DEPARTMENT OF ELECTRICAL ENGINEERING

QUESTION BANK ON

ENERGY CONVERSION-I

(4th Semester)

Question Bank On
ENERGY CONVERSION-1

D.C. MACHINES

[1] Voltage equation of a dc motor is

A. **V = Eb + IaRa**
B. Eb = V + IaRa
C. V = Eb/IaRa
D. V = Eb + Ia2Ra

[2] Both Hopkinson's test and Field test

A. Require two electrically coupled series motors
B. **Need two similar mechanically coupled motors**
C. Use negligible power
D. Are regenerative tests

[3] which of the following motor has the constant speed?

A. Series motor
B. **Shunt motor**
C. Cumulatively compound motor
D. All of the above

[4] The usual test to find the efficiency of the traction motor is

A. **Field's test**
B. Retardation test
C. Hopkinson's test
D. Swinburn's test

[5] A DC series motor is best for driving

A. Lathes
B. **Cranes and hoists**
C. Shears and punches
D. Machine tools

[6] Retardation test on a dc shunt motor is used for finding

A. **Stray loss**
B. Copper loss
C. Friction loss
D. Iron loss

[7] In a DC series motor increasing the load current will

A. **Decrease the speed**
B. Increase the speed
C. Better commutation
D. Increase the back emf

[8] One of the main advantage of the swinburn's test is

A. It is applicable both shunt and compound motors

B. It needs one running test

C. **It is very economical and convenient**

D. It ignores any charge in iron loss

E.

[9] the main disadvantage of hopkinson's test for finding efficiency of shunt dc motors is that it

A. Requires full load power

B. Ignores any change in iron loss

C. Needs one motor and one generator

D. **Requires two identical shunt machines**

E.

[10] The most economical method of finding no losses of a large dc shunt motor is

A. Hopkinson's test

B. **Swinburn's test**

C. Retardation test

D. Field's test

D.C. MOTOR

[1] The basic requirement of a dc armature winding is that it must be
- A. **a closed one**
- B. a lap winding
- C. a wave winding
- D. either b or c

[2] The sole purpose of a commutator in a dc generator is to
- A. increase output voltage
- B. reduce sparking at brushes
- C. provide smoother output
- D. **convert the induced ac into dc**

[3] In small DC machines, armature slots are sometimes not made axial but are skewed, results in
- A. quieter operation
- B. slight decrease in losses
- C. saving of copper
- D. **both a and b**

[4] The critical resistance of the dc generator is the resistance of
- A. armature
- B. **field**
- C. load
- D. brushes

[5] In a dc generator, the generated emf is directly proportional to the
- A. field current
- B. **pole flux**
- C. number of armature parallel paths
- D. number of dummy coils

[6] The commutation process in a dc generator basically involves
- A. passage of current from moving armature to a stationary load
- B. **reversal of current in an armature coil as it crosses MNA**
- C. conversion of ac to dc
- D. suppression of reactance voltage

[7] The essential condition for stable parallel operation of two dc generators having similar characteristics is that they should have
- A. same kilowatt output ratings
- B. **dropping voltage characteristics**
- C. same percentage regulation
- D. same no load and full load speed

[8] An ideal dc generator has……voltage regulation.
- E. low
- F. **zero**
- G. positive
- H. negative

[8] Which generator has poorest voltage regulation

A. **series**
B. shunt
C. compound
D. high

[9] The voltage regulation of an over compound dc generator is always

A. Positive
B. negative
C. zero
D. high

Long quesions

Q1: Explain the Construction, in detail, of 1-phase transformer with neat diagram.

Q2: Explain the basic principle of working of DC Machine and drive the EMF equation.

Q3: Describe the advantages of using small DC Generator in parallel over the use of single large generator. Explain various conditions to be fulfilled for parallel operation of DC Generator.

Q4: Explain, in detail, armature reaction in DC machine with suitable diagrams and its effects on the performance of DC machine. How it is minimized?

Q5: Draw OCC, Internal and external characteristics of

(1) D.C Shunt Generator
(2) D.C Series Generator
(3) Compound Generator

Which characteristics is more suitable for traction purpose and why?

Q6: Explain the parallel operation of followings with suitable diagrams and Characteristics Curves

(1) DC Compounded Generator
(2) DC Shunt Generator

Q7: Draw the torque vs speed and armature current vs speed characteristics of

(1) D.C shunt motor
(2) D.C Series motor
(3) Compound motor

Which characteristics is more suitable for traction purpose and why?

Q8: Write short notes on following

(1) Armature reaction in DC motor and few remedies to adverse its effects
(2) Ward-Leonard Method
(3) Drive Torque Equation of DC motor

Q9: Why is electric braking of electric motor superior to mechanical braking? How is dynamic braking of D.C shunt motor done?

Q10: Explain various method for speed control of

(1) D.C shunt motor
(2) D.C Series motor

Q11. Explain the principle of operation of DC motor and drive the torque equation of a DC motor

Q12. Write the advantage and disadvantage of parallel operation of transformer

Q13. Explain the V-V connection for 3 phase transformer. Prove that in V-V connection each transformer will supply 57.7% of the load. The parameter of the equivalent circuit of a 150-KVA, 2400/240 V transformer are:

$R_1 = 0.2\ \Omega$ $R_2 = 2x10^{-3}\Omega$

$X_1 = 0.45\ \Omega$ $X_2 = 4.5x10^{-3}\Omega$

$R_i = 10\ K\Omega$ $X_m = 1.6\ K\Omega$ (as seen from 2400 V side)

Calculate:

1. Open-circuit current, power and pf when LV is excited at rated voltage
2. The voltage at which the HV should be excited to conduct a short-circuit test (LV shorted) with full load current flowing. What is the input power and its pf?

Q14. Explain the Construction, in detail, of DC Machine with neat diagram

Q15. A 100 KVA, 50 Hz, 440/11000 V, 1-phase transformer has an efficiency of 98.5% when supplying full-load current at 0.8 power factor lagging and an efficiency of 99% when supplying half full load current at unity power factor. Find the core losses and the copper losses corresponding to full-load current. At what value of load current will the maximum efficiency be attained?

Q16. Write the advantage and disadvantage of auto-transformer.

Q17. A 3-phase stepdown transformer is connected to 6600 volts mains and takes 10 A. Calculate the secondary line voltage, line current and output for the following connections.

Δ-Δ; Y-Y; Δ-Y; Y-Δ

The ratio of turns per turns per phase is 12. Neglect losses.

Q18. Why is electric braking of electric motor superior to mechanical braking? Explain, in detail various types of braking used in DC motor

Q19. Explain in detail following

a) Swinburne's test
b) Hopkinson test
c) Retardation test.

Q20. Explain

a) Differentiate between core and shell type transformer

b) Why transformer is rated in KVA not in KW?

c) Draw OCC and Internal characteristics of D.C Shunt Generator

d) Drive the induced EMF equation of a transformer. What is Voltage Regulation?

e) Draw the Exact phasor diagram of Transformer on full load.

Q21. Explain

a) Draw the Exact phasor diagram of Transformer on full load

b) What are the various losses in the transformer?

c) What are the conditions for satisfactory parallel operation of 1-φ transformer?

d) Write a short note on lap and wave winding

e) Write the characteristics of an ideal transformer

Q22. Explain, in detail, armature reaction in DC machine with suitable diagrams and its effects on the performance of DC machine. How it is minimized?

Q23. A transformer has its maximum efficiency of 0.98 at 15 kVA at unity pf. Compare its all-day efficiencies for the following load cycles:

a. Full load of 20 kVA 12 hours/day and no-load rest of the day.
b. Full load 4 hours/day and 0.4 full-load rest of the day.

Assume the load to operate on unity pf all day.

Q24. Write:

a) SCOTT connection for phase conversation in transformer
b) Ward –Leonard method for speed control of DC motor
c) Dynamic braking of D.C shunt motor.

Q25. Explain the Need of Starter in DC motors. Explain 3-point and 4-point Starter