Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EE) (2011 Onwards)/(Electrical & Electronics/Electronics & Electrical) (2011 & 2012 Batch)/
Electrical Engineering & Industrial Control (2012 Onwards)

(Sem.–4)

ASYNCHRONOUS MACHINES

Subject Code : BTEE-401

Paper ID : [A1209]

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. In a 4-pole, 3-phase, 50 Hz induction machine, the slip-rings of the machine are open-circuited. The frequency of the voltage across slip-rings is 75 Hz. Find the speed at which the rotor is driven.

b. The no-load speed of a 3-phase 50 Hz induction motor is 1485 rpm. Find the number of alterations per minute which the rotor emf will make and the speed of rotor mmf with respect to rotor wound.

c. The stator of a 4-pole, 3-phase induction machine is supplied from 3-phase, 50 Hz supply and a prime-mover drives its rotor at a speed of 750 rpm. The slip-rings of the machine are open-circuited. Find the frequency of the voltage across any two slip-rings.

d. What are the limitations of induction generator?

e. State the condition for maximum torque in a 3-phase induction motor.

f. The rotating fields of the stator and rotor are stationary with respect to each other. Justify the statement.

g. What happens to a 3-phase induction motor if one of its three supply-leads gets disconnected?

h. A 6-pole, 50 Hz single-phase induction motor runs at a speed of 900 rpm. Calculate the frequency of current in the cage rotor.

i. In a 3-phase induction motor, maximum torque of 100 Nm occurs at a slip of 10%. Calculate the torque at a slip of 5%.

j. Why does a 3-phase induction motor always run at a speed less than the synchronous speed?

SECTION-B

2. A 3-phase induction motor crawls near half synchronous speed. Give the reasons.

3. A 3-phase cage rotor induction motor has a full load slip at 4%. The standstill current at rated voltage is 6.5 times full load current. Find auto transformer tapping to give full load torque at starting and also find line current at starting.

4. Explain how the stationary, pulsating m.m.f. wave of a single phase induction motor can be considered as equivalent to two equal but oppositely rotating m.m.f. waves.

5. Describe the constructional features and working of stepper motor.

6. Describe various methods of excitation of induction generator.

SECTION-C

7. An 1100 V, 50 Hz star connected induction motor has a star connected slip-rings rotor with a transformation ratio of 3.8 the rotor resistance per phase is 0.012 Ω. and leakage inductance is 0.8 mH per phase. Neglect' stator impedance. Find (a) the rotor starting current per phase with slip rings short circuited, (b) the rotor power factor at starting, (c) the external resistance per phase to obtain a starting current of 100A in the stator and (d) the rotor current at 4% slip.

8. Explain, how the equivalent circuit of an ordinary polyphase induction motor is also applicable to deep-bar induction motors.

9. Explain the working of universal motor and draw its phasor diagram.