Basic Electrical and Electronics Engineering

Assignment-04

DC Machines

Short Questions

1. Write down the different method of excitations seen in DC machines.
2. A DC shunt motor develops 200V on no load, while running at 1200RPM. If the machine has 4-pole and 100 lap wound armature Conductors, calculate the flux per pole.
3. What is the function of Brush and Commutator in DC machines?
4. Describe the various methods of excitation provided in d.c. machines.

Long Questions

1. Explain the principle of DC generator and hence derive the expression for generated EMF.
2. 6-pole DC. shunt generator has 1500 armature conductors in six parallel paths. The average flux per pole in the air gap is 0.065 Weber. Calculate the generated EMF if the generator runs at a speed of 1500 RPM with the help of a prime mover.
3. Explain the construction and working of a DC machine.
4. A 6-pole lap connected generator has a useful flux/pole of 0.045 Wb. If the no load voltage at 400 rpm is 300V, find the number of conductors on the armature periphery.
5. An 8-pole wave connected DC generator has 1000 armature conductors and flux/pole is 0.035 Wb. At what speed must it be driven to generate 500V.
6. The armature of a 6-pole DC generator has a wave winding containing 650 conductors. Calculate the generated emf when the flux per pole is 0.055 Wb and the speed is 300 rpm.Calculate the speed at which the armature must be driven to generate an emf of 550 V if the flux per pole is reduced to 0.05Wb.

Single Phase Transformer

Short Questions

1. What is a transformer? How does it transfer electric energy from one circuit to another?
2. Why the core of a transformer is laminated?
3. Why silicon sheet of steel is used in the transformer core?
4. Which parameter in a transformer does not change?
5. A single phase transformer develops 200V at the secondary terminals on no load condition. If the secondary winding has 1000 turns, find the maximum flux in the core. Assume a 30V, 50 Hz single phase in the primary.

6. A transformer with 40 turns on high voltage winding is used to step down the voltage from 240V to 120V. Find the number of turns in low voltage winding.

Long Questions

1. State and explain working principle and construction of a 1-phase Transformer.
2. A 220/20V transformer has 50 turns on its low voltage side.
   Calculate
   i. The number of turns on the high voltage side?
   ii. The turn ratio when it is used as step down transformer?
   iii. The turn ratio when it is used as step up transformer?
3. Derive an e.m.f equation of a single phase transformer. Also find out transformation ratio of the transformer and explain each term briefly.
4. A 25KVA single phase transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000V, 50 Hz supply. Find the full load primary and secondary currents, the secondary e.m.f and maximum flux in the core. Neglect leakage drops and no load primary currents.
5. A single phase, 50Hz transformer has 80 turns on primary winding and 400 turns on secondary winding. The net cross-sectional area of the core is 200 cm^2. If the primary winding is connected to 240V, 50Hz supply, detremine a) e.m.f induced in secondary winding b) Maximum value of flux density in the core.
6. The primary of a single phase transformer is connected to 200V, 50 Hz supply. If the flux in the core is 12mWb, what is the no of turns in the primary? How many no of turns required in the secondary to obtain a voltage of 110V?
7. A single phase Transformer is connected to a 230V, 50Hz supply. The net cross sectional area of the core is 60cm2. The number of turns in the primary is 500 and in the secondary is 100. Determine (i) Transformation ratio (ii) EMF induced in the secondary winding (iii) Maximum value of the flux density in the core.
8. A 3300/300 single phase 300kVA transformer has 1100 primary turns. Find (i) Transformation Ratio (ii) Secondary turns (iii) Voltage per turn (iv) secondary current when it supplies a load of 200 kW at 0.8 power factor lagging.