Reg. No. :

Question Paper Code: 31432

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2016

Fourth Semester

Electrical and Electronics Engineering

01UEE402 - AC MACHINES

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Define slip of three phase induction motor.

2. Why are the rotor slots of a 3 phase induction motor skewed?

3. Why are most of the 3-phase induction motors constructed with delta connected stator winding?

4. While controlling the speed of an induction motor, how is super-synchronous speed achieved?

5. Two reaction theory is applied only to salient pole machines. State the reason.

6. A 3-phase star connected salient pole synchronous generator is driven at a speed near synchronous with the field circuit open and the stator is supplied from a balanced 3-phase supply. Voltmeter connected across the line gave minimum and maximum readings of 2800 V and 2820 V. The line current fluctuated between 360 A and 275 A. Find the direct and quadrature axis reactance per phase. Neglect armature resistance.

7. Why is the field system of an alternator made as a rotor?

8. What is V curve?

9. How is the direction of rotation of a single phase induction motor reversed?

10. Name the motor being used in ceiling fans.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Derive an expression for the torque of an induction motor and obtain the maximum torque. (8)

    (ii) Derive the torque slip characteristics of three phase induction motor and explain. (8)

Or

    (b) (i) Deduce the equivalent circuit of an 3 phase induction motor. (10)

    (ii) An eight pole, 3-phase induction motor running with the slip of 4% takes 20 KW from a 50 Hz supply. Stator losses amount to 0.5 KW. If the mechanical torque lost in friction is 16.2 Nm, Find the power output and efficiency. (6)

12. (a) (i) Explain the tests required to be performed to obtain the data for the circle diagram and give the steps to draw the circle diagram . (8)

    (ii) Describe in detail the braking methods of three phase induction motor. (8)

Or

    (b) Explain the following methods of speed control scheme

        (i) Cascaded connection (8)

        (ii) Slip power recovery scheme (8)

13. (a) (i) Describe the method of determining the voltage regulation of an alternator by synchronous impedance method. (8)

    (ii) A 4 pole, 50 Hz star connected alternators has a flux per pole of 0.12 Wb. It has 4 slots per pole per phase and conductors per slot are 4. If the winding coil span is 150 degrees, find the emf. (8)

Or

    (b) (i) Derive the EMF equation of an alternator. (8)

    (ii) Describe the method of synchronising the three phase alternator to the infinite bus giving the relevant circuit diagram. (8)

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14. (a) (i) Draw the equivalent circuit and phasor diagram of a synchronous motor. (8)

(ii) Explain the significance of V and Inverted V curves. (8)

Or

(b) (i) Describe the principle of operation of synchronous induction motor. (8)

(ii) Explain with necessary diagrams the principle of operation and characteristics of double cage induction motor. (8)

15. (a) (i) Explain linear induction motor. (8)

(ii) Explain Hysteresis motor. (8)

Or

(b) (i) Using double field revolving theory explain why single phase induction are not self-starting and also deduce the equivalent circuit for the same with relevant equations. (8)

(ii) Explain any two starting methods of single phase induction motors. (8)

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