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

Subject code: 1722902   **Date: 18-06-2014**
Subject Name: Modern Electric 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)** Discuss the characteristics of induction motor with a view to stable operation. **07**
         (b) Explain various operating duty cycles for motor and discuss how rating of motor can be obtained. **07**

Q.2 **(a)** Explain following terms with respect to the controlled converter. **07**
                  i. Harmonic Factor.
                  ii. Displacement Factor.
                  iii. Input Supply Power Factor.
         (b) The speed of a 10 hp,230 V,1200 rpm seperately excited dc motor is controlled by a single-phase full converter. The rated motor armature current is 38 A and Ra=0.3 á , AC suppy voltage=260 V, motor voltage constant kaØ=0.182 V/rpm. Assume that suffient inductance is present in the armature circuit to make the motor current contious. Find (i) motor torque (ii) Speed of the motor (iii) supply power factor. For firing angle =30°. **07**
                                          OR
         (b) Discuss how the motor efficiency of an inverter fed induction motor varies with frequency. **07**

Q.3 **(a)** Explain reference frame theory in brief. **07**
         (b) Explain V/F control of induction motor with neat diagram. Also discuss, where this method is applicable? **07**
                                          OR
Q.3 **(a)** Discuss four quadrant chopper circuit for DC motor. **07**
         (b) Discuss rotor resistance control of induction motor. Also draw its speed torque characteristics. **07**

Q.4 **(a)** Write a brief note on modeling of DC motor. **07**
         (b) Compare operation of induction motor operated through current source inverter and voltage source inverter. **07**
                                          OR
Q.4 **(a)** Explain closed loop control of DC motor operated through chopper circuit. **07**
         (b) Explain stator voltage control method for speed control of induction motor. Also discuss why it is suitable for fan type load. **07**

Q.5 **(a)** Explain Direct torque control method for induction motor. **07**
         (b) Explain indirect vector control scheme for induction motor. **07**
                                          OR
Q.5 **(a)** Explain self synchronous operation of synchronous motor drive. **07**
         (b) Explain Derating of induction motor due to Harmonics present in supply. **07**

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