

B.E. / B.Tech. Electrical (Electronics & Power) Engineering (Model Curriculum) Semester-IV
SE203 - Electrical Machines-II

P. Pages : 2



Time : Three Hours

GUG/S/25/13858

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) Derive the Expression for Distribution Factor and Coil span factor. 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) Define 4
- | | |
|---------------------------|--------------------------|
| i) Short Pitch Coils | ii) Full Pitch Coils |
| iii) Concentrated Winding | iv) Distributed Windings |
- b) How will you reduce 13th order harmonics by using short pitch winding. 4
- c) 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 8
- | |
|---|
| i) Fundamental |
| ii) Third harmonic and |
| iii) Fifth harmonic frequency waveform. |

- 3.** a) Explain with neat Diagram 8
- | | |
|-----------------------------|------------------------------|
| i) Pulsating magnetic field | ii) Constant magnetic field. |
|-----------------------------|------------------------------|
- b) A 3 phase, 6 Pole, 50 Hz Induction motor has a slip of 1% at no Load and 3% at full Load. Determine: 8
- 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.

OR

- 4.** a) Explain concept of rotating magnetic field for 4 pole Machine. 8
- b) Prove that The Resultant Flux at in instant for Rotating Magnetic Field is 1.5 times the Maximum Flux. 8

5. a) A 746 KW, 3 Phase, 50 Hz, 16 Pole induction motor has a rotor impedance of $(0.02 + j 0.15)$ 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 Diagram Construction of three phase Induction motor. 8

OR

6. a) Draw and explain a typical torque-speed characteristic for a 3 phase induction motor. Explain the relation between torque and slip before and after the maximum torque. Show the stable region in the graph. 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 Construction of single phase induction motor. 8
- b) Explain double field revolving theory and hence show that single phase induction motors are not self starting. How can it be made self starting. 8

OR

8. a) Explain Equivalent circuit 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? 10
- b) Explain the hunting of a synchronous motors, What is the purpose of damper winding in synchronous machine. 6

OR

10. a) What do you mean by voltage regulation? Derive condition for maximum voltage regulation and zero voltage regulation? 8
- b) A 3ϕ , 16 pole, 60 Hz, star connected alternator has 144 slots with a 3 conductors/slot. The coil span is $2/3$ of pole pitch. Determine phase and line emfs, if the flux per pole is 0.062 Wb. 8
