Scheme-G

Sample Test Paper- I

Course Name : Diploma in Electrical Engineering Group

Course Code : EE/EP **17415**

Semester : Fourth

Subject Title : D. C. Machine and Transformers

Marks : 25 **Time:-1 hour**

Instructions:

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

Q.1 Attempt any THREE **(9 Marks)**

a) Classify D.C. generators on the basis of their connections.

b) A 4 pole, lap connected D.C. generator has 1230 armature conductors. Calculate the flux developed per pole if the terminal voltage of the generator is 220 V & it is driven at 1500 rpm. The armature is delivering a current of 120 A & has a resistance of 0.5 Ω .

c) State various losses that occur in a d. c. motor, locations at which they occur and methods to minimize them.

d) Draw and explain power stages in a d. c. motor.

Q.2 Attempt any TWO **(8 Marks)**

a) Explain with help of characteristics, why a d. c. series motor should not be started without any mechanical load.

b) Explain the speed control methods using armature control, of a d. c. shunt motor.

c) Describe working of brushless d. c. motor.

Q.3 Attempt any TWO **(8 Marks)**

a) State why back e. m. f occurs in a d. c. motor. State how it governs the armature current.

b) State necessity of starter for d. c. motor. Draw neat sketch of three point starter.

c) A 400 V d. c. series motor runs at 1000 rpm & takes a current of 20 A from the mains. Calculate its speed and change in torque if the motor takes 10 A from the supply. Assume unsaturated poles and motor resistance to be 0.6 Ω

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Sample Test Paper- II

Course Name : Diploma in Electrical Engineering Group

Course Code : EE/EP **17415**

Semester : Fourth

Subject Title : D. C. Machine and Transformers

Marks : 25 **Time:-1 hour**

Instructions:

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

Q.1 Attempt any THREE (9 Marks)

a) Derive e. m. f equation of a transformer. Define transformation ratio.

b) State why transformer is rated in KVA.

c) Define regulation and all day efficiency of a transformer.

d) State the effect when a 1 KVA, single phase, 50 Hz, 220/110 V transformer primary is connected to.

   i. 12 V D.C.

   ii. 220 V D.C.

Q.2 Attempt any TWO (8 Marks)

a) Draw experimental setup to conduct O.C. and S.C. test on a 2.5 KVA, 220V/115V, 50Hz, 1 phase, transformer. Select the ranges of meters used for test.

b) Explain various losses in a transformer. Where do they occur? How to minimize them?

c) Explain transformer 'On Load' with inductive load. Draw phasor diagram.

Q.3 Attempt any TWO (8 Marks)

a) The iron loss of a 80 KVA, 1000V/250V, 50Hz,1 phase, transformer is 800 w. The total Copper Loss is 400 W when primary current is 50 A. Calculate

i. Cross sectional area of core when the core has a flux density of 1T and having 1000 turns on its H.V. winding.

ii. Efficiency at F.L. 0.8 (lag)

b) A 50 KVA, 2200V/220V,50Hz,1 phase, transformer at no load takes a current of 10 A at 0.8 (lag) p.f. The resistances of H.V. & L.V. windings are 0.5 Ω and 0.005 Ω respectively. Calculate core Resistance, reactance and equivalent resistance referred to primary

c) A 250 KVA, distribution transformer has full load copper loss and iron loss of 4.0 KW and 3.5 KW respectively. The transformer is loaded as shown below

Loading (KW)	Power Factor (lag)	No. of hours
200	0.84	06
350	0.75	08
50	0.82	06
No Load	---	04

Calculate all day efficiency.

Scheme-G

Sample Question Paper

Course Name :- Diploma in Electrical Engineering Group

Course Code :- EE/EP **17415**

Semester :- Fourth

Subject Title :- D. C. Machine and Transformers

Marks :- 100 **Time:-3 hour**

Instructions:

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

Q.1 Attempt any TEN of the following. **(20 Marks)**

a) State the working principle of D.C. generator.

b) State classification of D.C. generators on the basis of their winding connections.

c) State the working principle of D.C. motor.

d) State the condition for maximum efficiency of a D.C. motor

e) Write e. m. f equation of D.C. short shunt compound motor in the form of their voltage drops.

f) It is required to install a three phase, 150 KVA transformer on a pole mounted substation (at a height of 20 feet from the ground) in the campus of a polytechnic. Suggest the type of D.C. motor required to lift the transformer. Justify your answer.

g) State why a transformer always have a efficiency of more than 90% ?

h) State Faraday's law of electromagnetic induction.

i) A 3 KVA, 220/110 V transformer has 500 turns on its primary. Find its transformation ratio.

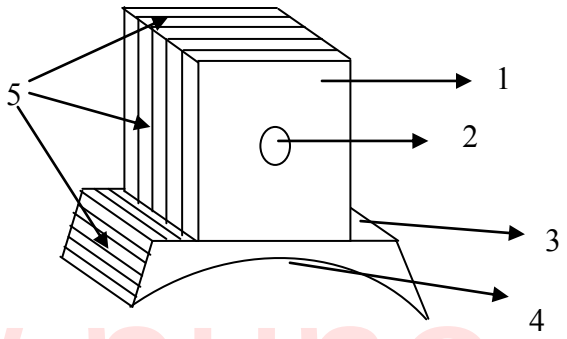
j) A 50 KVA transformer has an iron loss of 2KW on full load. Calculate its iron loss at 75% F.L.

k) State any two advantages of using three phase transformer over bank of single phase transformers.

l) State conditions for parallel operation of 3 phase transformer.

Q.2 Attempt any FOUR of the following. **(16 Marks)**

a) Identify the parts of d. c. machine shown below. Name the components marked, state use of each component.



b) A four pole d. c. shunt generator delivers 40 A to a load of 10 Ω. if the armature and field resistances are of 0.75 Ω & 50 Ω respectively. Find induced e. m. f.

c) Define the term 'Back EMF' with respect to a D.C. motor. Explain the role of Back E. M. F. in smooth running of motor

d) A 220 V d. c. shunt motor runs at a speed of 850 rpm and takes a current of 30 A from the mains. Calculate speed if the torque is doubled. Armature resistance of the motor is 0.2 Ω.

e) State various applications of D. C. Series Motor. Also state why D. C. Series Motor is selected for such applications?

f) State various methods of speed control of d. c. shunt motor. Explain any one with necessary circuit diagrams.

Q.3 Attempt any FOUR of the following. **(16 Marks)**

a) Compare core type & shell type transformers on the basis of construction, cooling, applications (at least four points)

b) Derive e m f equation of transformer. Calculate primary and secondary full load currents of a 5 KVA, 440/230 V single phase transformer

c) Explain concept of an ideal transformer with its properties

d) Explain working of transformer 'On Load' using its phasor diagram and assuming no magnetic leakages and resistive load

e) Draw approximate equivalent circuit of a 220 V/24 V transformer referred to primary

f) A 500 KVA, distribution transformer having copper and iron losses of 5 KW and 3 KW respectively on full load. The transformer is loaded as shown below

Loading (KW)	power factor (lag)	No. of hours
400	0.8	06
300	0.75	12
100	0.8	03
No Load	---	03

Calculate all day efficiency.

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

a) The efficiency of a 150 KVA, 11000/440 V, single phase transformer is 97% on half load at 0.8(lead) & 97.8 % on full load at u p f. Determine iron and full load copper loss and maximum efficiency at u p f.

b) Draw experimental setup to conduct O.C. & S.C. test on a 2.5 KVA, 220V/115V,50Hz, single phase transformer. Select the ranges of meter used for test.

c) Two single phase transformers of 250 KVA each are operated on parallel (both side). Their percentage drops are (1+ j6) Ω and (1.2+ j4.8) Ω. The load connected across the bus bar is 500 KVA at 0.8 p. f. lag. Calculate the load shared by each transformer

d) Explain with /appropriate circuit diagrams, load sharing of transformers operating in parallel with equal voltage ratio.

e) Explain working of transformer 'On No Load'. Draw its phasor diagram assuming resistive winding core with no magnetic leakages.

f) List various losses in a transformer, the places at which they occur. Methods to minimize these losses.

Q.5 Attempt any FOUR of the following. (16 Marks)

a) Classify transformers on the basis of construction and voltage levels

b) Draw approximate equivalent circuit referred to primary of a 2.5 KVA, 220/110 V transformer. The details of test results are as given below O.C. 220 V, 0.5 A, 125 Watt S.C. 20 V, 11.36 A, 300 Watt (on primary)

c) Define voltage regulation of transformer. Two distribution transformers A and B has voltage regulation of 3% & 8% respectively. State the performance of which transformer is better. Justify your answer.

d) State criteria for selection of distribution transformer

e) Explain construction and operation of three phase auto transformer.

f) Explain procedure to find polarity of windings of a three phase transformer

Q.6 Attempt any FOUR of the following. (16 Marks)

a) Draw a neat diagram of Scott connected three phase transformers and explain the working.

b) Compare two winding transformer with auto transformer on the basis of construction, copper loss, output voltage variation.

c) Explain with neat diagram construction and working of a current transformer.

d) Explain with circuit diagram use of potential transformer to measure 11KV.

e) Explain construction and working of isolation transformer.

f) Compare single phase welding transformer with two winding transformer on the basis of construction, working, winding sizes, cooling,