KUMARAGURU
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Register Number:……..

B.E DEGREE EXAMINATIONS: NOV / DEC 2014

(Regulation 2009)

Fourth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

EEE105: Electrical Machines II

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. In a three phase alternator, a field current of 50A produces a full load armature current of 200A on short circuit and 1730 volt on open circuit, then its synchronous impedance is_____ohm.

   a) 8.66 b) 4.33

   c) 5.66 d) 6

2. Two reaction theory method is used for analysis of

   a) Magnetic saturation b) Armature reaction

   c) Disturbance in salient pole construction d) Disturbance in non-salient pole construction

3. Synchronous capacitor is

   a) An ordinary static capacitor bank b) An over excited synchronous motor driving mechanical load

   c) An over excited synchronous motor running without mechanical load d) An under excited synchronous motor driving mechanical load

4. In a synchronous motor, damper winding is provided in order to

   a) Stabilize rotor motion b) Suppress rotor oscillations

   c) Develop necessary starting torque d) Both (b) and (c)

5. A 3-phase 50 Hz induction motor runs at speed of 940 RPM; the speed of the rotating magnetic field will be

   a) 940 RPM b) 1000RPM

   c) 1050 RPM d) 1100 RPM

6. Which of the following rotor quantity in a squirrel cage induction motor does not depend on its slip?
   a) reactance
   b) speed
   c) Induced emf
   d) frequency
7. In a squirrel cage induction motor, torque with autotransformer starter is _____ times torque with direct –switching.
   a) K^2
   b) K
   c) $1/ K^2$
   d) 1/K
8. The speed of an induction motor
   a) Decreases too much with the increase of load
   b) Increase with the increase of load
   c) Decreases slightly with the increase of load
   d) Remains constant with the increase of load
9. The starting winding of a single phase induction motor is placed
   a) rotor
   b) stator
   c) armature
   d) field
10. In reluctance motor, if the rotor is in un-aligned position, then the reluctance torque is,
   a) maximum
   b) minimum
   c) zero
   d) infinity

PART B (10 x 2 = 20 Marks)

11. Why is short pitch winding preferred over full-pitch winding in alternator?
12. What are the conditions for parallel operation of an alternator?
13. List the characteristic features of Synchronous motor.
14. Compare pull- out torque and pull -in torque in synchronous motor.
15. Induction motor can run at synchronous speed? True or false? Explain.
16. A three phase, 4 pole, 50HZ induction motor is running at 1440 rpm. Determine the slip speed and slip.
17. What are the different types of protection, provided in the starter meant for three phase induction motors?
18. What is meant by v/f speed control?
19. Draw the equivalent circuit of single phase induction motor.
20. Give some applications of stepper motor.

PART C (5 x 14 = 70 Marks)

21. a) (i) Explain the phenomena of armature reaction in alternator for different load power factors. (8)

(ii) Find the no-load phase and line voltage of a star connected 3 phase,6 pole alternator which runs at 1200 rpm, having flux per pole of 0.1Wb sinusoidally distributed. Its stator has 54 slots having double layer winding. Each coil has 8 turns and coil is chorded by 1 slot. (6)

(OR)

b) (i) A three phase star connected alternator is rated at 1600K VA, 13500V. The armature resistance and synchronous reactance are 1.5ohm and 30ohm respectively per phase. Calculate the percentage regulation for a load of 1280KW at 0.8 leading p.f (8)

(ii) Explain the construction of salient pole rotor and cylindrical rotor. (6)

22. a) (i) Describe why a synchronous motor does not have starting torque and also explain one method of starting a synchronous motor. (8)

(ii) A 2200V, three phase, star connected, 50Hz, 8 pole synchronous motor has Zs = (0.4+j6) ohm/phase. When the motor runs at no load, the field excitation is adjusted so that E is made equal to V. When the motor is loaded, the rotor is retarded by 3°.Calculate the armature current, p.f, and power of the motor. (6)

(OR)

b) Describe the effect of varying the excitation on the armature current and power factor of a synchronous motor when input power to the motor is maintained constant. (8)

Explain the power developed by a Synchronous motor using vector diagram. (6)

23. a) (i) Draw and explain the equivalent circuit of induction motor from no load and blocked rotor test. (8)

(ii) Derive the condition for maximum running Torque in induction motor. (6)

(OR)

b) Draw the circle diagram for a 5.6 KW,400V.three phase 4 pole,50HZ,slip ring induction motor from the following data:

No load readings: 400V,6A,p.f=0.087

Short circuit test: 100V, 12A, 720W.

The ratio of primary and secondary turns =2.62

R_1 per phase is 0.67 ohm; R2 per phase is 0.185 ohm. Calculate, (i) full load current (ii) full load slip (ii) full load p.f (iii) maximum torque (iv) maximum power.

24. a) (i) Describe the following with neat diagram: (8)

Auto transformer starter

Star delta starter

(ii) Explain the operation of rotor resistance speed control method of induction motor. (6)

(OR)

b) What is slip power? Draw and Explain the operation of slip power recovery schemes on induction motor.

25. a) (i) Explain the operation of single phase induction motor on the basis of double field revolving theory. (8)

(ii) Explain the construction and working of shaded pole induction motor, with neat diagram. (6)

(OR)

b) Write short notes on: (8)

(i) Stepper motor

(ii) Reluctance motor (6)

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