



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

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
B.Tech Degree S8 (R,S) Examinations April 2026 (2019 Scheme)

**Course Code: MRT434**

**Course Name: SPECIAL ELECTRICAL MACHINES AND APPLICATION**

**Max. Marks: 100**

**Duration: 3 Hours**

**PART A**

*Answer all questions, each carries 3 marks.*

Marks

- |    |  |     |
|----|--|-----|
| 1  | Draw and explain the static characteristics of a Stepper motor.  | (3) |
| 2  | Define the term step angle of a Variable Reluctance Stepper motor. Also, write an expression for the same. | (3) |
| 3  | What is drag cup AC Servomotor? Give diagrams  | (3) |
| 4  | List any three applications of servomotors.  | (3) |
| 5  | Draw equivalent circuit of Induction generator.  | (3) |
| 6  | What are the advantages of using a Universal motor over other conventional motors?                         | (3) |
| 7  | What is the working principle of Brushless DC motor?   | (3) |
| 8  | Explain the constructional details of a Brushless DC motor with the help of a neat diagram.                | (3) |
| 9  | Explain the operation of a Hysteresis motor.   | (3) |
| 10 | What is Repulsion-start Induction -run motor?  | (3) |

**PART B**

*Answer any one full question from each module, each carries 14 marks.*

**Module I**

- |    |   |     |
|----|---|-----|
| 11 | a) Describe the drive circuits used in stepper motor control and their significances in different applications with the aid of neat sketches. | (8) |
|    | b) Explain the functioning of a Hybrid type Stepper motor with neat diagram.  | (6) |

OR

- |    |   |      |
|----|---|------|
| 12 | With the help of suitable diagrams, explain the various modes of operation of Single Stack Variable Reluctance Stepper motor. | (14) |
|----|---|------|

**Module II**

- |    |  |      |
|----|--|------|
| 13 | Explain the construction and principle of operation of DC servomotors with the | (14) |
|----|--|------|

help of necessary diagrams.

OR

- 14 a) Explain Servomechanism. What is the role of feedback device in a servomotor system? Also, draw the characteristics of AC Servomotor. (9)
- b) Compare the performance of AC and DC servo motors. (5)

**Module III**

- 15 a) Explain the principle of operation of Induction generator with the help of neat diagrams. (8)
- b) Draw and explain the torque-speed characteristics of Induction Generator. (6)

OR

- 16 a) Describe the principle of operation of Universal motor with relevant diagram. (6)
- b) Explain different speed control methods of a Universal motor and draw speed-torque characteristics (8)

**Module IV**

- 17 a) Explain the working of a current fed inverter control of Brushless DC motor using a neat circuit diagram. (9)
- b) Explain using diagrams, the commutation technique adapted in a Brushless DC motor. (5)

OR

- 18 Draw the basic block diagram of a Brushless DC motor. Also, explain its working with the help of a neat diagram. (14)

**Module V**

- 19 What are the different types of Synchronous motors? Explain the working of Permanent Magnet Synchronous motor with the help of relevant diagram. (14)

OR

- 20 Explain in detail the construction, characteristics and operation of a Repulsion motor. (14)

\*\*\*\*