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

Question Paper Code: 47303

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Seventh Semester

Electrical and Electronics Engineering

14UEE703- SPECIAL ELECTRICAL MACHINES

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Vernier motor is an _____type synchronous motor

   (a) unexcited reluctance (b) excited reluctance

   (c) unexcited permeance (d) excited permeance

2. The material's resistance to becoming magnetized is called

   (a) Resistance (b) Resistivity (c) Reluctance (d) Permeance

3. Operation of stepper motor at high speed is referred to as

   (a) Fast forward (b) Slewing

   (c) Inching (d) Jogging

4. The rotational speed of a given stepper motor is determined solely by the

   (a) Shaft load (b) Polarity of stator current

   (c) Step pulse frequency (d) Magnitude of stator current.

5. Reluctance Motors are

(a) Doubly excited (b) Singly excited

(c) Either doubly excited or singly excited (d)None of the above

6. For which one of the following applications a Reluctance Motor is preferred?

(a) Electric shavers (b) Refrigerators

(c) Signaling and timing devices (d) Lifts and hoists

7. Which one of the following permanent magnet material has low coercive force?

(a) Cobalt – samarium (b) Alnico

(c) Barium and strontium ferrites (d) Neodymium – iron - boron

8. Permanent Magnet Brushless DC Motors are compact in size due

(a) Absence of field winding (b) Presence of smaller field winding

(c) Present of magnets (d) Any of the mentioned

9. In order to get maximum torque in Permanent Magnet Synchronous Motor, the angle between the stator flux and rotor flux is kept closer to.

(a)90^o (b) 45^o (c) 30^o (d) 60^o

10. Synchronous Motors are generally not self-starting because

(a) The direction of rotation is not fixed

(b) The direction of instantaneous torque reverses after half cycle

(c) Starters cannot be used on these machines

(d) Starting winding is not provided on the machines

PART - B (5 x 2 = 10 Marks)

11. Draw the phasor diagram of Synchronous Reluctance Motor.

12. Define holding torque and detent torque in Stepper motor.

13. Point out the disadvantages of Switched Reluctance Motor.

14. How the demagnetization occurs in PMBLDC motor.

15. What are the assumptions made in derivation of EMF equation for Permanent Magnet Synchronous Motor?

PART - C (5 x 16 = 80 Marks)

16. (a) Discuss in detail about the principle of operation and constructional features of Synchronous Reluctance Motor. (16)

Or

(b) Discuss about the various types of Synchronous reluctance motor based on rotor construction with neat sketch (16)

17. (a) Describe the construction and operation of Variable Reluctance Stepper Motor with different modes. (16)

Or

(b) (i) What is step angle? A Variable Reluctance Stepper Motor has 8 poles in the stator and they have 5 teeth in each pole. If the rotor has 50 teeth, calculate the step angle and resolution. (6)

(ii) Explain the closed loop control concept of Stepper motor with neat diagram. (10)

18. (a) (i) Derive the torque equation of Switched Reluctance Motor and illustrate the various dependent parameters. (8)

(ii) Explain the speed-torque characteristics of Switched Reluctance Motor. (8)

Or

(b) Discuss the necessity of power electronic circuit in Switched Reluctance Motor and explain different types of converter circuits in detail. (16)

19. (a) (i) Explain in detail about magnetic circuit analysis of Permanent Magnet Brushless DC Motor on open circuit. (8)

(ii) Explain the speed- torque characteristics of Permanent Magnet Brushless DC motor in detail. (8)

Or

(b) (i) Explain principle of operation of Permanent Magnet Brushless DC Motor. (8)

(ii) Discuss about mechanical and electronic commutators. Also state the difference between them. (8)

20. (a) (i) Explain microprocessor based control of Permanent Magnet Synchronous Motor in detail. (6)

(ii) Write short note on constructional features of Permanent Magnet Synchronous Motor. (10)

Or

(b) (i) Discuss about Volt-ampere requirements in Permanent Magnet Synchronous Motor. (8)

(ii) Derive an EMF equation of Permanent Magnet Synchronous Motor. (8)

———————