

**B. TECH**  
**(SEM VI) THEORY EXAMINATION 2022-23**  
**SPECIAL ELECTRICAL MACHINES**

*Time: 3 Hours**Total Marks: 100***Note:** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A****1. Attempt all questions in brief.****2 x 10 = 20**

- a. In which mode the induction machine runs faster than the synchronous speed and define the nature of slip in the same mode.
- b. Write the applications of Induction generator, Linear Induction Motor and Servomotors.
- c. Describe the differences between a Stepper motor and a Servo motor?
- d. Define pull in torque and pull out torque in stepper motor
- e. Differentiate between Switched Reluctance and stepper motor.
- f. Draw the torque speed characteristics of Switched Reluctance Motor.
- g. Differentiate between DC motors and PMDC motors.
- h. Differentiate between DC motors and BLDC motors.
- i. State the working principle of single phase ac synchronous motor.
- j. Write four applications of single phase ac commutator motors.

**SECTION B****2. Attempt any three of the following:****10x3=30**

- a. Illustrate the construction and working principle of two phase servomotor with the help of torque speed characteristics.
- b. Explain the construction and working principle of multi stack Variable Reluctance Stepper motor with the help of neat sketches.
- c. Explain the torque production and performance characteristics of switched reluctance motors (SRM).
- d. Describe the working principle, important features and applications of sinusoidal permanent magnet AC motors (PMAC).
- e. Differentiate between single phase induction motor and single phase synchronous motor and discuss the different challenges.

**SECTION C****3. Attempt any one part of the following:****10x1=10**

- a. Illustrate the construction and working principle of Induction generator with the help of equivalent circuits and characteristics.
- b. Classify the different types of Induction generator? Illustrate the construction and working principle of each.

**4. Attempt any one part of the following: 10x1=10**

- a. Classify the different type of stepper motors? Illustrate the construction and working principle of each with the help of neat diagrams.
- b. Illustrate open loop and closed loop control of stepper motors with the help of microprocessor control circuits, express the five applications of stepper motor.

**5. Attempt any one part of the following: 10x1=10**

- a. Explain the construction and working principle of rotary and linear switched reluctance motor(SRM) .
- b. Illustrate the performance characteristics and methods of rotor position sensing and sensor less operation of switched reluctance motor.

**6. Attempt any one part of the following: 10x1=10**

- a. Describe the operating principle, equivalent circuit and characteristics of permanent magnet DC Motor.
- b. Classify the different types of permanent magnet brushless DC motors? Explain the principle of operation with the help of e.m.f. and torque equation of permanent magnet brushless DC motors.

**7. Attempt any one part of the following: 10x1=10**

- a. Identify the different types of single phase synchronous motors? Explain the construction, operating principle and characteristics.
- b. Classify the different types of single phase commutator motors? Explain the construction, operating principle and characteristics of each type of single phase commutator motors.

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