 2:30 PM to 5:00 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) Describe difference between scalar and vector control method of electrical drive. Also explain the vector control principle for AC motor drive. **07**
(b) Obtain the d-q model of induction motor in stator reference frame. Explain each term thus involved. **07**
- Q.2** (a) Discuss the merits of sensorless speed control over the speed sensed vector control of induction motor **07**
(b) Draw the block diagram of sensorless vector control of PMSM and explain the important of PI Controller in this control scheme. **07**
- OR**
- (b) Develop the mathematical model of Induction Motor in arbitrary reference frame. **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 open loop flux control with indirect vector control with suitable block diagram. **07**
- OR**
- Q.3** (a) Explain the concept of vector flux oriented speed control using equivalent circuit and phasor diagram. **07**
(b) Explain the concept of rotor flux oriented direct vector control support your answer with necessary diagram. **07**
- Q.4** (a) Explain the sensorless vector control of an IM. What are the different methods employed for speed estimation. **07**
(b) What is the constant torque strategy to control the speed of PMSM motor? Support your answer with proper characteristic curve. **07**
- OR**
- Q.4** (a) Show different converters for Switched Reluctance Motor drives and explain freewheeling and regeneration capability converter in detail. **07**
(b) Explain the Optical Encoder to sense the rotor position of Permanent Magnet Synchronous Motor. **07**
- Q.5** (a) Explain the control strategy for Linear induction motor. **07**
(b) How does a BLDC motor works? Support your answer with proper switching table and explanation. **07**
- OR**
- Q.5** (a) Explain the control strategy for Hysteresis motor. **07**
(b) Explain the control strategy for Stepper motor. **07**
