

King Fahd University of Petroleum & Minerals

Electrical Engineering Department

EE 466: Power System Protection (071)

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Second Major Exam : December 10, 2007 (Time: 5:15-6:30 pm)

Q1) [50 points]

A 2500 kVA, 13.8 kV motor is protected using a relay whose characteristics is attached. The motor starting current is 5 times its full load current. The motor has the following parameters:

| | |
|------------------------------|----------------------------------|
| Phase-to-phase fault current | 17000 A |
| Three phase fault current | 25000 A |
| Ground fault current | 10% of phase-phase fault current |
| Motor's starting time | 3 seconds |

Recommend a protection scheme for this motor. Justify your recommendation.

Allow for a motor service factor of 15%.

Assume that the motor can't be overloaded.

Available taps are: 1, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 12, 14, 16.

Q2) [50 points]

A 3-phase 600 MVA delta / Y transformer is rated at 34.5 / 500 kV kV. A percentage differential relay is used to protect the transformer. The CTs used are of the type 7C200 and the 500 kV side has a tap changer with (5/8)% step size with a range of 475 – 525 kV.

The available percentage differential slopes are 10, 15, 18, 30 and 35.

Determine:

- The CT ratios.
- The slope of the % differential relay.

Available taps are: 1, 1.5, 3, 4.5, 5, 5.5, 7, 9, 10, 12, 14, 16