

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**EIGHTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019**

**Course Code: EE402**  
**Course Name: Special Electrical Machines**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks.*

Marks

- |   |  |     |
|---|--|-----|
| 1 | Draw and explain the Torque speed curves of an AC servomotor for various values of control voltage | (5) |
| 2 | Define Step angle and detent torque for a Stepper motor.   | (5) |
| 3 | Explain working principle of two-pole single-phase AC series motor with diagram.                   | (5) |
| 4 | Explain why rotor position sensor is required for the operation of switched reluctance motor.      | (5) |
| 5 | What are the advantages of PMSLDC motor over DC motor?   | (5) |
| 6 | Differentiate trapezoidal type BLDC motor and sinusoidal type PMSLDC motor                         | (5) |
| 7 | Enumerate linear motors and list any four applications.  | (5) |
| 8 | Write short note on linear induction motor.  | (5) |

**PART B**

*Answer any two full questions, each carries 10 marks.*

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|----|---|-----|
| 9  | a) Explain the types of series split field DC servomotor.   | (4) |
|    | b) With relevant diagrams explain field controlled DC Servomotors                                 | (6) |
| 10 | a) Explain any two modes of excitation used in three phase permanent magnet stepper motor.        | (5) |
|    | b) Explain the construction of multi stack Variable reluctance stepper motor with neat sketches.  | (5) |
| 11 | a) Compare the performance of AC and DC servo motors and list the applications.                   | (6) |
|    | b) Define the following terms as applied to a Stepper motor (1) Start-stop mode (2) Slewing mode. | (4) |

**PART C**

*Answer any two full questions, each carries 10 marks.*

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|----|---|-----|
| 12 | a) Draw the phasor diagram of AC series motor and derive the voltage equation | (5) |
|    | b) Derive the torque equation of hysteresis motor                             | (5) |

- 13 a) With neat sketches explain the construction and operation of 6/4 SRM (10)
- 14 a) Write short notes on the principle of hysteresis motor with necessary diagrams (5)
- b) Draw and explain  $n+1$  switches and diode configuration power converter for SRM. (5)

**PART D**

*Answer any two full questions, each carries 10 marks.*

- 15 Explain the principle of operation of PMBLDC motor for  $120^\circ$  commutation with neat circuit diagram. (10)
- 16 With necessary diagrams explain Longitudinal flux linear switched reluctance motor and Transverse flux linear switched reluctance motor. (10)
- 17 a) Draw and explain the performance characteristics of PMBLDC motor. (6)
- b) Derive the expression for linear force. (4)

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