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Dec. 2021

B.Tech. (EL) VII SEMESTER

Advanced Electric Drives (ELPE-715)

Time : 90 Minutes] [Max. Marks : 25

Instructions :

1. *It is compulsory to answer all the questions (1 mark each) of Part-A in short.*
2. *Answer any three questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART - A

1. (a) Give few applications of Switched Reluctance Motor. (1)

(b) What are the advantages of reference frame theory? (1)

(c) What are the various configurations used for a BLDC motor? (1)

(d) Draw the equivalent circuit for a Switched Reluctance Motor. (1)

(e) Discuss advantages and disadvantages of 'Open loop V/f control of Synchronous Motor'. (1)

(f) Give applications of DSPs in motion control. (1)

(g) How can we do field weakening in 'Permanent Magnet Synchronous Motor'? (1)

(h) How can we transform quantities in abc reference frame to dq reference frame? (1)

(i) Give advantages of Pulse Width Modulation. (1)

(j) What are the advantages of 'Vector Control of Induction Motors'? (1)

PART - B

2. (a) Explain in detail 'Space Vector Modulation'. (3)

(b) A single phase half bridge inverter has a resistive load of 10 ohm and the centre tap dc input voltage is 100 V. Determine

(i) rms value of output voltage.

(ii) rms value of fundamental component of output voltage. (2)

3. (a) Discuss V/f control in an induction motor drive. (2)

(b) A 400 V, 50 Hz, 4 pole, 1370 rpm, star connected induction motor is supplied from a current regulated PWM voltage source inverter and is operated with

rotor flux oriented vector control. The motor parameters are given as follows :

Rs = 2 ohm, Rr' = 5 ohm, Xls = Xlr' = 5 ohm, Xm = 80 ohm. All reactance are calculated at 50 Hz. Neglect core and friction losses.

Find the required values of Idse and Iqse to operate the motor at rated speed, if the terminal voltage and frequency are held at rated values. (3)

4. (a) With the help of a diagram discuss in detail a 'diode clamped three level inverter'. (2)

(b) Discuss in detail 'Vector Control in Synchronous Motor Drives'. (3)

5. (a) Give a comparison of BLDC motor and Permanent Magnet Synchronous Motor. (3)

(b) Discuss closed loop control of BLDC Motor. (2)

6. (a) With the help of an example, show different inductance regions of a Switched Reluctance Motor. (3)

(b) Draw and explain basic block diagram for implementation of DSP based motion control. (2)