Kafrelsheikh University
Faculty of Engineering
Department: Electrical Power and Machines
Year: 3rd (2007) /2020-2021
Subject: Electric Tests (2)
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Date: 14 -3-2021
Time Allowed: 3hrs
Full Mark: 60 Marks
Final Exam: 1st Term.
No of pages: 2
Academic Code: EPM 3005.

This Exam measures the ILOs [a.3, a.15, b.5, b.14, b.15, c.5, c.8 and c.13]

Answer the following questions: In each question, draw the circuit diagram and write the necessary equations to clarify your answer

Question One: (20 Mark) [measures the ILOs of a1, b.5, b.14, and c.13]

a) ***Show***, experimentally, how you can ***perform*** load test of separately-excited DC generator. ***Interpret*** your results. [8Mark/ b.5.1,b.14.2and c.13.2]

b) ***Explain*** three reasons behind failing of self-exciting DC machine then ***suggest*** the suitable action/ actions required to build the machine voltage.

[6Mark/ a.15.4, b.5.1and c.13.4]

c) In the laboratory, the open circuit characteristic of a self- excited DC shunt generator driven at 2000 rpm is measured as follows:-

Field current(A)	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6
EMF(V)	60	110	150	180	200	220	230	240

The machine field resistance is 7 Ω.The machine is driven at 1500 rpm. An external resistance R_x is added in series in field circuit.

i). ***Find*** the value of external resistance R_x to obtain terminal voltage of 165V.

ii). If R_x is equal to 118 Ω, ***what*** is the value of the machine terminal voltage? [6Mark/ b.5.2and b.14.2]

Question Two: (20 Mark) [measures the ILOs of a1, b.14, and c.5]

a) ***Show***, experimentally **how can you** start DC shunt motor. **Explain** different methods used to control the speed of DC shunt motor and **discuss** the advantages/ disadvantages of each one. [8Mark/ a.15.1, b.14.1and c.5.2]

b) A 250V, 10 kW DC shunt machine having an armature resistance of 0.125 Ω and a field resistance of 250Ω. An external starting resistance is to be inserted with the armature circuit to limit the starting current to 115% of full load current. ***Design*** the required value of the starting resistance? ***What will happen if*** the starting resistance is not provided? [6Mark/ a.1.1 and b.14.1]

c) ***Discuss*** what will happen in each of the following cases:

i. Field circuit resistance of a DC shunt generator is increased.

ii. When performing the three phase full-wave controlled rectifier at a firing angle of 120 with resistive load

iii. Resistive load of half-wave single-phase rectifier is replaced with inductive load.

[6Mark/ a.1.5.4, b.14.2 and c.13.4]

Question Three: (20 Mark) [measures the ILOs of a1, b.5, b.14, and c.5]

a) ***Explain***, experimentally, how you can obtain DC source from a single phase AC source, (full- wave uncontrolled and controlled rectification). ***Which*** of them you prefer and ***why***? [10 Mark/ a.1.2, b.5.2, c.5.1]

b) ***Sketch*** the output voltage waveform which can be obtain experimentally from:

i. Three phase full-wave controlled rectifier at α=60

ii. Three phase full-wave controlled rectifier α=90 . [10 Mark/ a.1.2 and b.5.2]

Best wishes

Committee of corrections and Testers

Dr. Amlak Abaza