Question Paper Code : 91494

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fifth Semester

Electrical and Electronics Engineering

EE 6504 – ELECTRICAL MACHINES – II

(Regulations 2013)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. What is meant by armature reaction in alternator ?

2. Which method of predetermining the voltage regulation is called optimistic method ? Why ?

3. Why a 3-phase synchronous motor will always run at synchronous speed ?

4. What is meant by 'constant power circle' for synchronous motor ?

5. What is synchronous induction motor ?

6. Define pullout torque.

7. Why is a starter needed for starting a large capacity induction motor ?

8. Define slip power.

9. State double field revolving theory.

10. Identify the category of motor used in ceiling fan.

PART – B   **(5×13=65 Marks)**

11. a) Explain the operating principle of three-phase alternator and derive the emf equation.   **(13)**

(OR)

b) i) Explain how the voltage regulation is predetermined using ZPF method.   **(7)**

ii) Describe about slip test.   **(6)**

12. a) i) Explain V curve and inverted V curve.   **(4)**

ii) Explain different starting methods of synchronous motor.   **(9)**

(OR)

b) i) A 1000 kVA, 11000 V, 3-phase star-connected synchronous motor has an armature resistance and reactance per phase of 3.5 Ω and 40 Ω respectively. Determine the induced emf and angular retardation of the rotor when fully loaded at 0.8 p.f. lagging and 0.8 p.f. leading.   **(6)**

ii) Derive the expression for power delivered by a synchronous motor in terms of load angle (α).   **(7)**

13. a) i) Derive the expression for developed torque in a 3-phase induction motor and find the condition for maximum torque.   **(8)**

ii) Explain construction and working of double cage induction motor.   **(5)**

(OR)

b) i) Develop the equivalent circuit of a 3-phase induction motor.   **(8)**

ii) A 440 V, 3-phase, 50 Hz, 6-pole induction motor running at 960 rpm takes 50 kW at a certain load. The friction and windgage loss is 1.8 kW. The stator losses are 1.2 kW. Calculate the

1) The rotor copper loss,

2) The output from the rotor and

3) Efficiency of the motor.   **(5)**

14. a) Explain the speed control of a 3 phase induction motor using V/f control.   **(13)**

(OR)

b) Explain the speed control of 3 phase induction motor with slip power recovery scheme.   **(13)**

15. a) i) Explain the operation of a single phase induction motor using double field revolving theory. (7)

   ii) Discuss with neat diagram the operation of shaded pole IM. (6)

(OR)

   b) Explain the construction and working principle of
   i) A.C. Series motor (6)
   ii) Hysteresis motor. (7)

PART – C   (1×15=15 Marks)

16. a) Explain with a neat diagram and clear steps how to construct a circle diagram for a 3φ induction motor. Also enumerate the procedure involved in obtaining its performance. (15)

(OR)

   b) i) Construct the phasor diagram of non-salient pole synchronous generator connected to infinite bus. (8)

   ii) Discuss the construction and working of Repulsion motor. (7)

15. a) i) Explain the operation of a single phase induction motor using double-field revolving theory. (4)

ii) Discuss with neat diagram the operation of shaded pole [4]

(OR)

b) Explain the construction and working principle of

i) A.C. Series motor (8)

ii) Synchronous motor (7)

PART – C (1×15=15 Marks)

16. a) Explain with a neat diagram and clear steps how to construct a circle diagram for a 3-φ induction motor. Also enumerate the procedure involved in obtaining its performance. (15)

(OR)

b) i) Construct the phasor diagram of non-salient pole synchronous generator connected to infinite bus. (8)

ii) Discuss the construction and working of Stepper motor. (7)