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Question Paper Code : 21517

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Seventh Semester

Electrical and Electronics Engineering

EE 2403/EE 73/10133 EEE 25 — SPECIAL ELECTRICAL MACHINES

(Regulations 2008/2010)

(Common to PTEE 2403/10133 EEE 25 – Special Electrical Machines for
B.E. (Part-Time) Sixth/Seventh Semester – EEE – Regulations 2009/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the principle of operation of synchronous reluctance motor.
2. Compare synchronous reluctance motor and induction motor.
3. Name the various modes of excitation in stepping motor.
4. Define the terms holding and detente torques as referred to stepper motor.
5. Enumerate the different power controllers used for the control of SRM.
6. Mention the different modes of operation of switched reluctance motor.
7. Why Brushless Permanent Magnet (BLPM) DC motor is called as electronically commutated motor?
8. List down some important applications of BLPM DC motor.
9. Explain the distribution factor for PMSM.
10. Distinguish PM synchronous motor from BLPM DC motor.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Draw the phasor diagram of synchronous reluctance motor. (4)
(ii) Explain the construction of radial and axial flux machines. Discuss the advantages and disadvantages of each construction. (12)

Or

- (b) Explain in detail, the operating principle and construction of synchronous reluctance motor with neat diagrams. Derive the torque equation of synchronous reluctance motor. (16)

12. (a) (i) Explain microprocessor based control of stepper motor with an example. (12)
(ii) What are the advantages of closed loop control of stepper motor? (4)

Or

- (b) Describe the operation of a variable reluctance type stepper motor with different modes of operation. (16)
13. (a) Explain with neat diagrams the constructional details and operation of rotary switched reluctance motors. (16)

Or

- (b) (i) Explain with neat circuit any two configurations of power converters used for the control of switched reluctance motor. (12)
(ii) State the advantages of sensorless operation. (4)
14. (a) (i) What are the advantages of BLPM dc motor over conventional dc motor? (4)
(ii) From the magnetic circuit analysis of permanent magnet brushless DC Motor. Derive the expression for permeance coefficient. (12)

Or

- (b) Derive the emf equation and torque equation of PMBLDC motor. (16)
15. (a) (i) Derive an expression for synchronous reactance of PMSM. (10)
(ii) Explain the power controllers used in PMSM. (6)

Or

- (b) Derive the EMF and torque equations of permanent magnet synchronous motor. (16)