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Code No. : 7212

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
M.E. I Year (EEE) II-Semester (Main) Examinations, July-2016
(Power Systems & Power Electronics)

Power Electronics Controlled Electric Drives

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in **Part-A** and any **FIVE** from **Part-B**

Part-A (10 × 2=20 Marks)

1. Define Commutation of thyristors.
2. Compare VSI and CSI.
3. Discuss current limit control strategy.
4. List the methods to improve the performance of a dc drive.
5. Draw the schematic block diagram of static Kramer drive.
6. Write the two major limitations of the stator voltage control of 3-phase induction motor using phase control technique.
7. What is the importance of microprocessor based drives?
8. Define step angle and give the formula for calculation of step angle.
9. Explain the working principle of brushless dc motor drive in brief.
10. List the various speed control schemes of switched reluctance motor drive.

Part-B (5 × 10=50 Marks)

11. a) State and explain the functions of various power electronic converters. [5]
b) Explain the basic principle of operation of a cycloconverter with a neat circuit diagram. [5]
12. a) With the help of circuit diagram, Explain the steady state analysis of a separately excited dc motor. [6]
b) A 220V, 1500 rpm, 10A separately excited dc motor is fed from a single phase fully controlled rectifier with an ac source voltage of 230V, 50Hz. The armature resistance is 2Ω and current conduction is continuous. Calculate the firing angle for rated motor torque at 1000 rpm. [4]
13. a) Draw and explain the speed – torque characteristics for a chopper controlled induction motor. [5]
b) A 4-pole, 50 Hz, 3-phase induction motor has a chopper controlled resistance in the rotor circuit for speed control. Load torque is proportional to ω^2 . When the thyristor is ON the torque is 30 N-m at a slip of average 0.03. If $\frac{T_{on}}{T_{off}} = 1$, determine the average torque and speed. The motor develops a torque of 80% of ON torque. When the thyristor is OFF the speed variation down to 1200 rpm from synchronous speed. Determine $\frac{T_{on}}{T_{off}}$ to give an average torque of 25 N-m. [5]
14. a) With the help of block diagram, Explain the microprocessor based firing scheme for dual converter. [6]
b) Explain the operation of 2-Phase, 4/2 pole permanent magnet stepper motor. [4]

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15. a) Explain the speed – torque characteristics of switched reluctance motor drive. [5]
b) Draw and discuss the control schemes of brushless dc motor drive. [5]
16. a) Explain the operation of self commutated inverter circuit with the help of a neat circuit diagram. [5]
b) Explain briefly about the Regenerative braking for dc motors. [5]
17. Write short notes on any **two** of the following
- a) Advantages of variable frequency induction motor drives. [5]
b) Microprocessor based speed control of synchronous motor drive. [5]
c) Constructional details of Brush less DC motor. [5]
