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MEPE - 201

M.E./M.Tech., II Semester

Examination, July 2015

Solid State Controllers of Drives

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions.

ii) Each question carry equal marks.

iii) Assume suitable data if needed.

1. a) Explain the advantages of microprocessor control of electric drives when compared to the dedicated hardware control.

   b) Explain the application areas and functions of microprocessors in drive technology.

2. a) Develop a microprocessor based firing scheme for single phase cycloconverter with controlled frequency and output voltage.

   b) Explain in detail the voltage and frequency control in inverters.

3. a) Distinguish between scalar control and field oriented control of induction motor drives. What is sensorless control?

   b) Describe Slip Recovery Scheme used for controlling speed of Slip Ring Induction motor.

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4. a) Draw the block diagram of direct torque control of a VSI fed squirrel Cage induction motor drive and state necessary equations used in modeling.

   b) Explain the advantages of vector control over V/f control for A.C. machines.

5. a) Explain Self control scheme for synchronous machines.

   b) Explain microprocessor based control of a current source inverter fed synchronous motor.

6. a) A three phase, 400V, 50Hz four pole delta connected squirrel Cage induction motor is fed from a six pulse bridge inverter supplied from a d.c. source, such that the fundamental of the motor voltage is the same as the motor rated voltage at 50Hz. The equivalent circuit parameter of the motor are as follows stator impedance $(1 + j2.6)\Omega$ rotor impedance $(0.5 + j2.4)\Omega$. Full load speed is 1425 rpm at 50Hz. Calculate the current waveform of the motor assuming V/f is constant for

   i) 50 Hz ii) 25 Hz and iii) 5 Hz

   b) Explain variable stator voltage control of induction machines and discuss its applicability.

7. a) Explain the control scheme for switch Reluctance motor.

   b) Explain the control scheme for permanent magnet brushless A.C. motor drives.

8. Write short notes (any two):

   a) Applications of PLL

   b) Advantages of solid state controlled A.C. drives

   c) Chopper fed D.C. motor drive

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