

EE 466 (071)

Solved Problems on Rotating M/c's.

7.1

$$I_{f1} = \frac{975000}{\sqrt{3} \times 22} = 25,600 \text{ Amperes pri.}$$

Select 30000:5 CT (600:1)

$$I_{f1} = 4.26 \text{ Amperes sec.}$$

$$I_{3\phi} @ F_1 = I_{3\phi} @ F_2 = 1.0/0.21 = 4.76 \text{ pu} \times 4.26 = 20.3 \text{ Amperes.}$$

Assume no CT error, current through relay is 0 for external fault (F₂) and 20.3 Amperes for internal fault (F₁). Set lightest tap, fastest time.

p.u. = 1.0

T.D. = #1/2

7.2

Three phase fault current at F₂ = 121798 Amperes

$$I_{1sec} = 121798/6000 = 20.3 \text{ Amperes}$$

$$I_{2sec} = 121798/6000 = 20.3 \text{ Amperes}$$

$$I_{rel} = 0.8 \text{ Amperes}$$

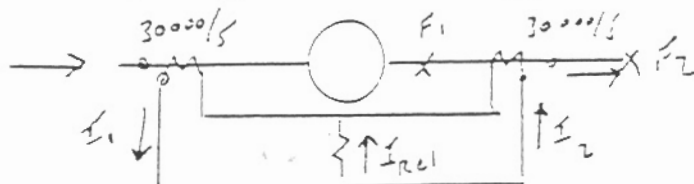
Set 3 times error current = 2.4 Amperes - use 2.5 A. tap

From appendix IV b Tap = 2.5

T.D. = #1/2

Check for internal fault (F₁)

$$I_1 = 20.9 \quad I_2 = 0 \quad I_{rel} = 20.9/2.5 = 8.36 \text{ pu operates in .06 sec.}$$



7.3

$$I_{a1} = -I_{a2} = \frac{1.0}{.21 + .21} = 2.3 \text{ p.u.}$$

$$I_b = -I_c = a^2(2.3) + a(-2.3) = 2.3 \times \frac{\sqrt{3}}{2} = 2.06 \text{ p.u.}$$

$$I_b = 2.06 \times 4.26 = -I_c = 8.78 \text{ Amperes sec.}$$

with no CT error, set pick up = 1.0

$$T.D = \#1/2$$

with 1% CT error for external fault, error = 0.8 Amperes.

Setting is still good