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. Obtain the d-q model of Induction motor in rotor reference frame. Explain each **Q.1 (a)** 07 term thus involved. **(b)** Explain the basics construction of Brushless DC motor. Also explain how BLDC 07 motor rotates. Support your answer with diagrams Q.2 Draw and explain the block diagram of synchronously rotating frame machine **(a)** 07 model with input voltage and output current transformation. **(b)** Explain the necessity of transformation in vector control and mention the 07 different types of transformations thus employed. Also explain that how is decoupling achieved using transformations OR Explain Direct Torque control of IM. Support your answer with necessary 07 **(b)** vector and block diagrams Derive the torque equation of induction motor in d_e - q_e reference frame. 07 Q.3 **(a)** Explain how this equation is different from the torque expression of IM in steady state **(b)** Explain the space vector theory as applied to rotating machines 07 OR Explain the sensorless vector control of Induction motor. Explain any one **Q.3 (a)** 07 technique thus adopted in practice. Draw the block diagram of sensorless vector control of PMSM. And explain **(b)** 07 the important of PI Controller in this control scheme. Explain the open loop flux control with indirect vector control with suitable block **Q.4 (a)** 07 diagram. Draw the inductance profile of Switched Reluctance Motor. Explain the each **(b)** 07 step of this profile in detail. OR Develop the mathematical model of Permanent Magnet Synchronous Motor **Q.4** 07 **(a)** with proper assumptions How the rotor position of Permanent Magnet Synchronous is sensed using 07 **(b)** optical encoder? **Q.5** Explain the control strategy for Liner Induction motor. 07 **(a) (b)** Explain the different commutation techniques for permanent magnet motor. 07 OR **Q.5 (a)** Explain the control strategy for Stepper motor. 07 Compare PMBLDC motor and PMSM motor with their construction and 07 **(b)** working criteria
