B.Tech Degree VI Semester Examination April 2011

EE 604 ELECTRICAL MACHINES III

(2002 Scheme)

Time : 3 Hours | Maximum Marks : 100

I. (a) Draw and explain the torque slip characteristics of a 3 – phase induction motor. Clearly indicate the effect of change in rotor resistance. (10)

(b) Explain the working principle of a 3 phase induction motor. Why does an induction motor never run on synchronous speed.? (10)

OR

II. (a) A 3 phase 6 – pole 50 Hz induction motor develops 3700 Watts at 950 rpm. What is the stator input, if the stator losses is 300 W? (8)

(b) Draw the circle diagram from no load and blocked rotor test of a 3 phase 14.92 KW, 400 V, 6 – pole induction motor from the following test results :

No load	:	400 V	11 A	pf = 0.2
Blocked rotor	:	100 V	25 A	pf = 0.4

Rotor copper loss at standstill is half the total copper loss. From the diagram find line current, slip, efficiency and pf at full load. (12)

III. (a) Why a starter is necessary to start an induction motor? Mention various methods of starting. Explain in detail auto transformer method of starting a squirrel cage induction motor. (10)

(b) A 11.2 KW, 3 phase, 6 – pole, 50 Hz, 400 V delta connected induction motor runs at 960 rpm on full load. If it takes 86.4 A on direct starting, find the ratio of starting torque to full load torque with a star delta starter. Full load efficiency and power factor are 88% and 0.85 respectively. (10)

OR

IV. (a) At standstill the equivalent impedance of inner and outer cages of a double cage rotor are (0.4 + j2) Ohms and (2 + j 0.4) Ohms respectively. Calculate the ratio of torques produced by the two cages (i) at standstill (ii) at 5% slip. (10)

(b) Differentiate between harmonic induction torque and harmonic synchronous torque developed in an induction motor. What are their effects? (10)

V. (a) Explain the cascade arrangement for controlling the speed of three phase induction motor. (10)

(b) Discuss the method of speed control of induction motor by changing the number of poles. (10)

OR

VI. (a) Explain with diagram Leblanc system of speed control of 3 – phase induction motor. (10)

(P.T.O.)

(b) Describe with a neat diagram the principle of operation of induction generator. (10)

VII. (a) Explain the working principle and applications of a shaded pole induction motor. (10)

(b) Explain why a single phase induction motor does not self start. Discuss its operation based on double field revolving theory. (10)

OR

VIII. Write short notes on the following :

(i) Torque speed curve of a single phase induction motor

(ii) Capacitor start induction run motor

(iii) Repulsion induction motor (20)

IX. (a) Mention the problems usually encountered when a d.c series motor is operated on ac. What design modifications are to be incorporated for its satisfactory operation on ac? (14)

(b) Explain the principle of working of a universal motor and mention its applications. (6)

OR

X. (a) How does a 3 phase ac shunt commutator motor differ from a 3 phase ac series commutator motor? (10)

(b) Explain with neat diagram the working principle of a schrage motor. (10)

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