M.E/M.TECH Degree Examination, December 2020

Third Semester

PD18020 -Special Electrical Machines

(Regulation 2018)

Time: Three hours   Maximum : 80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. PMDC offers _____ characteristics.

    a) shunt

    b) series

    c) armature

    d) cumulative

2. The speed at which the rotating magnetic field revolves is called?

    a) Induction speed

    b) Synchronous speed

    c) Relative speed

    d) Rotating speed

3. What is the angle between stator direct axis and quadrature axis?

    a) 90°

    b) 0°

    c) 45°

    d) 60°

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

    a) Shaft load

    b) Step pulse frequency

    c) Polarity of stator current

    d) Magnitude of stator current.

5. How the reluctance torque is developed in synchronous reluctance motor?

6. Compare the switched reluctance motor and synchronous reluctance motor.

7. What is the role of suppressor circuit in a step machine?

8. For the same dimension, compare induction motor with Hysteresis Motor.

PART B - (4 X16 = 64 marks)

09. (a) Derive the EMF and torque equations of a permanent magnet brushless DC motor **(16)** and compare the equations with the conventional DC motor.

(OR)

(b) Perform the magnetic circuit analysis of brushless DC motor on open circuit in **(16)** detail.

10. (a) Enumerate the design consideration of permanent magnet synchronous motor. **(16)**

(OR)

(b) Derive the expression for torque of a synchronous reluctance motor and compare **(16)** the torque equation with the conventional synchronous motor.

11. (a) (i) Discuss the sensorless control of SRM in detail. **(8)**

(ii) Explain in detail the L-Ө profile of Switched reluctance motor. **(8)**

(OR)

(b) Discuss the design consideration of various power controller circuits for **(16)** Switched reluctance motor and explain any two power controller in details.

12. (a) Enumerate the design consideration of driver circuits used to drive the stepper **(16)** motor and explain their performance characteristics with neat sketches.

(OR)

(b) (i) Analyze the role of dynamic characteristics in a stepper motor. **(8)**

(ii) Find the pulse rate to obtain the rotor speed of 2400 rpm for a stepper motor **(8)** having a resolution of 200 steps/rev.