## Question Paper Code: 41013

Ode/05/18

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Seventh Semester
Electrical and Electronics Engineering
EE6703 – SPECIAL ELECTRICAL MACHINES
(Regulations 2013)

Time: Three Hours

Maximum: 100 Marks

Answer ALL questions

PART - A

 $(10\times2=20 \text{ Marks})$ 

- 1. Mention any two advantages of synchronous reluctance motors.
- 2. Define 'Reluctance Torque' with reference to synchronous reluctance motor.
- 3. What are the different modes of excitation in a stepper motor?
- 4. What is meant by Lead angle in stepper motors?
- 5. What is the need for shaft position sensor for Switched Reluctance Motor?
- 6. Draw the speed-torque characteristics of Switched Reluctance Motor.
- 7. List any four permanent magnet materials.
- 8. State some important applications of Permanent Magnet Brushless DC Motors.
- 9. Write the important features of Permanent Magnet Synchronous Motor.
- 10. State the types of power controllers for Permanent Magnet Synchronous Motor.

PART - B

(5×16=80 Marks)

11. a) Explain the constructional details and working principle of synchronous reluctance motor with neat diagrams. (10+6)

(OR)

b) Explain the phasor diagram and characteristics of synchronous reluctance motor. (10+6)

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12.	a)	i) Describe the principle of operation of hybrid stepper motor. (8)
À		ii) Explain briefly a closed-loop operation system using a microprocessor for a hybrid stepping motor. (8)
		(OR)
	b)	i) Explain the mechanism of static torque production in a variable reluctance stepping motor. (10)
		ii) Describe the dynamic characteristics of a variable reluctance stepper motor.  (6)
13.	a)	Draw the cross sectional view of switched reluctance motor and explain the principle of operation. State the advantages of switched reluctance motor. (10+6) (OR)
	b)	Draw and explain four converter topologies for a 3-phase SRM. Write the merits and demerits of each topology. (16)
14.	a)	i) Explain the magnetic circuit analysis of permanent magnet brushless DC motor on open-circuit. (10)
		ii) Derive the EMF equation of permanent magnet brush less DC motor. (6) (OR)
	b)	i) Draw and explain the general structure of a controller for a permanent magnet brush less DC motor. (8)
		ii) Describe the torque/speed curve of the ideal burshless DC motor. (8)
15.	a)	For an ideal sine wave permanent magnet motor, derive the EMF and Torque equations. (8+8)
		(OR)
	b)	i) Describe the construction of phasor diagram of surface-magnet sine wave motor. (8)
		ii) Explain the torque/speed characteristic of sine wave motor. (8)