

Total No. of Questions : 8]

SEAT No. :

PD4609

[Total No. of Pages : 2

[6404]-115

B.E (Electrical)

ADVANCED ELECTRICAL DRIVES AND CONTROL

(2019 Pattern) (Semester-VIII) (403149)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable, data if necessary.
- 5) Use of non-programmable calculator is allowed.

- Q1) a)** Compare VSI and CSI speed control of 3- phase Induction motor. **[4]**
b) Explain regenerative braking and multi quadrant operation of Induction motor drives. **[6]**
c) Explain steady-state analysis of induction motor. **[8]**

OR

- Q2) a)** What are different failure modes of Drives? **[4]**
b) Draw and explain block diagram of Vector control of induction motor. **[6]**
c) A 3-Phase, Y-connected squirrel cage induction motor has the following ratings and parameters: 1370rpm, 400V, 50Hz, 4 pole, $R_s = 2\Omega$, $R_r' = 3\Omega$, $X_s = X_r' = 3.5\Omega$ and $X_m = 33.2\Omega$. Motor is connected by a voltage source inverter V/f ratio. **[8]**

Calculate:

- i) Speed for frequency of 30Hz and 80% of full load torque.
- ii) Frequency for a speed of 1000rpm and full load torque.
- iii) Torque for a frequency of 40Hz, speed of 100rpm

- Q3) a)** Draw construction and working of BLDC motor for motoring and regenerative braking. **[9]**
b) Explain vector control of BLDC drive and mention its importance in EV application. **[9]**

OR

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Q4) a) Explain variable DC link converter topology for BLDC motor half wave drives for motoring and regenerative braking. [9]

b) Draw and explain speed torque characteristics of BLDC motor. How it differs from PM synchronous motor. [9]

Q5) a) Describe closed loop control of PM synchronous motor. [8]

b) Describe the construction of synchronous reluctance motor. Also judge the suitability of this motor for EV applications. [8]

OR

Q6) a) Draw speed torque characteristics of PMSM. Explain application of synchronous reluctance motor in EV. [8]

b) Explain different topologies of rotor construction used in PMSM. Also state application of each. [8]

Q7) a) How motors are classified on the basis of duty and enclosure type. How these will help selecting motors? [9]

b) Explain requirements of motor drive requirements for traction application. Explain with neat sketch any one scheme. [9]

OR

Q8) a) Write short note on any two: [9]

i) Requirements of drive for Sugar industries.

ii) Requirements of drive for Solar and battery powered application.

iii) Requirements of drive for Machine tools.

b) Explain various requirements and choice of drive for EV applications. Also explain basic operations of drive. [9]

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