

Roll No.

Total Pages : 03

BT-4/M-20

34107

ELECTRICAL MACHINES-II

EE-208-N (Opt. II)

Time : Three Hours]

[Maximum Marks : 75

Note Attempt Five questions in all, selecting at least one question from each Unit. All questions carry equal marks.

Unit I

1. (a) Derive the expression of generated e.m.f. in three phase induction machine. Also explain the winding factor. **7**
- (b) The power input to the rotor of a 400 V, 50 Hz 6 pole, 3-phase induction motor is 20 kW. The slip is 3%. Calculate : **8**
- (i) Frequency of the rotor current
 - (ii) Rotor speed
 - (iii) Rotor copper loss
 - (iv) Rotor resistance per phase if rotor current is 60 A.

(2)L-34107

1

2. (a) Explain the significance of running light and blocked rotor test of induction machines. **7**

(b) A 10 kW, 400 V, 4 pole delta-connected squirrel cage induction motor gave the following test results : **8**

No-load test : 400 V, 8 A, 250 Watts

Blocked rotor test : 90 V, 35 A, 1350 Watts

The d.c. resistance of the stator winding per phase measured immediately after the blocked rotor test is 0.6 Ω . Calculate the rotational losses and the equivalent circuit parameters.

Unit II

3. (a) Draw the torque-slip characteristic of the three phase induction machine and explain the effect of change in rotor resistance. **7**

(b) A 60 W, 400 V, 3 phase, 6 pole, 50 Hz wound rotor induction motor has a full load slip of 0.04 when operating at rated voltage and frequency with rotor windings shortcircuited at slip rings. The slip at maximum torque is 0.2. Stator resistance and rotational losses are neglected. Determine the :

(i) maximum torque

(ii) full load rotor ohmic losses. **8**

(2)L-34107

2

4. (a) Explain the double revolving field theory of single phase induction machine. **7**
 (b) Draw the equivalent circuit of the single phase induction machine. **8**

Unit III

5. (a) Draw the phasor diagram of the synchronous generator showing the effect of mmf and emf. **7**
 (b) Explain the armature reaction of synchronous generator. **8**
6. (a) Derive an expression for the power developed in cylindrical rotor and salient-pole rotor synchronous generator. **8**
 (b) A 3-phase alternator has a direct axis synchronous reactance of 0.7 p.u. and a quadrature axis synchronous reactance of 0.4 p.u. Draw the vector diagram for full load 0.8 power factor lagging and obtain there from (i) The load angle, (ii) No load p.f. unit. **7**

Unit IV

7. (a) Explain the starting methods of synchronous motor. **7**
 (b) Explain V-curves in synchronous motor **8**
8. (a) Explain the principle of synchronous condenser.
 (b) Explain the functioning of high starting torque motors. **8**

(2)L-34107

3

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