Kafrelsheikh University
Faculty of Engineering
Department: Electrical Power and Machines
Year: 3rd (2007) /2020-2021
 Subject: Electric Tests (2)
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Date: 17-6-2021
Time Allowed: 3hrs
Full Mark: 60 Marks
Final Exam: 2nd Term.
No of pages: 2
Academic Code: EPM 3005.

This Exam measures the LOs [A.2, A.4, A.9, B.3, B.4, and C.2]

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

Question One: (20 Mark) [measures the LOs of A.2, B.3, B.4, and C.2].

a) **_Show_**, experimentally, how general circuit constants (A, B, C, and D) are determined for medium transmission lines. **_How_** can you interpret the experimental results to determine the performance of transmission lines?   [8 mark/A.2 and B.3]

b) **_Show_**, experimentally, how voltage regulation and transmission efficiency are determined for medium lines using π- method. **_Explain_** how the loading type and amount can affect the voltage regulation.   [8 mark/A.2 and B.4]

c) **_Illustrate_** the expected relation between sending end voltage and receiving end voltage at lightly and no load conditions of medium transmission lines. [4 mark/A.9 and C.2]

Question (2): (20 Mark) [measures the LOs of A.2, A.9, B.4, and C.2]

a) **_Define_** the voltage regulation. Under what load condition(s), a negative voltage regulation may be obtained? **_What_** are the parameter(s) which cause(s) voltage regulation? **_Verify_** your answer by the aid of a phasor diagram.   [6 mark/A.2 B.4]

b) **_Discuss_** two methods used to improve the poor voltage regulation. [4 mark/A.9 and C.2]

c)A 10 KVA, 2200/220 V single-phase transformer has the following test results:

Test	Voltage (V)	Current (A)	Power (W)
Open-circuit	220	2	44
Short circuit	45	4.55	140

   i.   **_Illustrate_** the side at which the measuring instruments were located for both tests, **_according_** to the given table.

   ii.   **_Estimate_** the transformer equivalent circuit parameters referred to high voltage -side

   iii.   **_Determine_** the iron loss and the cupper loss.

   iv.   **_Determine_** the efficiency and voltage regulation if the transformer is operating at **_half-full load_** and a power factor of 0.85 lagging. [10 mark/A.9, B.4, and C.2]

Question (3): (20 Mark) [measures the LOs of A.2, A.9, B.3, B.4, and C.2]

a) *Define* the power factor. *Explain* using the phasor diagram and power triangle how you can improve the power factor for inductive load. *What* are the measurements in the laboratory that necessary to get the power factor? [6 mark/A.2, B.3 and B.4]

b) *Discuss* what will happen in each of the following practical case:

   i.   A load drawn current of 90 A is connected to the secondary of a single-phase transformer rated at 50 Hz, 10 kVA, 2200/220 V.

   ii. Short-circuit test of a transformer is performed under rated voltage

   iii. The load of a medium transmission line is reduced to 10% of full load.

   iv. One circuit of transmission lines is used at high voltage level.

   [8 mark/A.2, B.3, B.4 and C.2]

c) A single- phase motor connected to a power supply at 400 V develops 10 HP at 0.8 power factor lagging. It is desired to improve the power factor to 0.92 lagging value. *Estimate* the capacitance required in parallel with motor to reach this value.

   [6 mark/A.2, A.9, B.4 and C.2]

Best wishes   **Committee of corrections and Testers**