

# KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

## ELECTRICAL ENGINEERING DEPARTMENT

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EE-463 - 131

### Key Solutions

Quiz 4                  ser#:                  I.D.:                  Name:

Q.1) The symmetrical components of a set of unbalanced three-phase currents are

$$I_{a0} = 3 \angle -30^\circ; \quad I_{a1} = 5 \angle 90^\circ; \quad I_{a2} = 4 \angle 30^\circ$$

The original unbalanced phasor currents are

a)  $I_a = 8.19 \angle 42.2^\circ; \quad I_b = 4 \angle -30^\circ; \quad I_c = 8.19 \angle -102.2^\circ$

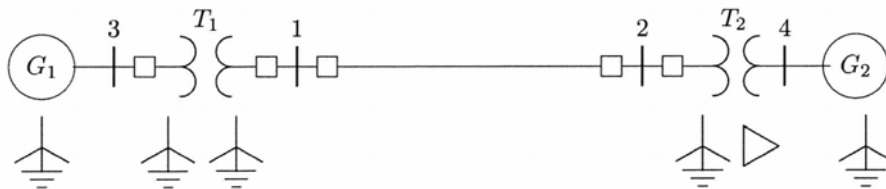
b)  $I_a = 4 \angle -30^\circ; \quad I_b = 8.19 \angle 42.2^\circ; \quad I_c = 8.19 \angle -102.2^\circ$

c)  $I_a = 8.19 \angle 42.2^\circ; \quad I_b = 8.19 \angle -102.2^\circ; \quad I_c = 4 \angle -30^\circ$

d)  $I_a = 8.19 \angle -42.2^\circ; \quad I_b = 4 \angle -30^\circ; \quad I_c = 8.19 \angle 102.2^\circ$

Q.2) Transformer  $T_1$  is a step-up transformer. The symmetrical components of line voltages of bus 3 (ref. to phase voltage base), due to SLG fault on bus 1 as seen from the H.V.S. of  $T_1$  are

$$V_3^0 = 0; \quad V_3^1 = 0.89885; \quad V_3^2 = -0.1012$$



The symmetrical components of line voltages of bus 3 (ref. to phase voltage base), due to SLG fault on bus 1 as seen from the L.V.S. of  $T_1$  are

a)  $V_3^0 = C; \quad V_3^1 = 0.89885 \angle 30^\circ; \quad V_3^2 = 0.1012 \angle -210^\circ$

b)  $V_3^0 = 0; \quad V_3^1 = 0.89885 \angle -30^\circ; \quad V_3^2 = 0.1012 \angle -150^\circ$

c)  $V_3^0 = C; \quad V_3^1 = \sqrt{3} * 0.89885 \angle -30^\circ; \quad V_3^2 = \sqrt{3} * 0.1012 \angle -150^\circ$

d)  $V_3^0 = C; \quad V_3^1 = 0.89885; \quad V_3^2 = 0.1012 \angle 180^\circ$