A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 54302

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Fourth Semester

Electrical and Electronics Engineering

15UEE402- AC MACHINES

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. A SCIM runs at constant speed only so long as CO1-R

   (a) Stator flux remains constant

   (b) Its torque exactly equals the mechanical load

   (c) Its supply voltage remains constant

   (d) Torque developed by it remains constant

2. If the frequency of input power to an induction motor increases, the rotor copper loss CO1-R

   (a) Decreases (b) Increases (c) Remains the same (d) None of these

3. The drawback of speed control of a slip ring induction motor with the help of resistance in the circuit is that CO2-R

   (a) It is applicable only to motors having power of more than 100 kW

   (b) It results in high losses

   (c)With reduction in speed, the torque decreases significantly

   (d) The speed can be controlled only very broadly

4. In an induction motor, rotor runs at a speed CO2-R

   (a) Equal to the speed of stator field

   (b) Lower than the speed of stator field

   (c) Higher than the speed of stator field

   (d) Having no relation with the speed of stator field

5. How many poles will be required if an alternator runs at 1500 rpm and given frequency of 50 Hz? CO3-R

(a) 8 pole (b) 6 pole (c) 4 pole (d) 2 pole

6. The power factors of an alternator is determined by its CO3-R

(a) Speed (b) Load (c) Excitation (d) Prime mover

7. When a 3-phase synchronous motor is switched on, there exists a rotating magnetic field. The magnitude of this field flux CO4-R

(a) Varies with power factor (b) Varies with load

(c) Is constant at all loads (d) None of these

8. The back emf set up in the stator of synchronous motor depends on CO4-R

(a) Speed of the rotor (b) Input to prime mover

(c) Rotor excitation (d) Coupling angle

9. A capacitor start single phase induction motor will usually have power factor of CO5-R

(a) Unity (b) 0.6 leading (c) 0.8 leading (d) 0.6 lagging

10. All single phase motors have CO5-R

(a) Large starting torque (b) Zero starting torque

(c) Medium starting torque (d) Very small starting torque

PART – B (5 x 2= 10Marks)

11. Why slots on the rotor of an Induction Motor are skewed? CO1-U

12. Mention different types of speed control of slip ring induction motor. CO2-R

13. What are the causes of changes in voltage of alternators when loaded? CO3-R

14. Why a 3-phase synchronous motor will always run at synchronous speed? CO4-U

15. List some applications of linear induction motor. CO5-R

PART – C (5 x 16= 80 Marks)

16. (a) Draw the slip-torque characteristics for a three-phase induction motor and explain. CO1-R (16)

Or

(b) Draw the circle diagram for a 5 HP ,200 V, 50 Hz ,4 pole , 3 phase star connected induction motor for the following data: CO1-App (16)

(i)200 V,5 A,300 watts

(ii) 100 V,26 A,1700 watts

(iii) Rotor copper losses at standstill = half of the total copper loss.

Estimate the full load current, power factor, speed and torque.

17. (a) With neat diagrams explains the working of any two types of starters used for squirrel cage type 3 phase induction motor. CO2-R (16)

Or

(b) Explain the cascade operation of induction motors to obtain variable speed. CO2-Ana (16)

18. (a) What is an armature reaction? Explain the effect of an armature reaction on the terminal voltage of an alternator at CO3-Ana (16)

(i) unity power factor load and

(ii) zero leading power factor load.

Draw the relevant phasor diagrams.

Or

(b) Describe the slip test for the measurement of X_d and X_q of synchronous machine. CO3-Ana (16)

19. (a) Explain briefly the construction and principle of operation of three-phase synchronous motor. CO4-U (16)

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. CO4-Ana (16)

20. (a) Explain the double field revolving theory for operation of single phase induction motor. CO5-U (16)

Or

(b) Explain the principle of operation and applications of repulsion motor and hysteresis motor. CO5-U (16)

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