GUJARAT TECHNOLOGICAL UNIVERSITY
M.E –IIst SEMESTER–EXAMINATION – JULY- 2012

Subject code: 1724501   **Date: XX/07/2012**

Subject Name: Solid State AC Drives

Time: 10:30 am – 13:00 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)** Make comparison between Current Source Inverter (CSI) and Voltage Source Inverter (VSI) drives. Why stator voltage control is suitable for speed control of Induction Motors in Fan and Pump drives? **07**

(b) Variable frequency control of Induction Motor is more efficient than stator voltage control, Why? Variable frequency control of Induction Motor yields high torque to current ratio during starting. Why? **07**

Q.2 **(a)** Explain how a voltage source inverter fed induction motor is operated in dynamic braking. **07**

(b) What is the maximum rms voltage obtainable with a six –step operation in a voltage source inverter? DC link voltage is Vdc. **07**

OR

(b) Explain open loop V/f control of voltage source inverter fed for induction motor. What is 'voltage boosting' in a voltage-source inverter, and why is it necessary? **07**

Q.3 **(a)** Explain direct vector control of induction motor with current model. Give the limitation of the model. **07**

(b) Explain vector control of current-fed inverter of induction motor. **07**

OR

Q.3 **(a)** Explain indirect vector control of induction motor with slip and flux estimation from machine parameters. **07**

(b) An induction motor is running at the rated conditions. If the shaft load is now increased, how do the following quantities change?
(a) Mechanical speed
(b) Slip
(c) Rotor induced voltage
(d) Rotor current
(e) Rotor frequency
(f) P$_{RCL}$
(g) Synchronous speed **07**

Q.4 **(a)** Explain closed loop current-source induction motor drive with circuit diagram. **07**

(b) Explain power factor control of synchronous motor with changing excitation for constant load torque. **07**

OR

Q.4 **(a)** Explain self-controlled synchronous motor drive employing load commutated thyristor inverter. **07**

(b) What is the difference between self-controlled and true synchronous mode of variable frequency control of synchronous motor? Why self-controlled motor is free from hunting? **07**

Q.5 **(a)** Explain the field oriented control method for induction motor. **07**

(b) Explain the torque and power limitations and modes of operation for variable frequency controlled induction motor. **07**

OR

Q.5 **(a)** Explain regeneration in current-source induction motor drive with circuit diagram. **07**

(b) What is Direct torque control of Induction motor? Explain how it is useful for fast torque response. **07**

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