

SE203 - Electrical Machines-II

P. Pages : 2

Time : Three Hours



GUG/W/24/13858

Max. Marks : 80

-
- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.
 5. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.

1. a) What do you mean by distributed winding? What is its necessity? Define distribution factor & hence derive equation for the same. **8**
- b) A 3 phase, 16 pole star connected alternator has 144 slots an armature. Each slot has 10 conductors per slot. The coil span is 120° . Electrical. Find Pitch factor and distribution factor. **8**

OR

2. a) Write short notes on: **8**
- i) Short Pitch Coils
 - ii) Full Pitch Coils
 - iii) Concentrated Winding
 - iv) Distributed Windings
- b) A 4-pole ac machine has a 3-phase winding wound in 60 slots. The coils are short pitched in such a way that if one coil side lies in slot number 1, the other side of the same coil lies in slot no. 13. Calculate the winding factor for
- i) Fundamental
 - ii) Third harmonic and
 - iii) Fifth harmonic frequency waveform
3. a) Explain concept of rotating magnetic field for 2 pole machine. **8**
- b) A 3 phase, 6 pole, 50 Hz induction motor has a slip of 1% at no. Load and 3% at full Load. Determine: (a) synchronous Speed; (b) No Load Speed; (c) Full Load Speed; (d) Frequency of Rotor Current at Standstill; (e) Frequency of Rotor Current at Full Load. **8**

OR

4. a) Prove that The Resultant Flux at in instant for Rotating Magnetic Field is 1.5 times the Maximum Flux. **8**

- b) Derive the relation between input, rotor copper losses and mechanical power developed in terms of a slip of a three phase induction motor. 8
5. a) A 746 KW, 3 phase, 50 Hz, 16 Pole induction motor has a rotor impedance of $(0.02 + j0.15)$ ohm at standstill. Full load torque is obtained at 360 r.p.m. Calculate (a) the speed at which maximum torque occurs; (b) the ratio of maximum to full load torque; (c) the external Resistance per phase to be inserted in the rotor circuit to get maximum torque at starting. 8
- b) Explain with neat sketch construction of 3 phase Induction Motor. 8

OR

6. a) Derive the Torque Equation of 3 phase Induction Motor also Derive the condition of Maximum torque. 8
- b) Develop an equivalent circuit of a 3 phase induction motor. What do the various parameters represent? Represent the approximate equivalent circuit and state its significance. 8
7. a) Explain Equivalent Circuit of Single Phase Induction Motor. 7
- b) Explain double field revolving theory and hence show that the single phase induction motors are not self starting. How can it be made self starting? 9

OR

8. a) Explain construction of single phase induction motor. 8
- b) Explain any three split phase induction motor starting method. 8
9. a) Derive the phasor diagram of a cylindrical rotor alternator. What is the effect of armature reaction and how it is included in the phasor diagram for lagging, unity and leading power factor load? 8
- b) Explain the difference between salient pole and cylindrical pole synchronous machines. 8

OR

10. a) What do you mean by Voltage Regulation of Alternator? Describe any one method to determine Voltage Regulation. 8
- b) A 3 Phase, 50 Hz, 16 Pole star connected alternator has a stator winding with 144 slots with 10 conductors/slot. The magnetic flux/pole is 0.03 webers and is sinusoidally distributed in space. The coil pitch of the winding is 8 slots. Estimate the E.M.F. induced between the lines of the alternator. 8
