G 365

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 602—INDUCTION MACHINES

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Discuss the construction of rotor of slip-ring induction motor.
2. What are the methods of improving starting torque of squirrel-cage induction motor ?
3. Discuss the types of induction generators.
4. Explain the applications of commutator machines.
5. Discuss the principle of linear induction motor.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Explain crawling and how is it eliminated.
7. Explain pole changing and cascading of induction motors.
8. Discuss the different types of construction of rotor windings of synchronous induction motor.
9. Explain the types of repulsion motors.
10. Explain the construction of permanent magnet synchronous motor.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. The following are the test results on a 440 V, 18.65 kW, 4-pole, three-phase delta-connected induction motor :

No load test : 440 V, 7.5 A, 1050 W

Blocked rotor test ; 100 V, 32 A, 2000 W

Draw the circle diagram and determine :

(a) Line current, power factor and efficiency for full-load output.

(b) Starting torque and maximum torque.

Assume ratio of stator copper loss to rotor copper loss at stand still is 7 : 6.

Or

12. (a) Explain power stages in three-phase induction motor. (6 marks)

(b) A three-phase induction motor having a star connected rotor has an induced e.m.f. of 85 V. between slip-rings at standstill on open circuit. The rotor has resistance and reactance of 1 Ω and 4 Ω per phase respectively. Calculate the rotor current and powerfactor when (i) slip rings are short circuited ; (ii) when slip rings are connected to star connected rheostat of 3 Ω per phase.

(6 marks)

13. (a) Explain rotor resistance starting and design of rotor resistance starter. (8 marks)

(b) The cages of a double cage induction motor have standstill impedance of $(3.5 + j\ 1.5)\ \Omega$ and $(0.6 + j\ 7.0)\ \Omega$ respectively. The full-load slip is 6 %. Find the starting torque at normal voltage in terms of full-load torque. Neglect stator impedance and magnetising current.

(4 marks)

Or

14. (a) Explain the operation of 3-phase induction motor when one of its stator windings gets accidentally disconnected during normal working.

(8 marks)

(b) The rotor of a 4 pole, 50 Hz, slip ring induction motor has a resistance of 0.25 Ω per phase and runs at 1440 r.p.m. at full-load. Calculate the external resistance per phase to be added to lower the speed to 1200 r.p.m.., the torque being the same as before.

(4 marks)

15. (a) Discuss how slip ring induction motor operate as synchronous induction motor. What are the different modes of operation ?

(8 marks)

(b) Explain double revolving field theory. (4 marks)

Or

16. (a) Why single-phase induction motor is not self starting ? Explain the working of shaded pole motor. (8 marks)

(b) Explain the torque slip curve of single-phase induction motor. (4 marks)

17. (a) With circuit model and phasor diagram, explain the operation of single-phase series motor. (8 marks)

(b) Write short note on Hysterisis motor. (4 marks)

Or

18. (a) What is the principle of commutator motor ? Explain how e.m.f. is induced in commutator winding of AC commutator machines. (8 marks)

(b) Draw the typical speed torque curve of universal motor of DC and AC supply. (4 marks)

19. Explain the construction and operation of the following :—

(a) Stepper motor. (6 marks)

(b) BLDC motor. (6 marks)

Or

20. (a) Explain the construction and working of switched reluctance motor. (8 marks)

(b) Compare the performance of VR stepper motor and SR motor. (4 marks)

[5 × 12 = 60 marks]