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

V 4163

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Seventh Semester

Electrical and Electronics Engineering

EE 1001 — SPECIAL ELECTRICAL MACHINES

(Common to B.E. (Part-time) Sixth Semester Regulation 2005)

(Regulation 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What are the types of synchronous reluctance motor?

2. List the applications of vernier motor.

3. What are the main features of stepper motor which are responsible for its wide - spread use?

4. Define the term 'Stepping - Angle'.

5. Draw the speed - torque characteristics of switched reluctance motor.

6. What is the working principle of switched reluctance motor?

7. Give the merits of PMBLDC motor compare to conventional motor

8. What is meant by peak recovery current in PMBLDC motor.

9. Synchronous machines with surface - mount magnets have very little difference between direct axis and quadrature - axis inductances. Why?

10. What is the magnitude of stator current in PMSM to achieve demagnetization?

PART B — (5 × 16 = 80 marks)

11. (a) Describe the constructional details and working principle of synchronous reluctance motor.

Or

(b) (i) Draw and explain a typical torque-speed characteristics of a synchronous reluctance motor. (9)

(ii) Explain the working principle of Vernier motor. (7)

12. (a) (i) Describe the operation of a variable reluctance type stepper motor. Also explain about micro stepping? (9)

(ii) Explain the working of hybrid motor. (7)

Or

(b) (i) Explain torque versus stepping rate characteristics of a stepper motor. Also explain about slew range and ramping. (10)

(ii) What is stepping angle? Calculate the stepping angle for a 3 phase 24 - pole permanent magnet type stepper motor. (6)

13. (a) (i) Explain with neat diagram, the constructional details and working principle of switched reluctance motors. (9)

(ii) Write a note on the power controllers used in switched reluctance motors? (7)

Or

(b) Explain with neat block diagram, the microprocessor based control in switched reluctance motors. (16)

14. (a) (i) Explain the principle of operation of PMBLDC motors? (8)

(ii) Derive the emf equation of PMBLDC motor. (8)

Or

(b) (i) Explain with neat diagram and waveforms of the full wave inverter based PMBLDC motor. (9)

(ii) Draw and explain the speed - torque characteristics of PMBLDC motor. (7)

15. (a) (i) Derive the torque equation in PMSM. (8)

(ii) Explain with phasor diagram, the measurement of L_d and L_q in PMSM. (8)

Or

(b) (i) Explain the speed - torque characteristics in PMSM. (8)

(ii) Explain the working of microprocessor based control in PMSM. (8)
