B. Tech Degree VI Semester Examination April 2011

EE 606 ELECTRICAL MACHINES III

(2006 Scheme)

Time : 3 Hours | Maximum Marks : 100

PART A

(Answer ALL questions)

(8 x 5 =40)

I. (a) Differentiate between slip ring and squirrel cage induction motor.
(b) Draw the equivalent circuit of a 3ϕ induction motor.
(c) Describe deep bar cage rotor motor.
(d) Explain cogging and crawling of induction motors.
(e) Discuss the pole changing method of speed control in induction motor.
(f) Write short note on synchronous induction motor.
(g) Explain how a commutator acts as a frequency converter.
(h) Discuss the working of universal motor.

PART B

(4 x 15 = 60)

II. (a) Explain the torque-slip curve of a 3ϕ induction motor. Derive the condition for maximum starting torque. (7)

(b) A 3ϕ induction motor having a star connected rotor has an induced emf of 80V between slip rings at stand still on open-circuit. The rotor has a resistance and reactance per phase of 1Ω & 4Ω respectively. Calculate current/ph and power factor when (i) slip rings are short circuited (ii) slip rings are connected to a star-connected rheostat of $3\Omega/ph$. (8)

OR

III. Draw the circle diagram from no load and short circuit test of a 3ϕ, 14.92KW, 400V, 6 pole induction motor from the following test results (line values).

No load test: 400V, 11A, pf = 0.2
S.C. test : 100V, 25A, pf = 0.4
Rotor Cu loss at standstill is half the total copper loss. From the diagram, find (i) line current, slip, efficiency and power factor at full load (ii) the maximum torque. (15)

IV. (a) Explain the working of a rotor rheostat starter for a 3ϕ induction motor with the help of neat sketch. (7)

(b) Calculate the steps in a 5 step rotor resistance starter for a 3ϕ induction motor. The slip at the maximum starting current is 2% with slip ring short circuited and the resistance per rotor phase is 0.02Ω. (8)

OR

V. (a) Explain the construction of double cage induction motor with the help of its equivalent circuit. (10)

(b) In a double cage IM, if the outer cage has an impedance at standstill of $(2+j1.2)\Omega$, determine the slip at which the two cages develop equal torques if the inner cage has an impedance of $(0.5+j3.5)\ \Omega$ at stand still. (5)

(P.T.O)

VI. Explain the theory and application of the induction generator with necessary phasor diagrams and equivalent circuit. (15)

OR

VII. (a) Explain the use of SCR for the speed control of induction motor. (5)

(b) Explain the effect of excitation on armature current and power factor of synchronous motor. (10)

VIII. (a) Explain the working and construction of a Schrage motor. (10)

(b) Write short notes on AC series motor. (5)

OR

IX. Why a single phase IM is not self starting? Explain any one circuit to self start a single phase induction motor. (15)

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