

2 MARKS QUESTION AND ANSWERS

DC GENERATORS

1. What is the function of carbon brush used in DC generator?

The function of carbon brush is to collect current from the commutator and supply to the external load circuit and to the field circuit.

2. Distinguish between lap winding and wave winding used in dc machine.

- Lap winding is designed for high current and low voltage machines
- Wave winding is designed for low current and high voltage machines

3. Write the number of parallel paths in a lap and wave connected windings

In a lap wound machine, the number of parallel paths is equal to the number of poles. But in wave wound machine, the number of parallel paths is always two irrespective of number of poles.

4. Name the three things required for the generation of emf.

- Presence of armature conductors
- Presence of magnetic field
- Relative motion between conductor and magnetic field

5. What is meant by self excited and separately excited dc generator?

- Self-excited generator are those whose field magnets are energized by the current produced by the generator themselves
- Separately excited generator are those whose field magnets are energized from an independent external source of dc current

6. What is the basic difference between dc generator and dc motor?

Generator converts mechanical energy into electrical energy. Motor converts electrical energy into mechanical energy. But there is no constructional difference between the two.

7. Write down the emf equation of dc generator. Give the meaning of each symbol

$$\text{Emf induced } E = \Phi ZNP/60A \text{ (Volts)}$$

where

Φ = Flux per pole in Weber

Z = Total number of armature

conductors N = Speed of armature in rpm

P = Number of poles

A = Number of parallel paths

8. What is pole pitch?

The periphery of the armature is divided for a number of poles of the generator. The

center to center distance between two adjacent poles is called pole pitch. It is also equal to the number of armature slots or armature conductors per pole.

9. How can the voltage in a DC generator be increased?

Increasing the main field flux and the speed of the armature can increase the voltage in a DC generator.

10. What is critical resistance of a DC shunt generator?

The value of resistance of shunt field winding beyond which the shunt generator fails to build up its voltage is known as "critical resistance".

11. What are the conditions to be fulfilled for a shunt generator to build up voltage?

- a) There must be some residual magnetism in the field poles.
- b) The shunt field resistance should be less than critical resistance.
- c) The field coils should be connected with the armature in such a way that current flowing through them should increase the emf induced by the residual magnetism.

12. What do you mean by residual flux in DC generator?

The magnetic flux retained in the poles of the machine even without field supply is called the residual flux.

13. A DC generator fails to self excite. List the cause for the failure for the failure.

- a) Residual magnetism may not be there in the poles
- b) Direction of rotation may be wrong
- c) The field resistance may be more than critical resistance
- d) There may be disconnection in the field winding
- e) Brush contact may be poor
- f) The field coils may be connected with the armature to oppose the emf due to residual magnetism

14. What are open circuit characteristics of DC shunt generator?

It is the relation between the field current and the emf induced in the armature.

15. How can one differentiate between long shunt compound generator and short shunt compound generator?

In a short shunt compound generator the shunt field circuit is shorter i.e. across the armature terminals. In a long shunt compound generator the shunt field circuit is connected across the load terminals.

16. Why is the emf not zero when the field current is reduced to zero in a dc generator?

Even after the field current/magnetizing force is reduced to zero the machine is left out with some flux as residue. Emf due to this residual flux is available when field current is zero.

17. Define the term 'critical speed' in dc shunt generator.

Critical speed is defined as the speed at which the generator is to be driven to cause self-excited generator to build up its emf for the given field circuit resistance.

18. On what occasions dc generators may not have residual flux?

- The generator may be put for its first operation after its construction
- In previous operation the generator would have been fully demagnetized

19. How the critical field resistance of a dc shunt generator is estimated from its OCC?

Critical field resistance can be obtained from OCC by drawing a straight line passing through the origin and tangent to the initial straight line portion of OCC. The slope of this line gives the value of critical field resistance for the given speed at which OCC is obtained.

20. Define the term armature reaction in dc machines.

The interaction between the flux set up by the current carrying armature conductors with the main field flux is defined as armature reaction.

21. What are the two unwanted effects of armature reaction?

- Cross magnetizing effect / Distorting effect
- Demagnetising effect

22. Differentiate between geometric neutral axis (GNA) and magnetic neutral axis (MNA).

GNA is the axis which is situated geometrically or physically in the mid way between adjacent main poles. MNA is the axis which passes through the zero crossing of the resultant magnetic field waveform in the air gap.

23. In which part of the dc machine is the compensating winding situated?

In the slots provided in the main pole phases.

24. What are the various types of commutation?

- Linear commutation
- Sinusoidal commutation

25. Name the two methods of improving commutation.

- Emf commutation
- Resistance commutation

26. What is reactance emf in dc machine?

The self induced emf in the coil undergoing commutation which opposes the reversal of current is known as reactance emf.

27. Define the term commutation in dc machines.

The changes that take place in winding elements during the period of short circuit by a brush is called commutation.

28. How and why the compensating winding in dc machine excited?

As the compensation required is proportional to the armature current the compensating winding is excited by the armature current.

29. How is the interpole winding in dc machine excited?

Interpole winding is connected in series with the armature circuit and is excited by the armature current.

30. To what polarity are the interpoles excited in dc generators?

The polarity of the interpoles must be that of the next main pole along the direction of rotation in the case of generator.

31. Why are carbon brushes preferred for dc machines?

The high contact resistance carbon brushes help the current in the coil undergoing commutation to attain its full value in the reverse direction at the end of commutation. The carbon brushes also lubricate and give less wear and tear on commutator surface.