Reg. No. : | | | | | | | | | | |

Question Paper Code: 44302

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Fourth Semester

Electrical and Electronics Engineering

14UEE402 - AC MACHINES

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. In a 3phase induction motor, the rotor field rotates at synchronous speed with respect to

   (a) Stator (b) Rotor
   (c) Stator flux (d) None of these

2. In the circle diagram for induction motor, diameter of the circle represents

   (a) Slip (b) Rotor current
   (c) Running Torque (d) Line Voltage

3. When rotor is at standstill

   (a) Slip is zero (b) Slip is one
   (c) Any slip (d) Slip is infinity

4. No load test is conducted at

   (a) High voltage (b) Rated current
   (c) High current (d) Rated voltage

5. The power factor of an alternator depends on

   (a) Load (b) Speed of rotor
   (c) Core losses (d) Armature losses

6. In a synchronous generator, delivering lagging power factor load
   (a) The excitation emf leads terminal voltage by the power angle
   (b) The excitation emf lags terminal voltage by the power angle
   (c) The excitation emf leads terminal voltage by the power factor angle
   (d) None of these

7. Synchronous motor can operate at
   (a) Lagging power factor only
   (b) Leading power factor only
   (c) Unity power factor only
   (d) Lagging, leading and unity power factor only

8. The maximum power developed in the synchronous motor will depend on
   (a) rotor excitation only
   (b) maximum value of coupling angle
   (c) supply voltage only
   (d) rotor excitation supply voltage and maximum value of coupling angle

9. Which type of motor suitable for a computer printer drive?
   (a) Reluctance motor (b) Hysteresis motor
   (c) Shaded pole motor (d) Stepper motor

10. Out of the following motors, which will give the highest starting torque?
   (a) Universal motor (b) Capacitor start motor
   (c) Shaded pole motor (d) All have zero starting torque

PART - B (5 x 2 = 10 Marks)

11. A 50 *Hz*, 6 pole, 3–phase induction motor runs at 970 *rpm*. Find slip?

12. What are the starting methods used in three phase induction motor?

13. Define hunting of alternator.

14. What is meant by hunting?

15. What are the starting methods of single phase induction motor?

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Explain the principle of operation of 3-phase induction motor and explain how the rotating magnetic field is produced by three-phase currents. (8)

(ii) A 50 *HP*, 6–Pole, 50 *Hz*, slip ring induction motor runs at 960 *rpm* on full load with a rotor current of 40 *A*. Allow 300 *W* for copper loss in S.C. and 1200 *W* for mechanical losses, find R_2 per phase of the 3- phase rotor. (8)

Or

(b) How the losses and efficiency of three phase induction motor can be calculated. Illustrate with necessary diagram and equations. (16)

17. (a) Explain the starting of induction motors using star- delta starter with necessary diagram and also mention the precaution with star- delta starter. (16)

Or

(b) (i) With neat diagrams, explain the slip power recovery schemes as applied to wound rotor induction motors. (8)

(ii) With the aid of diagrams, explain the principle of the following methods of speed control of a three phase induction motor:

(1) Variable frequency

(2) Pole changing (8)

18. (a) Derive the emf equation of Synchronous Generator. (16)

Or

(b) (i) Describe the Potier method of determining the regulation of an alternator. (8)

(ii) Describe a method of determining direct and quadrature axis reactance of salient pole alternator. (8)

19. (a) Derive the torque equation of synchronous motor. (16)

Or

(b) (i) What are constant excitation circles and constant power circle for a synchronous motor? How are they derived? (10)

(ii) Write short notes on synchronous condenser. (6)

20. (a) Explain double field revolving theory and cross field theory. (16)

Or

(b) Explain the construction and working of following motors:

(i) Reluctance motor. (8)

(ii) Hysteresis motor. (8)