MODAL ANSWER PAPER

Subject: - Electric Machine

Subject Code: - 4E4175

Year & Semester: - 2nd year & 4th Sem.

Q.1. Define voltage regulation transformer. (1)

Ans. The voltage regulation of the transformer is the percentage change in the output voltage from no-load to full-load. And since power factor is a determining factor in the secondary voltage, power factor influences voltage regulation. This means the voltage regulation of a transformer is a dynamic, load-dependent number.

Q.2. What is meant by 'Torque angle'? (1)

Ans. Torque angle: For a synchronous generator, the magnetic field rotates at synchronous speed and the rotating magnetic field is created in the stator. These two fields are not fully aligned. The stator field lags the rotating field. This lagging expressed in angle is called Torque angle.

Q.3. What is cogging of an induction motor? (1)

Ans. When the number of stator and rotor teeth's is equal or integral multiple of rotor teeth, they have a tendency to align themselves exactly to minimum reluctance position. Thus the rotor may refuse to accelerate. This phenomenon is known as cogging.

Q.4. What are conditions for parallel operation of alternators? (2)

Ans. The conditions to be satisfied are:

1. The phase sequence of the incoming machine voltage and the bus bar voltage should be identical.
2. The RMS line voltage (terminal voltage) of the bus bar or already running machine and the incoming machine should be the same.
3. The phase angle of the two systems should be equal.
4. The frequency of the two terminal voltages (incoming machine and the bus bar) should be nearly the same. Large power transients will occur when frequencies are not nearly equal.

Q.5. Explain single-phase induction motor principle. (5)

Ans. A single-phase induction motor consists of a single-phase winding mounted on a stator and a cage winding on the rotor. When a single-phase supply is connected to the stator winding a pulsating magnetic field is produced. By pulsating field we mean that the field builds up in one direction, falls to zero, and then builds up in the opposite direction. Under these conditions, the rotor does not rotate due to inertia. Therefore, a single-phase induction motor is inherently not self-starting and requires some special starting means. If, however, the single-phase stator winding is excited and the starting device is then removed, the motor continues to rotate in the direction in which it is started.Two theories have been suggested to analyse the performance of a single-phase induction motor, namely the double-revolving field theory and the cross field theory. Both the theories are fairly complicated, neither has any advantage over the other in numerical calculations. Almost similar results are obtained with both the theories. These two theories explain why torque is produced in the rotor once it is turning.