

**B.Tech. – VIEP – ELECTRICAL ENGINEERING  
(BTELVI)**

**Term-End Examination**

**00494**

**June, 2017**

**BIEEE-003 : SPECIAL ELECTRICAL MACHINES**

*Time : 3 hours*

*Maximum Marks : 70*

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**Note :** Attempt any *five* questions. Use of scientific calculator is permitted.

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1. (a) Draw the equivalent circuit of a double-cage induction motor. Sketch the torque and current characteristics of a double-cage induction motor. 10
- (b) Derive the relationship between the torques developed by outer and inner cages of a double-cage induction motor. 4
2. (a) Draw the circuit diagram of a capacitor-start capacitor-run single-phase induction motor and explain its working. Where is this type of motor commonly used? 10
- (b) Discuss why single-phase induction motors do not have a starting torque. 4

3. (a) Discuss the construction and working of a drag-cup servo-motor. 10
- (b) State the advantages of servo-motors over large industrial motors. 4
4. (a) Describe the construction and principle of operation of a synchronous hysteresis motor and show that it develops a running torque, both at synchronous and asynchronous speed of the motor. 10
- (b) Draw and explain the torque-speed characteristic of a hysteresis motor. 4
5. (a) Explain the principle of operation of a linear induction motor. Draw its characteristics. 10
- (b) Compare a reluctance motor with an equivalent induction motor. 4
6. (a) Explain the torque versus stepping rate characteristics of a stepper motor. What is the slew range and ramping? 10
- (b) What are the main features of stepper motors that are responsible for its widespread use? 4
7. (a) Describe the construction and operation of a hybrid stepper motor. 10
- (b) What are the main advantages and disadvantages of hybrid stepper motors compared with variable reluctance stepper motors? 4