

Roll No

MEPS-302(A)

M.E./M.Tech., III Semester

Examination, December 2016

Special Machines (Elective-II)

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) Each question carries equal marks

iii) Part a and b of a question carries 7 marks each.

1. Discuss the torque-pulse rate characteristics of a stepper motor. Enumerate the features that the drive circuit for a stepper motor should possess for optimum torque output.
2. Describe the three pulse, three phase brushless DC motor. Discuss how the torque is developed in this motor. Show that the torque is independent of rotor angle position for sinusoidal input currents.
3. Describe with appropriate sketches, a 2-phase 8/4 pole permanent magnet stepping motor. Also explain the step angle and the excitation sequence of the 2-phase winding for clockwise and counter-clockwise rotation of the rotor.
4. a) Discuss the advantages of a Hybrid stepper motor over PMSM and VRSM.
b) Define the terms switch on angle. Switch-off angle and angle of advance for a VRM. Discuss how these angles control the working of a VRM drive.

5. Explain the principle of operation of a linear induction motor. Draw and explain its characteristic. State its important applications.
6. a) A stepper motor has a step angle of 1.8° and is driven at 4000 pps. Determine
 - i) Resolution
 - ii) Motor speed
 - iii) Number of pulses required to rotate the shaft through 54°
- b) A single sided linear induction motor has 98 poles, and its pole pitch is 50cm. Determine the linear synchronous velocity and the velocity speed in km/hr if the frequency is 50Hz and the slip is 0.25.
7. a) Discuss the working of a switched reluctance motor. Describe, how motoring and regeneration is achieved in the switched reluctance motor.
b) Explain the working of VRM during PWM mode. Draw and explain the typical waveform of phase voltage and phase currents.
8. a) Write short notes on unipolar and Bipolar stepper motor drive.
b) In a three phase, 6/4 VRM, the total time required for exciting the three phase windings in proper sequence is 20ms. Determine the rotor velocity in rad/sec and also in rpm.
