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**BTECH**  
**(SEM VI) THEORY EXAMINATION 2023-24**  
**SPECIAL ELECTRICAL MACHINES**

TIME: 3 HRS

M.MARKS: 100

**Note:** 1. Attempt all Sections. If require any missing data, then choose suitably.

**SECTION A**

1. Attempt all questions in brief.

2 x 10 = 20

| Q no. | Question   | Marks | CO |
|-------|--|-------|----|
| a.    | Which type of generator used in wind energy and why?                           | 02    | 1  |
| b.    | Draw the torque speed characteristics of two phase AC Servomotor.              | 02    | 1  |
| c.    | Calculate the stepping angle for 3-stack, 16 tooth variable reluctance motor.  | 02    | 2  |
| d.    | What do you mean by closed loop control?                                       | 02    | 2  |
| e.    | Classify the conditions for successful operation of switched reluctance motor. | 02    | 3  |
| f.    | How Switched reluctance motor differ from synchronous reluctance motor?        | 02    | 3  |
| g.    | Discuss different types of rotors used in PMBLDC motor?                        | 02    | 4  |
| h.    | How can the direction of rotation of a PMDC motor can be reversed?             | 02    | 4  |
| i.    | How does switched reluctance motor differ from synchronus reluctance motor?    | 02    | 5  |
| j.    | Draw the torque-slip characteristic of hysteresis motor.                       | 02    | 5  |

**SECTION B**

2. Attempt any three of the following:

3 x 10 = 30

|    |  |    |   |
|----|--|----|---|
| a. | Explain detailed working of doubly excited induction generator.  | 10 | 1 |
| b. | With the help of diagram explain the construction and working principle of multi stack Variable Reluctance Stepper motor.                                      | 10 | 2 |
| c. | Explain the working of switched reluctance motor in detail and derive torque equation.   | 10 | 3 |
| d. | Explain the speed control of PMBLDC machine working for motoring and regenerative braking. <a href="https://www.aktuonline.com">https://www.aktuonline.com</a> | 10 | 4 |
| e. | Explain construction and working of universal motor.   | 10 | 5 |

**SECTION C**

3. Attempt any one part of the following:

1 x 10 = 10

|    |   |    |   |
|----|---|----|---|
| a. | Explain the constant power and constant torque control of induction motor | 10 | 1 |
| b. | Demonstrate the performance analysis of two phase AC Servomotor           | 10 | 1 |

4. Attempt any one part of the following:

1 x 10 = 10

|    |   |    |   |
|----|---|----|---|
| a. | Explain the concepts of open-loop and closed-loop control systems for stepper motors using microprocessor-based control circuits. | 10 | 2 |
| b. | Derive the torque equation of stepper motor and Draw the different performance characteristics of stepper motor                   | 10 | 2 |



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Subject Code: KEE061

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M.MARKS: 100

5. Attempt any *one* part of the following: 1 x 10 = 10

|    |   |    |   |
|----|---|----|---|
| a. | Explain the construction and working principle of linear switched reluctance motor (SRM). | 10 | 3 |
| b. | Explain sensor less operation of switched reluctance motor.                               | 10 | 3 |

6. Attempt any *one* part of the following: 1 x 10 = 10

|    |  |    |   |
|----|--|----|---|
| a. | Explain in detail about sinusoidal PMAC motor. Also give its applications. | 10 | 4 |
| b. | Explain the construction and principle of operation of PMSLDC motor.       | 10 | 4 |

7. Attempt any *one* part of the following: 1 x 10 = 10

|    |  |    |   |
|----|--|----|---|
| a. | Explain the construction and principle of operation of a Hysteresis motor. | 10 | 5 |
| b. | Explain construction and working of repulsion motor.                       | 10 | 5 |

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