SIXTH SEMESTER B.TECH DEGREE EXAMINATION
**13.602 INDUCTION MACHINES AND SPECIAL MACHINES (E)**
**MODEL QUESTION PAPER**

**PART A**
Answer all questions                    (2*10=20 Marks)

1.Why is the air gap between the stator and rotor of a three phase induction motorkept as short as possible?

2..Enumerate the advantages of skewed slots in the rotor of a squirrel cage motor.

3..What happens when an electric train driven by an induction motor begins to move down hill?

4..Explain briefly the phenomenon of crawling in an induction motor.

5..Explain the necessity of starters for induction motors.

6..List any two applications of an induction generator.

7. State why small fractional kilowatt ac series motors are called universal motors.

8. Explain the main advantage of using a dc servo motor.

9. What happens to a stepper motor if pulse duration is very short?

10. How end effects effect the performance of a linear induction motor and how its effects can be minimized?

**PART B**
**MODULE I**
(Answer   one  full question from each module)

11.

a)    Compare squirrel cage and wound rotor induction motor with reference to construction, performance                    and                    application. (6)

b) Draw the complete torque-slip characteristics of an induction motor and show starting torque and     breakdown     torque.     Mark        the        stable        and        unstable        regions. (6)

c) A 3φ, 60Hz, 15HP,460V, 4 pole, 1728rpm induction motor delivers full output power to a load connected   to   its   shaft  .   The   windage   and   friction   loss   of   the   motor   is   750W. Determine(i)mechanical   power   developed   (ii)air-gap   power   (iii)   rotor   copper   loss. (8)

**OR**

12.  Draw the circle diagram for a 5HP, 200V, 50Hz, 4pole,3φ, star connected induction motor from the following test data

| NO LOAD TEST | 200V | 5A | 350W |
|---|---|---|---|
| SHORT CIRCUIT TEST | 100V | 26A | 1700W |

   From the circle diagram , find

   (i)line current, power factor, slip, torque and efficiency  at full load

   (ii)Maximum   torque   and   starting   torque   in   terms   of   full   load   torque. (20)

## MODULE II

13.
a) Justify the suitability of induction generator in windmills. (5)
b) Calculate the steps in a 5 step rotor resistance starter for a three phase induction motor. The slip at maximum starting current is 2% with slip rings short circuited and the resistance per rotor phase is 0.02Ω. (10)
c) Compare an induction generator with an alternator. (5)

### OR

14.
a) Discuss with neat sketches the different electric braking methods used in three phase induction motor. (12)
b) Enumerate the advantages of synchronous induction motor over an ordinary synchronous motor. (8)

## MODULE III

**15.**
a) Explain double field revolving theory . Based on double field revolving theory, prove that a single phase induction motor is not self starting. (10)
b) Explain the construction ,principle of operation and application of AC Servomotor. (10)

### OR

16.
a) Explain the working principle and applications of single phase shaded-pole motor. (10)
b) Explain the principle of operation of a universal motor. How can it be developed from a DC series motor? (10)

## MODULE IV

17.
a) Briefly explain the working of different types of Linear Induction Motor and its applications (10)
b) Explain the construction ,principle of operation and applications of stepper motor. (10)

### OR

18.
a) Explain the principle of operation of (i)brushless dc motor (ii)switched reluctance motor. (8)
b) Derive the torque equation of a reluctance motor and draw the torque slip characteristics. Mention its applications. (12)