QUESTION BANK (Descriptive)

Subject with Code : DC Machines and Transformers (19EEB201)

Course & Branch: B.E–EEE Year & Sem: II &III-Sem

UNIT – I

D.C GENERATORS

PART A

1. Describe the working principle of operation of a DC generator.
2. Give the essential parts of DC generator.
3. Classify the different types of DC generators.
4. Sketch the external characteristics of a DC series generator.
5. Give the function of commutator in a DC machine.
6. What is the function of interpoles? 1 Remember
7. What is armature reaction? Mention its effects in DCmachines?
8. Write the conditions which determines if a DC machine is generating or Motoring.
9. Write the induced EMF equation when the machine act as DC motor and DC generator.

PART B

1. Explain the basic principle of operation of a DC Generator with a simple loop generator?
2. (a) How demagnetizing and cross magnetizing ampere turns per pole are calculated in a DCMachine?

(b)The brushes of a certain lap connected 400kw, 6-pole generator are given a lead of 18oelectrical. From the data given, calculate (i) the demagnetizing ampere-turns (ii) the cross-magnetizing ampere-turns (iii) series turns required to balance the demagnetizing component. The full load current is 750A and total number of conductors are 900 and the leakage coefficient is 1.4.

3. (a) Deduce an expression for e.m.f equation of DC Generator?

(b)An 8-pole lap connected armature has 960 conductors, a flux of 40 m Wb per pole and a speed of 400 r.p.m. Calculate the emf generated on open circuit. If the armature were wave connected, at what speed it must be driven to generate 400 V.

4. A DC Compound Generator has 110V as terminal voltage. The armature resistance, shunt field Resistance and series field resistance are 0.06Ω, 25Ω and 0.04Ω respectively. The load consists of 200A which rated at 55W. Find the total emf generated and armature current when the machine is connected as (i) Long Shunt (ii) Short Shunt.

5. (a)What are the causes for the failure of self excitation

(b) Distinguish between Lap and Wave windings?

6. What are the various characteristics of compound generators?
7. Enumerate all the parts of a DC machine and indicate their function?
8. Explain the effects of armature reaction in a DC Generator Briefly?
9. Draw and explain the characteristics of DC series and DC Shunt Generators.
10. a) What is the purpose of yoke?

b) Write the purpose of the commutator?

c) What is meant by armature reaction?

d)What is the purpose of inter poles?

e) What is the purpose of pole shoe?

UNIT –II D.C MOTORS

PART A

1. The starting current of a dc motor is high. Justify
2. The starting torque of a dc series motor more than that of a dc shunt motor of same power rating. Justify
3. Analyse on how can the direction of rotation of a DC shunt motor be reversed?
4. Name the type of DC motor used in electric train and justify.
5. What is the significance of back emf? **1** Remember
6. What are the performance characteristics of a DC motor?
7. Write the speed equation and List the various methods of speed in DC series motor.
8. Give the necessity of a starter for a dc motor. **2** Understand
9. Name the different methods of electrical braking of dc motors.
10. Write the voltage equation of DC motor. **3** Apply
11. Point out the applications of DC series and shunt motors.

PART B

1. A 25HP, 250V DC Series motor has armature resistance 0.1Ω and field resistance 0.05Ω and brush Contact drop 3V. When the line current is 80A, the speed is 600rpm. Find the speed when the line Current is 100A.
2. Draw and explain the characteristics of DC series and DC Shunt Motors.
3. Explain the principle of operation of a D.C motor. Derive the equation for the torque Developed by a D.C. motor?
4. (a)Distinguish between generator and motor action. Derive the equation for the back e.m.f of DC motor?

(b) Find the torque exerted by a 4-pole series motor whose armature has 1200 conductors Connected up in wave winding. The motor current is 10A and the flux per pole is 0.02Wb.

5. Explain in detail about the types of D.C motors. Also mention their applications?
6. Explain the operation of four point starter for a DC motor with neat diagram?
7. Explain the armature voltage and field flux control methods for the Speed control of a DC Motor.
8. Why is a starter necessary for a DC motor? Explain the working of a three-point starter with the help of a neat diagram?
9. Draw and explain the various characteristics of a DC Motor?
10. (a) Define torque?

(b) If the applied voltage of a DC motor is 230 V, then back emf, for maximum power developed is?

(c) What is the emf generated by a 4 pole lap connected DC motor rotating at 1500 rpm having 200 Conductors and useful flux per pole is 0.4 mwb.

(d) The speed of a motor falls from 1100 r.p.m at no-load to 1050 r.p.m at rated load. The speed regulation of motor is.

(e) Write the working principle of a DC motor.

UNIT –III
TESTING AND APPLICATIONS OF D.C MACHINES

PART A

1. What do you mean by power stages in a D.C machine? Also explain (i) Electrical efficiency ii) Mechanical efficiency (iii) commercial efficiency?
2. Explain Swinburne's test on DC machines? What are its advantages and disadvantages?
3. Explain the procedure for obtaining the efficiency by using brake test on DC shunt machine.
4. Describe Hopkinson test in detail. What are its advantages and disadvantages?
5. A Shunt generator delivers 195A at terminal Voltage of 250V. The armature resistance and shunt Field resistances are 0.02 Ω and 50 Ω respectively. The iron and friction losses equal 950W. Find (a) EMF generated (b) Copper losses (c) output of the prime mover (d) commercial, mechanical and electrical efficiencies.
6. Describe Field's test in detail. What are its advantages and disadvantages?
7. Describe Retardation test n detail. What are its advantages and disadvantages?
8. (a) Enumerate the losses in DC machine.
(b) Derive the condition for maximum efficiency.
9. Explain in detail about the parallel operation of DC series generators
10. (a) Write the condition for maximum efficiency?
(b) Which losses are called variable losses?
(c) Which losses are called constant losses?
(d)Define efficiency and write the equation for efficiency?
(e)Name the methods of direct and indirect testing?

UNIT –IV
SINGLE PHASE TRANSFORMERS

1. Classify the different types of transformer.
2. How transformers are classified according to their construction?
3. Draw a single phase shell type transformer and name the parts.
4. Define transformer ratio.
5. Write down the EMF equation of a transformer relative to the secondary winding.
6. Why transformer rating is in KVA? 1 Remember
7. A single phase transformer has 40 primary and 1100 secondary turns. The net cross-sectional area of the core is 500 cm2. If the primary winding be connected to 50 Hz supply at 400 V. Estimate the value of maximum flux density in the core and the emf induced in the secondary.
8. Open circuit test is generally performed at rated voltage on LV side for a transformer. Justify
9. Give the currents components of a transformer under load.
10. Prove that the flux in the core remains constant even under load.
11. A single phase transformer has 180 and 90 turns respectively in its secondary and primary windings. The respective resistances are 0.233 Ω and 0.067 Ω. Estimate the equivalent resistance of (i) the primary in terms of secondary winding, and (ii) the secondary in terms of the primary winding.
12. Draw the no-load phasor diagram of a transformer.
13. Define voltage regulation of a transformer.

14. Calculate the regulation of a transformer in which the Ohmic loss is 1% of the output and the reactance drop is 5% of the voltage when the p.f. is 0.8 lag and 0.8 leading.
15. Point out the different losses occurring in a transformer.
16. Write the two different components of core loss in a transformer.
17. At what condition does a transformer operate at its maximum efficiency?
18. Give the different types of 3 phase transformer connections.
19. What advantage is obtained with the delta-connection of three phase transformers?
20. What happen when a DC supply is applied to a Transformer?

PART B

1) a) With relevant phasor diagrams, explain the operation of a practical single phase transformer under no load condition.
b) A 230/2300V transformer takes a no load current of 6.5A and absorbs 187W. If the resistance of primary is 0.06Ù, find (a) Core loss (b) no load power factor (c) active component of current and (d) magnetizing current.
2. a) Discuss the constructional features of transformers. Draw neat diagrams.
b) A 10KVA, 2200/400V transformer has R1=5 Ù, X1=12 Ù, R2=0.2 Ù and X2=0.48 Ù. Determine
the equivalent impedance of the transformer referred to (i) primary side (ii) secondary side3. a) In a transformer, derive the condition for maximum efficiency and thus find the load current at which the efficiency is maximum.
b) A 20KVA, 2000/200V single phase transformer has the following parameters H.V winding: R1=3Ù , X1=5.3Ù, L.V winding: R2=0.05Ù ,X2=0.1Ù. Find the Voltage Regulation at (i) p.f of 0.8 lagging (ii) UPF (iii) 0.707 p.f leading
4. a) Explain the principle of operation of an transformer.
b) Derive the e. m. f. equation of a transformer.
5. a) Explain the effect of variations of frequency and supply voltage on iron losses.
b) Write a short notes on practical Transformer.
6 (a) what are the various losses taking place in transformer? How these losses can be minimized?
(b) The No-Load current of a 4400/440 V, 1-Ö, 50 Hz transformer is 0.04 A. It consumes power 80 W at no-load when supply is given to LV side and HV side is kept open. Calculate the following: (i) Power
factor of no-load current. (ii) Iron loss component of current. (iii) Magnetizing component of current.
7. (a) Draw the Expression for Voltage regulation of a transformer form the simplified approximate equivalent circuits of 1-Ö transformer and also obtain condition for zero regulation.
(b) A 10KVA, 2000/400V single phase transformer has the following data: R1=5Ù, X1=12Ù, R2=0.2 Ù, X2=0.48 Ù. Determine the secondary terminal voltage at full load, 0.8 power factor lagging when the
Primary supply voltage is 2000V.
8. (a) What is an ideal transformer? Also explain the operation of an ideal single phase transformer under no load condition.
(b) An ideal 25KVA transformer has 500 turns on the primary winding and 40 turns on the secondary winding. The primary is connected to 3000V, 50HZ supply. Calculate (i) primary and secondary currents at full load (ii) secondary emf and (iii) the maximum core flux.
9. a) Describe the Parallel operation of transformers with equal voltage ratios.
b) Draw the equivalent circuit of an Auto transformer.

10.a) Define a transformer?
b) Write the Emf equation of a transformer and define each term
c) Formulate the Regulation of a transformer at any load x.
d) A 1100/400 V, 50 Hz single phase transformer has 100 turns on the secondary Winding. Calculate the number of turns on its primary, transformation ratio and turns ratio.
e) Full load copper loss in a transformer is 1600 watts. What will be the copper loss at half full load and 3/4th full load?