

# COLLEGE OF ENGINEERING & TECHNOLOGY



Department : Electrical & Control Engineering

Lecturer : Dr. Rania Assem

Course : Electrical Power Distribution

Course Code : EE 543

Marks : 40

Date : 30 / 5 / 2015

Time : 2 hours

## Final Exam

**Answer The Following Questions:**

**Q1 (A-12)**

a- Compare between the different primary distribution systems arrangements indicating merits, demerits and practical application of each approach (4 marks)

b- There are six residential customers connected to a distribution transformer (DT), as shown in figure 1. Notice the code in the customer account number, for example 4276. The first number "4" stands for feeder F4, the second number "2" indicates the lateral connected to the F4 feeder, the third number "7" is the DT on that lateral and finally the last number "6" is for the house number connected to that DT. Assume that the connected load is 9 KW per house and that the demand factor and diversity factor for the group of six houses have been decided as 0.65 and 1.1, respectively.

- i. Determine the "diversified demand" of the group of six houses on the distribution transformer DT427.
- ii. Assume that feeder 4 has a system peak of 3000 KVA per phase and a copper loss of 0.5% at the system peak. Determine the following:
  - a. The copper loss of the feeder in kilowatts per phase
  - b. The total copper losses of the feeder in kilowatts per three-phase.

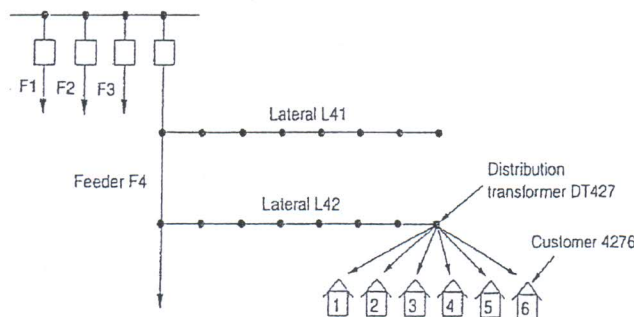


Figure 1: Illustration of loads connected to a distribution transformer

(6 marks)

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Head of Department : Prof. Hamdy Ashour		19/ 5 / 2015

**Q2 (A.4)**

a- What are the difference between nominal voltage, rated voltage, service voltage, and utilization voltage? (3 marks)

b- It is required to supply a 2 MVA, 11 kV distribution transformer from a utility supply in an industrial plant; which is 3 km away from MV switchgear panel. Underground XLPE-insulated, copper conductor cable is to be used. Cable installation conditions are:

- Soil resistivity (very dry with rain fall very rare): 200 cm °C/W.
- The depth of burial of the cable is 1.25 m at ground temperature of 40 °C.
- One other cable 30-cm apart in the trench.
- iii. Selected appropriate cable using the derating factors supplied (trefoil construction)
- iv. Calculate the voltage drop at 11-kV base line to line voltage
- v. Will the selected cable survive a short-circuit current of 12.36 kA for 0.5 seconds? Give reasons for your answer

(7 marks)

**Q3 (C-1)**

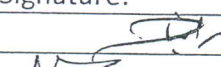
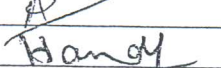

a- Explain the benefits of power factor correction and list the types of correction methods used. (4 marks)

b- An ABB 630 kVA oil distribution transformer with load factor equal to 0.5, calculate the capacitor control setting at low-voltage panel to improve the power factor of the 80% motor power factor up to 90% (lag) (6 marks)

**Q4 (A-12), (A-14)**

a- What are the different cooling classes used in distribution transformers. (2 marks)

b- What is the difference between an OFAF and an ONAN transformer? (2 marks)

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