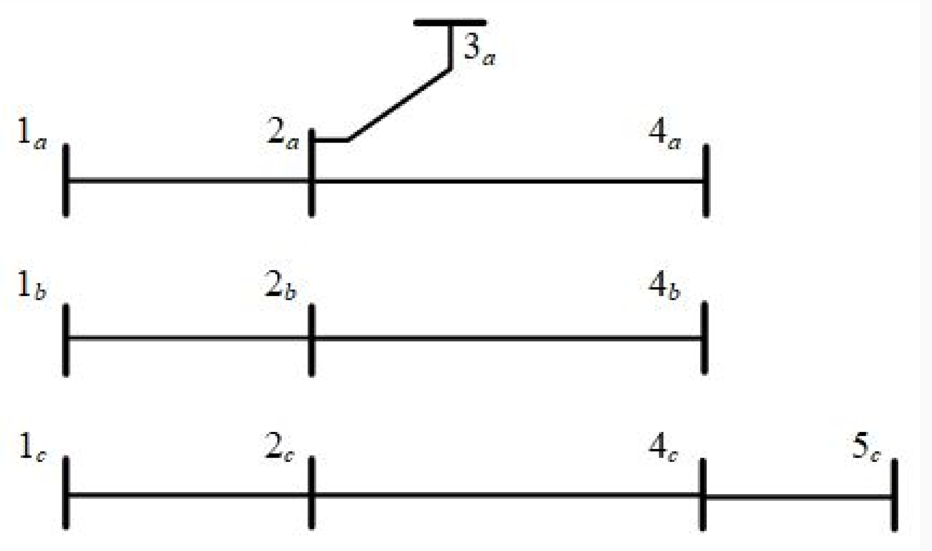
Unit 9 - Week 8

Assignment 8

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-09-25, 23:59 IST.

Data for Q. 1 to Q. 6: Consider a three-phase distribution system shown in the following figure. The system voltage is 6.4 kV (line-to-line). The BIBC and BCBV matrices for direct approach based short-circuit analysis are also given below.



$$BIBC = \begin{array}{c} \\ 1a-2a \\ 1b-2b \\ 1c-2c \\ 2a-3a \\ 2a-4a \\ 2b-4b \\ 2c-4c \\ 4c-5c \end{array} \begin{array}{c} \begin{array}{cccccccc} 2a & 2b & 2c & 3a & 4a & 4b & 4c & 5c \end{array} \\ \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \end{array} \text{ and}$$

$$BCBV = \begin{array}{c} \\ 2a \\ 2b \\ 2c \\ 3a \\ 4a \\ 4b \\ 4c \\ 5c \end{array} \begin{array}{c} \begin{array}{cccccccc} 1a-2a & 1b-2b & 1c-2c & 2a-3a & 2a-4a & 2b-4b & 2c-4c & 4c-5c \end{array} \\ \begin{bmatrix} 0.3+j0.5 & 0.2+j0.3 & 0.1+j0.2 & 0 & 0 & 0 & 0 & 0 \\ 0.2+j0.3 & 0.3+j0.5 & 0.2+j0.3 & 0 & 0 & 0 & 0 & 0 \\ 0.1+j0.2 & 0.2+j0.3 & 0.3+j0.5 & 0 & 0 & 0 & 0 & 0 \\ 0.3+j0.5 & 0.2+j0.3 & 0.1+j0.2 & 0.4+j1.2 & 0 & 0 & 0 & 0 \\ 0.3+j0.5 & 0.2+j0.3 & 0.1+j0.2 & 0 & 0.6+j1.2 & 0.3+j0.5 & 0.3+j0.4 & 0 \\ 0.2+j0.3 & 0.3+j0.5 & 0.2+j0.3 & 0 & 0.3+j0.5 & 0.6+j1.2 & 0.3+j0.5 & 0 \\ 0.1+j0.2 & 0.2+j0.3 & 0.3+j0.5 & 0 & 0.3+j0.4 & 0.3+j0.5 & 0.6+j1.2 & 0 \\ 0.1+j0.2 & 0.2+j0.3 & 0.3+j0.5 & 0 & 0.3+j0.4 & 0.3+j0.5 & 0.6+j1.2 & 0.4+j1.2 \end{bmatrix} \end{array}$$

1) The matrix $[BIBC_4^b]$ is represented as — *2 points*

- $[0\ 0\ 1\ 0\ 0\ 0\ 1\ 0]^T$
- $[0\ 0\ 1\ 0\ 0\ 0\ 1\ 1]^T$
- $[0\ 1\ 0\ 0\ 0\ 0\ 0\ 0]^T$
- $[0\ 1\ 0\ 0\ 0\ 1\ 0\ 0]^T$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$[0\ 1\ 0\ 0\ 0\ 1\ 0\ 0]^T$

2) The matrix $[BCBV_3^a]$ is represented as — *2 points*

- $[0.3+j0.5\ \ 0.1+j0.2\ \ 0.2+j0.3\ \ 0.4+j1.2\ \ 0\ \ 0\ \ 0\ \ 0]$
- $[0.3+j0.5\ \ 0.2+j0.3\ \ 0.1+j0.2\ \ 0\ \ 0\ \ 0\ \ 0\ \ 0]$
- $[0.3+j0.5\ \ 0.2+j0.3\ \ 0.1+j0.2\ \ 0.4+j1.2\ \ 0\ \ 0\ \ 0\ \ 0]$
- $[0.3+j0.5\ \ 0.1+j0.2\ \ 0.2+j0.3\ \ 0\ \ 0\ \ 0\ \ 0\ \ 0]$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$[0.3+j0.5\ \ 0.2+j0.3\ \ 0.1+j0.2\ \ 0.4+j1.2\ \ 0\ \ 0\ \ 0\ \ 0]$

3) — *4 points*
If the LG fault with zero fault-impedance occurs at Bus no. 3 and phase a, the short circuit impedance matrix $\left[Z_{SC}^{LG}\right]$ is

- $[1.4 + j1.4]\ \Omega$
- $[0.7 + j1.7]\ \Omega$
- $[0.35 + j0.35]\ \Omega$
- $[0.84 + j0.84]\ \Omega$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$[0.7 + j1.7]\ \Omega$

4) If the LG fault with zero fault-impedance occurs at Bus no. 2 and phase ***b***, the short-circuit current is — *4 points*

- 15.77 kA
- 19.01 kA
- 10.97 kA
- 6.34 kA

No, the answer is incorrect.
Score: 0
Accepted Answers:
6.34 kA

5) — *4 points*
If the LL fault with zero fault-impedance occurs at Bus no. 4 between ***a*** and ***b*** phases, the short circuit impedance matrix $\left[Z_{SC}^{LLG}\right]$ is

- $\begin{bmatrix} 0.9+j1.7 & 0.5+j0.8 \\ 0.5+j0.8 & 0.9+j1.7 \end{bmatrix} \Omega$
- $\begin{bmatrix} 0.5+j0.8 & 0.45+j0.85 \\ 0.45+j0.85 & 0.5+j0.8 \end{bmatrix} \Omega$
- $\begin{bmatrix} 0.5+j0.8 & 0.9+j1.7 \\ 0.9+j1.7 & 0.5+j0.8 \end{bmatrix} \Omega$
- $\begin{bmatrix} 0.45+j0.85 & 0.5+j0.8 \\ 0.5+j0.8 & 0.45+j0.85 \end{bmatrix} \Omega$

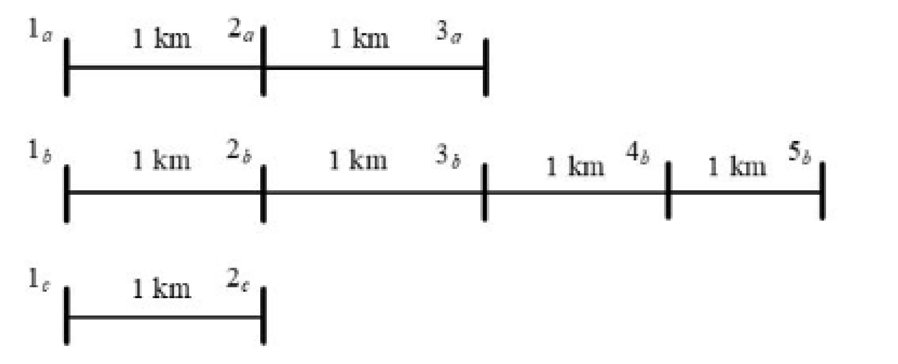
No, the answer is incorrect.
Score: 0
Accepted Answers:
$\begin{bmatrix} 0.9+j1.7 & 0.5+j0.8 \\ 0.5+j0.8 & 0.9+j1.7 \end{bmatrix} \Omega$

6) If the LLG fault with zero fault-impedance occurs at Bus no.4 between ***b*** and ***c*** phases, the short-circuit currents I_b and I_c respectively are — *4 points*

- 3.37 and 3.26 kA
- 4.41 and 3.87 kA
- 5.84 and 5.65 kA
- 5.39 and 5.48 kA

No, the answer is incorrect.
Score: 0
Accepted Answers:
3.37 and 3.26 kA

Data for Q. 7 to Q. 9: A 6.4 kV, 5-bus distribution system is shown in the following figure. The impedance (Ω/km) matrices of three-phase, two-phase, and single-phase sections are represented as Z_{abc}, Z_{ab}, and Z_b respectively.



$$Z_{abc} = \begin{bmatrix} 0.3+j0.5 & 0.2+j0.3 & 0.1+j0.2 \\ 0.2+j0.3 & 0.3+j0.5 & 0.2+j0.3 \\ 0.1+j0.2 & 0.2+j0.3 & 0.3+j0.5 \end{bmatrix} \Omega/\text{km}$$

$$Z_{ab} = \begin{bmatrix} 0.6+j1.2 & 0.3+j0.4 \\ 0.3+j0.4 & 0.6+j1.2 \end{bmatrix} \Omega/\text{km}$$

$$Z_b = 0.4+j1.2 \quad \Omega/\text{km}$$

7) If the LG fault (with 0.0 Ω fault impedance) occurs on the phase ***b*** of bus-5, the fault current will be — *2 points*

- 0.72 kA
- 1.44 kA
- 0.83 kA
- 1.66 kA

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.83 kA

8) If the LLG fault (with 0.0 Ω fault impedance) occurs on the phases ***a*** and ***b*** of bus-3, the fault currents in ***a*** and ***b*** phase respectively are — *4 points*

- 5.47 kA and 5.13 kA
- 5.13 kA and 5.47 kA
- 2.96 kA and 3.16 kA
- 3.16 kA and 2.96 kA

No, the answer is incorrect.
Score: 0
Accepted Answers:
3.16 kA and 2.96 kA

9) If the LL fault (with 0.0 Ω fault impedance) occurs on the phases ***b*** and ***c*** of bus-2, the fault current is — *4 points*

- 7.16 kA
- 14.31 kA
- 24.79 kA
- 8.26 kA

No, the answer is incorrect.
Score: 0
Accepted Answers:
14.31 kA