



EE8005 – SPECIAL ELECTRICAL MACHINES

QUESTION BANK

UNIT I - STEPPER MOTOR

PART A

1. Define the term i) holding torque ii) Detent torque.
2. What is hybrid motor?
3. What are the main features of stepper motor which are responsible for its wide spread use?
4. Define the term 'stepping angle'.
5. Classify the different types stepping motors.
6. What is the slew range in stepper motors?
7. What are the advantages and disadvantages of stepper motor?
8. Define the term skewing.
9. Why does stepper motor work in external logic circuit?
10. What is Hybrid motor?
11. List out different modes of excitation of stepper motor.
12. Define the term microstepping.
13. What is the function of drive circuit in stepping motor?
14. Find the step angle of a 4 phase stepper motor with 12 stator teeth and 3 rotor teeth.
15. Explain the need for closed loop operation of a stepper motor.
16. List the applications of stepper motor
17. What is a lead angle.
18. Define the term i) Slewing ii) resolution iii) step position error.
19. Define torque constant of stepper motor.
20. Distinguish the half step and full step operations of a stepping motor.
21. Write the principle of operation of a variable reluctance motor.

PART- B

1. Explain the construction operation of variable reluctance type stepper motor. Also explain about micro stepping.
2. Derive the reluctance torque of a stepper motor.
3. Calculate the stepping angle for a 3 phase 24 pole permanent magnet type stepper motor.
4. With a neat block diagram explain microprocessor control of stepping motor.
5. Explain the working of single and multistack configured stepping motors.
6. Explain the principle of operation of hybrid stepper motor in detail.
7. Draw and explain the characteristics of stepping motor.
8. A single stack 3 phase variable reluctance motor has a step angle of 15 degree. Find the no of stator and rotor poles.
9. Write a detail technical note on the bipolar drives for stepper motor
10. What is stepping angle? A VR stepper motor 8 poles in the stator and they have five teeth in each pole. If the rotor has 50 teeth, calculate the step-angle and resolution



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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING UNIT - II - SWITCHED RELUCTANCE MOTOR

PART – A

1. List out any four applications of switched reluctance motors.
2. What are the types of power controllers used for switched reluctance motors?
3. Draw the speed-torque characteristics of switched reluctance motor.
4. What are power controllers?
5. List the advantages of switched reluctance motor.
6. What is the significance of the closed loop control in switched reluctance motor?
7. Write down the torque equation of switched reluctance motor.
8. List out the limitations of switched reluctance motor.
9. How will you achieve torque ripple minimization in switched reluctance motors.
10. What is the working principle of switched reluctance motor?
11. Mention some position sensors used in switched reluctance motor.
12. Why switched reluctance machine popular in adjustable speed drive.
13. What is the significance of rotor position sensor essential for the operation of switched reluctance motors

PART-B

1. Explain the construction and working of switched reluctance motor with neat sketches.
2. Explain the importance of closed loop control in switched reluctance motor.(8)
3. Compare and contrast the performance of SR motor and VR stepper motor.(6)
4. Describe the construction and working of rotary and linear switched reluctance motors.
5. Discuss the following in switched reluctance motor.
 - i) Methods of rotor position sensing
 - ii) sensorless operation
6. Explain the importance of shaft position sensors on switched reluctance motors.(8)
7. With neat block diagram explain the microprocessor based control of switched reluctance motor.
8. Draw and explain the torque-speed characteristics of switched reluctance motor.
9. Describe the hysteresis type and PWM type current regulator for one phase of a switched reluctance motor with relevant circuit diagrams.
10. Derive the voltage and torque equation of switched reluctance motor.
11. Discuss the necessity of power electronic circuit in switched reluctance motor. Explain the different types of converter circuits in details.

UNIT – III - PERMANENT MAGNET BRUSHLESS D.C MOTORS

PART – A

1. What are the types of permanent magnet D.C motor?
2. What is permanent magnet DC commutator motor?
3. Give the merits of PMBLDC motor compared to conventional motor.
4. What is meant by peak recovery current in PMBLDC motor?
5. Differentiate electronic and mechanical commutator.
6. List the types of PM materials used in PMDC motor.



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7. State some important applications of PMDC motor.
8. Give the expression for the emf and torque of a PMBLDC motor.
9. Compare induction motor with brushless DC permanent magnet motor.
10. Write down the principle of operation of PMSM motor.
11. Compare permanent magnet brushless DC motor with permanent magnet synchronous motor.
12. Draw the magnetic equivalent circuit of PMBLDC motor.
13. A permanent magnet DC commutator motor has a stalling torque of 1 Nm. The stall current is 5 amps. Compute the motor's no load speed if it is fed with 28V Dc supply.
14. What is meant by demagnetization in PMBLDC motor.

PART – B

1. Discuss the construction and principle of operation of permanent magnet brushless DC motor with neat diagram.
2. Explain the speed-torque characteristics of PMDC motor.(8)
3. Discuss the magnetic circuit analysis relevant to permanent magnet brushless D.C. motor. Also draw the characteristics.
4. Clearly explain the function of optical sensors in PMBLDC motors.
5. Derive the emf and torque equations of PMDC motor.
6. Derive the permeance coefficient of PMBLDC motors.(8)
7. Draw the IGBT based inverter circuit for the delta connected, PMBLDC motor and sketch the firing sequence and phase current waveform for 180 degree mode.(180 degree magnetic arc)
8. Describe the constructional aspects of mechanical and electronic Commutator of PMBDC motor.
9. Illustrate the working of different types of power controllers used for the control of permanent magnet brushless D.C. motors.

UNIT – IV - PERMANENT MAGNET SYNCHRONOUS MOTOR

PART – A

1. List out the differences between the PM brushless DC motors and PM synchronous motors.
2. What is meant by slot less motor?
3. Synchronous machines with surface mount magnets have very little difference between direct axis and quadrature axis inductances. Why?
4. What is the magnitude of stator current in PMSM to achieve demagnetization?
5. Write the torque and emf equations of PM synchronous motor.
6. Draw the torque-speed characteristics of PM synchronous motor.
7. State the advantages of microprocessor based control of PMSM?
8. What is load commutation?
9. How is permanent magnet synchronous motor started?
10. Differentiate linear induction motor from induction motor.
11. What is linear synchronous motor?
12. Draw the output phasor diagram of PMSM.
13. Define synchronous reactance in PMSM.
14. Write the significance of power controllers of permanent magnet synchronous motors.
15. List the applications of permanent magnet synchronous motor.



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16. Brief up the advantages of load commutation in permanent magnet synchronous motors.
17. What is meant by self control?
18. Define the term load angle.

PART – B

1. Explain the construction and performance of a permanent magnet synchronous motor with neat diagram.
2. Derive the emf and torque equation of permanent magnet synchronous motor.
3. Write short notes on
 - i) Volt-ampere requirements in PMSM Motor.
 - ii) Torque-speed characteristics in PMSM Motor
4. With neat sketch explain the current control and vector control schemes of PM synchronous motor.
5. Microprocessor based control system in permanent magnet synchronous motor.
6. Explain with the phasor diagram of permanent magnet synchronous motor.

UNIT V- OTHER SPECIAL MACHINES

1. What is a synchronous reluctance motor?
2. What are the types of synchronous reluctance motor?
3. What are the types of rotors in synchronous reluctance motor?
4. Mention applications of synchronous reluctance motor.
5. What is vernier motor?
6. Compare syRM and induction motor.
7. Define Power factor of syRM.
8. Write the applications of vernier motor.
9. What is reluctance torque in syRM.
10. What are the design considerations of syRM?
11. Mention disadvantages of syRM.
12. Define torque angle.
13. What are the drawbacks of vernier motor?
14. List the types of stators in vernier motor.
15. Write the operating principle of syRM.
16. What are the two types of stator current modes?
17. Compare SRM and syRM.
18. Compare syRM and PMSM.

PART B

1. Explain the construction and operating principle of syRM.
2. Draw and explain the N-T and T- θ curve in detail.
3. List and explain the two types of stator current modes in syRM.
4. Explain the construction and operating principle of repulsion motor.
5. Draw and explain the construction and operating principle of magnetic repulsion motor.
6. Explain the operation of linear induction motor with neat diagrams.
7. Explain the construction and operating principle of Hysteresis motor.
8. Discuss the applications areas of different special electrical machines.

Course In-charge

HOD