



**B.E. DEGREE EXAMINATIONS: APRIL / MAY 2023**

(Regulation 2018)

Fourth Semester

**MECHANICAL ENGINEERING**

U18EEI4207: Electrical Drives and Control

**COURSE OUTCOMES**

**CO1:** Describe the construction, principle of operation and characteristics of DC motors.

**CO2:** Distinguish the construction and operation various types of induction motors.

**CO3:** Familiarize the speed control techniques for DC motor and induction motor.

**CO4:** Describe the construction and operation of special electrical machines.

**CO5:** Choose the suitable motor for specific application.

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions: -**

**PART A (10 x 2 = 20 Marks)**

**(Answer not more than 40 words)**

- |  |     |                   |
|--|-----|-------------------|
| 1. Can a DC series motor be started without load? Justify.   | CO1 | [K <sub>3</sub> ] |
| 2. Define back emf of DC motor.  | CO1 | [K <sub>2</sub> ] |
| 3. Mention the types of rotors used in three phase induction motor.  | CO2 | [K <sub>2</sub> ] |
| 4. Is a single phase induction motor self-starting? Justify.   | CO2 | [K <sub>3</sub> ] |
| 5. What are the factors that influence the choice of electrical drives?  | CO3 | [K <sub>2</sub> ] |
| 6. Define firing angle.  | CO3 | [K <sub>1</sub> ] |
| 7. Mention the types of motors suitable for Traction, Ceiling fan, Electric vehicles and Satellite applications. | CO5 | [K <sub>3</sub> ] |
| 8. What is meant by rotor resistance control?  | CO4 | [K <sub>1</sub> ] |
| 9. Mention the merits of VSI fed induction motor drives.   | CO4 | [K <sub>2</sub> ] |
| 10. List the applications of Stepper motor.  | CO5 | [K <sub>2</sub> ] |

**Answer any FIVE Questions: -**  
**PART B (5 x 16 = 80 Marks)**  
**(Answer not more than 400 words)**

- |     |    |   |    |     |                   |
|-----|----|---|----|-----|-------------------|
| 11. | a) | Explain the constructional details of DC motor with neat diagrams.  | 10 | CO1 | [K <sub>2</sub> ] |
|     | b) | Draw and explain the various characteristics of DC shunt motor.   | 6  | CO1 | [K <sub>2</sub> ] |
| 12. | a) | Describe the operation of split phase and capacitor start induction motor with neat diagram and phasor diagram.   | 10 | CO2 | [K <sub>2</sub> ] |
|     | b) | Derive the emf equation of the transformer.   | 6  | CO2 | [K <sub>2</sub> ] |
| 13. |    | Explain the operation of Single phase fully controlled converter fed DC motor with neat circuit and wave forms.   | 16 | CO3 | [K <sub>2</sub> ] |
| 14. | a) | Explain the operation of stator voltage control of three phase induction motor speed control using SCR based AC voltage controller with neat circuit diagram. | 8  | CO3 | [K <sub>2</sub> ] |
|     | b) | Write a short note about V/f control of induction motor.  | 8  | CO3 | [K <sub>2</sub> ] |
| 15. | a) | Illustrate the one phase ON mode operation of variable reluctance type stepper motor with neat circuit.   | 10 | CO4 | [K <sub>2</sub> ] |
|     | b) | Explain the operation of PMBLDC motor with neat diagrams.   | 6  | CO4 | [K <sub>2</sub> ] |
| 16. |    | Draw and explain the operation of the four quadrant chopper fed DC drive used for battery operated vehicle.   | 16 | CO5 | [K <sub>2</sub> ] |

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