Reg. No. : | | | | | | | | | | | |

Z 6401

M.E. DEGREE EXAMINATION, MAY/JUNE 2008.

Elective

Power Electronics and Drives

PE 1621 — SPECIAL ELECTRICAL MACHINES

(Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the principle of operation of synchronous reluctance motors?

2. Write the reluctance torque equation.

3. Name the main components of switched reluctance motors.

4. What are called power controllers?

5. Write the emf equation of permanent magnet synchronous motors.

6. Sketch the torque-speed characteristics of permanent magnet synchronous motors.

7. Differentiate between mechanical and electronic commutation of permanent magnet brushless DC motors.

8. What are known as optical sensors?

9. Name the different modes of excitation of torque production in variable reluctance stepping motors.

10. What is the significance of closed loop control of stepping motor.

PART B — (5 × 16 = 80 marks)

11. (a) With neat diagrams, describe the constructional features of axial and radial air gap motors.

Or

(b) Draw the phasor diagram of synchronous reluctance motor and explain it. Also explain the motor characteristics with neat diagrams.

12. (a) What is the principle of operation of switched reluctance motors? Explain and also derive its torque equation.

Or

(b) Describe in detail how switched reluctance motors are controlled using microprocessor based controller.

13. (a) Derive the expressions for power input and torque of permanent magnet synchronous motor. Also draw the phasor diagram.

Or

(b) Describe in detail the self control, vector control and current control schemes in a permanent magnet brushless DC motors.

14. (a) (i) Write in detail about Hall sensors. (8)

(ii) Compare between multiphase brushless motor and square wave permanent magnet brushless motor drives. (8)

Or

(b) (i) Derive the Torque and EMF equation of a permanent magnet Brushless DC motors. (10)

(ii) Draw the Torque-speed characteristics of permanent magnet brushless DC motors and explain. (6)

15. (a) Describe the constructional features and principle of operation of stepping motors.

Or

(b) (i) Explain the dynamic characteristics of stepping motors with a neat diagram. (8)

(ii) Draw a neat circuit for open loop control and explain the drive systems for stepping motors. (8)

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