Electrical department B.O.S.E,Cuttack

Energy conversion -1
Set-1

Duration: 3Hrs.   **Marks:80**

SECTION-A

Q1.Answer all questions

a. Why Interpoles are used?
b. Mention different types of prime mover used in DC generator.
c. Why the resistance of armature of a DC machine is low?
d. Function **of** breather in a transformer.
e. Define stray loss in DC machine.
f. Describe the relation between the load and speed of a DC series motor.
g. Give the difference between the lap winding and wave winding of a DC machine.
h. Why Transformers are rated in KVA?
i. WHY Short circuit test is conducted in a transformer?
j. Define cooling of transformer.

SECTION B

Q2: Attempt any FIVE questions.   **5x6=30**

a. Derive the EMF equation of a single phase transformer.
b. Derive the saving of copper in Auto transformer.
c. What are the causes of failure to build up voltage in a generator?
d. The no load ratio of a 50 Hz, single phase transformer is 3000/250 V. Determine the number of turns in each winding, if the maximum flux is 0.06 Wb in the core.
e. Explain the various types cooling methods used in transformers?
f. A 400V DC motor takes an armature current of 100A, when it's speed is 1000 rpm. If armature resistance is 0.25 ohms, calculate the torque produced in Nm.
g. Explain the Field control method for speed control of DC series motor.

SECTION C

Q3 : Attempt any THREE questions .   **3x10=30**

a. Explain the methods of speed control of DC series motor.
b. Draw & explain the characteristics of DC Shunt motor.
c. Explain how the Open Circuit & Short Circuit tests are performed on single phase transformer.
d. A 40 KVA transformer has iron losses of 450 W and full load copper losses 850 W. If P.F. of load is 0.9 lagging. Find full load efficiency, KVA load at which maximum efficiency occurs and the maximum efficiency.
e. Explain the construction & working principle of DC motor.

Electrical department B.O.S.E,Cuttack

Energy conversion -1

Set-2

Duration: 3Hrs.   Marks:80

SECTION-A

Q1.Answer all questions
   a. Why DC series motor should not be started without load?
   b. Why starter is used In DC motor?
   c. Which type of motor is used In electric trains?
   d. Give the difference between the all day efficiency and commercial efficiency of a transformer.
   e. What is the use of Brushes in DC machine?
   f. Explain In Fleming`s left hand rule.
   g. Mention the types of windings used in DC machines.
   h. Why Swinburne's test is conducted?
   i. Function of a Tap changers in transformer.
   j. Give the difference between C.T & P.T.

SECTION-B

Q2. Attempt any five questions.   5x6=30
   a. Why commutator is used in DC machines?
   b. Discuss the working of an On-load tapchanger with circuit diagram.
   c. Derive an expression for E.M.F induced in an electric machine.
   d. Enlist various losses occurring in DC generator.
   e. Derive the torque developed in the armature of DC Motor.
   f. Differentiate between motor action & generator action
   g. A 4 pole, 1200 rpm generator with a lap wound armature has 65 slots and 12 conductors per slot. The flux per pole is 0.01 weber. Find the EMF induced in the armature.

SECTION-C

Q 3. Attempt any THREE questions: 3x10=30
   i. How the speed of DC motor can be controlled? Explain the methods of controlling speed of DC series motor.
   ii. Explain the construction and working of a 3-point starter.
   iii. a) Explain the constructional features of a 1-phase transformer.
        b) How Hysteresis and Eddy current losses can be minimized?
   iv. a) Explain how the efficiency of transformer can be calculated by short circuit and open circuit test.
        b) If the losses of a 5KVA, 230/160V transformer are:
                Iron losses = 80W
                Copper losses = 90W
   Then, calculate the efficiency of
   transformer on full load at 0.8 pf.

Electrical department B.O.S.E,Cuttack

Energy conversion -1
Set-3

Duration: 3Hrs.   **Marks:80**

SECTION-A

Q1. Fill in the blanks.   **10x2=20**

a. What happens when d.c voltage is applied to the primary of a transformer?
b. Define all day efficiency of a transformer.
c. Describe the function of NVC in 4-point starter.
d. Mention the advantages of auto transformer over two winding transformer.
e. How residual magnetism helps in DC generator?
f. Define parallel paths in DC machine windings.
g. Describe torque loss in DC motor.
h. Uses of C.T & P.T.
i. Mention the methods of speed control in DC series motor.
j. Define rotational losses in DC machine.

SECTION-B

Q2. Attempt any five questions.   **5x6=30**

a. A 220 V d.c. machine has an armature resistance of 0.5 ohm. If the full load armature current is 20 A, find the induced emf when machine acts as a (i) generator (ii) motor.
b. Explain open circuit test of a single phase transformer with circuit diagram.
c. Explain field control method for speed control of D.C motors.
d. Explain the working principle of a transformer.
e. State and explain the conditions necessary for parallel operations of two single phase transformers.
f. Write short notes on: On load tap changer.
g. What is back e.m.f? What is its significance?

SECTION-C

Q3. Attempt any three questions.   **3x10=30**

 a. A 40 KVA transformer has a core loss of 450 W and full load copper loss of 800W . If the power factor of load is 0.8 , calculate
  i. The full load efficiency
  ii. The maximum efficiency.

b. What are instrument transformers? Explain PT working principle.

c. Draw and explain transformer phasor diagram for Inductive load.

d. A 25 KW, 250 V, DC shunt generator has armature and field resistance of 0.05 ohm and 100 ohm respectively. Find total armature power developed when working (i) as a generator delivering 25 KW output and ii) as a motor taking 25 KW input.

Electrical department B.O.S.E,Cuttack

Energy conversion -1
Set-4

Duration: 3Hrs.   **Marks:80**

SECTION-A
Q1. Fill in the blanks.   **10x2=20**
  a. In generating action, armature rotates in the same direction as that of __torque.
  b. Inward flow of current is represented by the symbol __
  c. The direction of induced e.m.f can be determined by applying __
  d. Direction of torque depends upon the____of the torque angle.
  e. _____Motor has high starting torque.
  f. The number of parallel paths in lap wound armature are __
  g. The segments of commutator of a DC machine are made of __
  h. As the load on DC shunt motor is increased, its speed will __
  i. Power transformers are designed for low____Losses.
  j. To determine the iron or core losses in the transformer___Test is performed.

SECTION-B
Q 2. Attempt any FIVE questions: **5x6=30**

  a. Derive an expression for E.M.F induced in a transformer.
  b. Explain the operation of electrical machine as a generator.
  c. How the torque is developed due to alignment of two fields?
  d. What is the function of commutator in DC machines?
  e. Explain the working of auto transformer.
  f. A 30KW, 300V, DC shunt generator has armature and field resistance
     of 0.05ohm and 100ohm respectively. Calculate the total power
     developed in the armature when it delivers full-load.
  g. Explain various characteristics of DC shunt motors.
  h.

SECTION-C
Q3. Attempt any three questions.   **3x10=30**
  a. Explain the working of 3 point DC shunt motor starter with neat diagram
  b. The armature of a 12 pole DC shunt generator has 50 slots and is wave
     wound with 12 conductors per slot. The generator is running at a speed of
     625rpm and supplies a resistive load of 115ohm at a terminal voltage of
     300V, the armature resistance is 0.5ohm and field resistance is 60ohm.
     Find armature current, generated e.m.f. and flux per pole.
  c. Explain in detail the construction and working of Instrument Transformers.
  d. The no load current of a transformer is 5A at 0.25 p.f when supplied at 230
     V,50 Hz. The numbers of turns on primary winding are 200. Calculate
    (a) Maximum value of flux in core (b)Core loss (c) Magnetising current.