Q.P. Code : 627401

(3 Hours)   [Total Marks : 100

N.B.: (1)   Question **No.1** is **compulsory**.
  (2)   Answer **any Four** questions out of remaining **Six** questions.
  (3)   Assume suitable **data** if **necessary** and **justify** them.
  (4)   **Figure** to the **right** indicates **MARKS**.

1. (a) Plot speed torque characteristics for stator voltage control of an induction motor. **5**

  (b) Explain that steady state stability of a drive depends on relative characteristics of motor and load, and just not on motor (or load) characteristics. **5**

  (c) State and explain the disadvantages of using a motor of wrong rating. **5**

  (d) Why vector control is considered to be superior to scalar control. **5**

2. (a) Explain the four-quadrant operation of a DC motor drive with an example. **10**

  (b) Explain the operation of a closed loop speed control scheme with inner current control loop. What are the various functions of inner current control loop. **10**

3. (a) Explain plugging in separately excited DC motor drive. **10**

  (b) A 220 V, 1500 RPM, 10 Amp, separately excited DC motor is fed from a single phase fully controlled rectifier with an AC voltage source of 230 V, 50 Hz, Ra = 2Ω, conduction can be assumed to be continuous. Calculate firing angle for **10**
      (i)   Half the rated motor torque and 500 RPM,
      (ii) Rated motor torque and (-1000) RPM.

4. (a) Explain the plugging operation of a three phase induction motor. **10**

  (b) Explain the Autotransformer method of starting a squirrel cage induction motor with a neat sketch. **10**

5. (a) Explain chopper control of DC separately excited motor. **10**

  (b) Explain with the help of block diagram 'electrical drive'. What are the functions of power modulators? **10**

TURN OVER

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6. (a) A constant speed drive has the following duty cycle,   **10**
    (i)   Load rising from 0-400 KW = 5 min
    (ii)   Uniform load of 500 KW = 5 min
    (iii) Regenerative power of 400 KW returned to the supply = 4 min
    (iv)   Remain idle for 2 min.
    Estimate the power rating of the motor.
    (b) Write a brief note on components of load torque.   **5**
    (c) Explain dynamic braking in separately excited DC motor and DC series   **5**
    motor with speed torque characteristics in braking and motoring mode.

7. Write short notes on :   **20**
    (a) Stepper Motor
    (b) Vector control of induction motor
    (c) Brushless DC motor
    (d) Basic principle of operation of switched reluctance motor.

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