Sample Question Paper -I

Course Name : Diploma In Electrical Engineering 9061

Course Code : EE /EP

Semester : Fourth

Subject : D.C. Machines & Transformers

Marks : 80 **Time:- 3 Hours**

Instructions:

1) All the questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if necessary.
4) Illustrate your answer with neat sketches wherever necessary.
5) Preferably write the answer in sequential order.

Q.1 A) Attempt any Four of the following: **(Marks 08)**

a. List the parts that constitute the magnetic circuit of a dc machine.

b. State two characteristics of shell type transformers.

c. Draw a labeled diagram giving constructional details of shell type transformer.

d. Why efficiency of transformer is very high?

e. State the two special features of welding transformer.

Q.1 B) Attempt any Two of the following **(Marks 08)**

a. What is commutation, state its effect & methods of improving it.

b. State four peculiar characteristics of ideal transformer.

c. Draw circuit diagrams & phasor diagrams for phasor combination a)△△0 b) Dd0.

Q.2 Attempt any Three of the following: **(Marks 12)**

a. Define armature reaction & state its effect.

b. What is back EMF? State its significance.

c. Derive EMF equation of a Single Phase transformer.

d. Name the various losses that occurs in transformer & parts in which these losses occur.

Q.3 Attempt any Three of the following: (Marks 12)

a. State two advantages & two disadvantages of auto transformer.

b. Draw a neat connection diagram of 3 single phase transformer connected in star-delta configuration & schematic diagram of a 3 phase core type transformer showing core & windings.

c. State two applications each of CT & PT.

d. Compare current transformer with potential transformer on any four points.

Q.4 Attempt any Two of the following: (Marks 16)

1. A 100 V series motor takes 45 A when running at 750 rpm. Its armature resistance is 0.22 ohm & series field resistance is 0.13 ohm, iron & friction losses amount to 750 W, find i) output power ii) total torque & iii) shaft torque.

2. In a 50 KVA, 1100/220 V transformer, the iron & copper losses at full load are 350 W & 425 W, calculate the efficiency at i) full load with unity power factor ii) half load with unity power factor iii) full load with 0.8 power factor lagging. Also determine the maximum efficiency & the load at which maximum efficiency occurs assuming load to be resistive.

3. Calculate the net core area, gross core area, no of primary & secondary winding turns for a 1 phase 2 winding transformer suitable for 230 V, 50 Hz, having a rating of 100VA with maximum flux density of 1 wb/m^2, stacking factor= 0.9, current density= 2.3 A/mm^2 & turns per volt = 4.6 Assume 90%. Efficiency.

Q.5 Attempt any Two of the following: (Marks 12)

1. A lap wound dc shunt generator having 80 slots with 10 conductors per slot generates an emf of 400V on no load when running at 1000 rpm. At what speed it should run to generate a voltage of 220 V on open circuit.
2. Draw characteristic curve of DC series motor & state two applications of it.
3. Draw neat labeled equivalent circuit diagram referred to primary of transformer on load, Also draw phasor diagram for lagging load .

Q.6 Attempt any Two of the following: (Marks 12)

1. Draw an experimental set up to perform OC & SC test on a 230/110 V, 1 KVA transformer, state the equation to determine regulation & efficiency from these tests.
2. Compare 2 winding transformer with auto transformer on the basis of copper saving.
3. Mention various information printed on the name plate of any 100 kVA 3-phase transformer.

Sample Question Paper -II

Course Name : Diploma In Electrical Engineering 9061

Course Code : EE /EP

Semester : Fourth

Subject : D.C. Machines & Transformers

Marks : 80 **Time:- 3 Hours**

Instructions:

1) All the questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if necessary.
4) Illustrate your answer with neat sketches wherever necessary.
5) Preferably write the answer in sequential order.

Q.1 A) Attempt any Four of the following: **(Marks 08)**

1. Which parts of a dc machine are laminated?

2. How are the primary & secondary windings placed on the core of a single phase core type transformer.

3. What is the percentage saving in copper of an auto transformer?

4. State the four phasor groups of a three phase transformer.

5. What is Instrument transformer?

Q.1 B) Attempt any Two of the following: **(Marks 08)**

1. What is armature reaction state its effect?

2. Why is transformer rating in KVA?

3. Classify & list the applications of 3 phase transformer.

Q.2 Attempt any Three of the following: **(Marks 12)**

1. State 4 difference between lap & wave type of winding.

2. Compare NVC with OLC.

3. What is ideal transformer, draw its equivalent circuit diagram?

4. Draw & explain the circuit diagram to carry out polarity test on single phase transformer.

Q.3 Attempt any Three of the following: (Marks 12)

1. What is stacking factor explain its significance & value?
2. Draw connection diagram for 3 phase auto transformer connected to induction motor & explain its working.
3. What is Isolation transformer, & state its application?
4. Draw & label a circuit diagram using CT & PT connected to 1100/400 V, 50 KVA load.

Q.4 Attempt any Two of the following: (Marks 16)

1. A 60 KW, 400V dc shunt motor has 4 poles & wave connected armature winding with 450 conductors. The flux per pole is 0.045 Wb . The full load efficiency of the motor is 90.5%. The armature & interpole winding resistance is 0.1 ohm & shunt field resistance is 200 ohm. Calculate for full load i) the speed ii) armature torque & iii) useful torque

2. A 5 KVA, 400/200 V , 50 Hz single phase transformer gave the following results. No load test: 400 V, 1 A, 60 W (primary side)& Short circuit test 15 V, 12.5A, 50 W (primary side) calculate i) the no load parameters R_0 & Xm ii) equivalent resistance & reactance referred to primary iii) regulation at full load & 0.8 pf lagging. iv) iron & copper losses at full load v) efficiency at full load & 0.8 pf lagging

3. Calculate the net core area, gross core area, no of primary & secondary winding turns for a 1 phase 2 winding transformer suitable for 230 V, 50 Hz, having a rating of 100VA with maximum flux density of 1 wb/m^2, stacking factor= 0.9, current density = 2.3 A/mm^2 & turns per volt = 4.6 assuming efficiency = 90%.

Q.5 Attempt any Two of the following: (Marks 12)

1. A 4 pole wave connected dc generator having 60 slots on its armature with 6 conductors per slot , runs at750 rpm & generates an open circuit voltage of 230 V Find i) the useful flux per pole needed for the above condition ii) keeping the flux constant suggest a change in armature of the generator so that the generator is capable to generate no load voltage of 115 V running at the same speed.

2. Explain the merits & demerits of flux speed control method in D. C. Motor

3. Define different transformation ratios of single phase transformer, state their relationship.

Q.6 Attempt any Two of the following. (Marks 12)

1. A load test conducted on 1 KVA 230/110 V 50 Hz 1 phase transformer using lamp load gave following results Primary side V_1=230 V, I_1=4.2 A, W= 846 W, Secondary side V_2 = 115 V, I_2 =7.5 A, if no load voltage is 114 V find efficiency & regulation at given condition.

2. Compare principal features of commonly used 3 phase transformer connections.

3. State the procedure for core & winding design of a 1 phase transformer.

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