

**Total No. of Pages : 02**

**Total No. of Questions : 09**

**B.Tech. (EE) PT (Sem.-3)**  
**ASYNCHRONOUS MACHINES**  
Subject Code : BTEE-401  
Paper ID : [A3240]

**Time : 3 Hrs.**

**Max. Marks : 60**

**INSTRUCTION TO CANDIDATES :**

1. **SECTION-A** is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt **ANY FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt **ANY TWO** questions.

## SECTION-A

**1. Answer briefly :**

- a. Name the two types of 3-phase induction motors. What are the differences in construction between the two?
- b. What are the parts of an induction motor?
- c. How can the direction of rotation of the 3-phase induction motor be reversed?
- d. Why does a 3-phase induction motor always run at a speed less than the synchronous speed?
- e. Why should the rotor of a 3-phase induction motor rotate in the same direction as that of its rotating magnetic field?
- f. Why is the efficiency of a 3-phase induction motor less than that of a 3-phase transformer?
- g. Draw the neat diagrams of single-phase capacitor-start capacitor-run induction motor.
- h. How can ohmic loss be measured in 3-phase induction motor?
- i. *"The rotating fields of the stator and rotor are stationary with respect to each other".* Justify the statement.
- j. What happens to a 3-phase induction motor if one of its three supply-leads gets disconnected?

**SECTION-B**

2. A 3-phase slip ring induction motor has its stator wound with 4-poles but its rotor is wound with 6-poles. Will this induction motor be able to develop torque? Explain.
3. With the help of rotor equivalent circuit of an induction motor, show that the power transferred magnetically from stator to rotor is given by  $I_2^2 (r_2/s)$  per phase.
4. Describe the performance characteristics of three-phase self-excited induction generator.
5. Describe the working principle of shaded pole motor.
6. Describe the working principle of linear induction machines.

**SECTION-C**

7. A 3-phase induction motor having a 6-pole star connected stator winding runs on a 240 V, 50 Hz supply. The rotor resistance and standstill reactance are  $0.12 \Omega$  and  $0.85 \Omega$  per phase respectively. The ratio of stator to rotor turns is 1.8. The full load slip is 4%. Calculate for this load the torque developed torque and the horse power. Also find the maximum torque and the speed at maximum torque. Neglect stator impedance.
8. Describe the double revolving field theory of single phase induction motor and develop its equivalent circuit.
9. The test on a 3-phase star connected 400V induction motor gave the following test results :

No load test: 400V, 20A, 5000W and -3200W

Blocked rotor test: 50V, 60A, 2300W and 750W

D.C. test: applied voltage (across two windings in series) 18V, 60A

**Find :**

- a. The equivalent circuit of motor.
- b. Slip for pull out torque and the magnitude of pull-out torque. The synchronous speed of the motor is 25 rev/sec.