Unit 4 - Week 3

Assignment 3

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

Due on 2019-08-21, 23:59 IST.

1) Which of the following sentences are true in the case of ACSR conductors? *2 points*

I Outer aluminum strands carry most of the current.
II The internal steel strands increases tensile strength.
III Strands are twisted in the opposite direction to avoid unwinding.

- I and II
- I and III
- II and III
- I , II, and III

No, the answer is incorrect.
Score: 0
Accepted Answers:
I , II, and III

2) Carson’s equations are used to compute *2 points*

- Capacitances of conductors with earth return.
- Self and mutual impedances of conductors with earth return.
- Resistance of conductor with skin and proximity effect.
- Self and mutual impedances of conductors with skin and proximity effect.

No, the answer is incorrect.
Score: 0
Accepted Answers:
Self and mutual impedances of conductors with earth return.

3) A three-phase three-wire overhead line distribution line segment will result in primitive impedance matrix of size *2 points*

- 3×3
- 4×4
- 5×5
- 6×6

No, the answer is incorrect.
Score: 0
Accepted Answers:
3×3

4) The primitive impedance matrix of the system is *2 points*

$$Z_{\text{Pri}} = \begin{bmatrix} \hat{Z}_{aa} & \hat{Z}_{an} \\ \hat{Z}_{an} & \hat{Z}_{nn} \end{bmatrix}$$

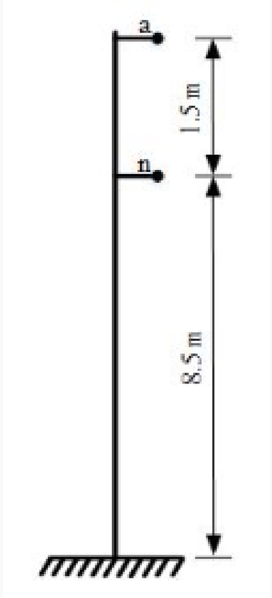
$$Z_{\text{Pri}} = \begin{bmatrix} 0.1493 + j0.6754 & 0.0493 + j0.6319 \\ 0.0493 + j0.6319 & 0.5493 + j0.6319 \end{bmatrix} \ \Omega/\text{km}$$

Then, the The phase-impedance Z_{phase} of the system is

- $Z_{Phase} = 0.1055 + j1.0820 \ \Omega/\text{km}$
- $Z_{Phase} = 0.4067 + j0.8920 \ \Omega/\text{km}$
- $Z_{Phase} = 0.4041 + j0.2689 \ \Omega/\text{km}$
- $Z_{Phase} = 0.1081 + j0.4589 \ \Omega/\text{km}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$Z_{Phase} = 0.4041 + j0.2689 \ \Omega/\text{km}$

Data for Q. 5, Q. 6, Q. 7, and Q. 8: A single-phase distribution line shown in following figure. The GMR and resistance of both phase and neutral conductor are 0.03 m and 0.6 Ω/km respectively.



The Carson’s equations for self and mutual impedance are

$$Z_{ii} = r_i + 0.0493 + j0.0628\left(\ln\frac{1}{GMR_i} + 6.843\right) \ \Omega/\text{km}$$

$$Z_{ij} = 0.0493 + j0.0628\left(\ln\frac{1}{D_{ij}} + 6.843\right) \ \Omega/\text{km}$$

The equations for potential coefficients are

$$P_{ii} = 17.98 \ \ln\frac{S_{ii}}{GMR_i} \ \text{km}/\mu\text{F} \quad \text{and} \quad P_{ij} = 17.98 \ \ln\frac{S_{ij}}{D_{ij}} \ \text{km}/\mu\text{F}$$

5) The primitive impedance matrix of the system is *4 points*

$$Z_{\text{Pri}} = \begin{bmatrix} \hat{Z}_{aa} & \hat{Z}_{an} \\ \hat{Z}_{an} & \hat{Z}_{nn} \end{bmatrix}$$

- $Z_{\text{Pri}} = \begin{bmatrix} 0.0493 + j0.2021 & 0.3246 + j0.3249 \\ 0.3246 + j0.3249 & 0.0493 + j0.2021 \end{bmatrix} \ \Omega/\text{km}$
- $Z_{\text{Pri}} = \begin{bmatrix} 0.3246 + j0.3249 & 0.0493 + j0.2021 \\ 0.0493 + j0.2021 & 0.3246 + j0.3249 \end{bmatrix} \ \Omega/\text{km}$
- $Z_{\text{Pri}} = \begin{bmatrix} 0.0493 + j0.4043 & 0.6493 + j0.6499 \\ 0.6493 + j0.6499 & 0.0493 + j0.4043 \end{bmatrix} \ \Omega/\text{km}$
- $Z_{\text{Pri}} = \begin{bmatrix} 0.6493 + j0.6499 & 0.0493 + j0.4043 \\ 0.0493 + j0.4043 & 0.6493 + j0.6499 \end{bmatrix} \ \Omega/\text{km}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$Z_{\text{Pri}} = \begin{bmatrix} 0.6493 + j0.6499 & 0.0493 + j0.4043 \\ 0.0493 + j0.4043 & 0.6493 + j0.6499 \end{bmatrix} \ \Omega/\text{km}$

6) The phase-impedance Z_{phase} of the system is *2 points*

- $Z_{Phase} = 0.3530 + j0.2351 \ \Omega/\text{km}$
- $Z_{Phase} = 0.7427 + j0.4952 \ \Omega/\text{km}$
- $Z_{Phase} = 0.4952 + j0.7427 \ \Omega/\text{km}$
- $Z_{Phase} = 0.2351 + j0.3530 \ \Omega/\text{km}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$Z_{Phase} = 0.7427 + j0.4952 \ \Omega/\text{km}$

7) The primitive potential coefficient P_{pri} matrix of the system is *4 points*

- $P_{\text{Pri}} = \begin{bmatrix} 58.45 & 22.58 \\ 22.58 & 56.99 \end{bmatrix} \ \text{km}/\mu\text{F}$
- $P_{\text{Pri}} = \begin{bmatrix} 113.99 & 45.17 \\ 45.17 & 116.91 \end{bmatrix} \ \text{km}/\mu\text{F}$
- $P_{\text{Pri}} = \begin{bmatrix} 116.91 & 45.17 \\ 45.17 & 113.99 \end{bmatrix} \ \text{km}/\mu\text{F}$
- $P_{\text{Pri}} = \begin{bmatrix} 56.99 & 22.58 \\ 22.58 & 58.45 \end{bmatrix} \ \text{km}/\mu\text{F}$

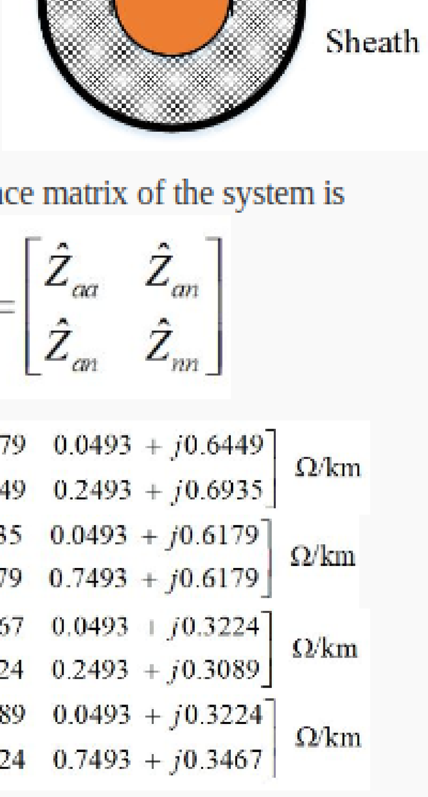
No, the answer is incorrect.
Score: 0
Accepted Answers:
$P_{\text{Pri}} = \begin{bmatrix} 116.91 & 45.17 \\ 45.17 & 113.99 \end{bmatrix} \ \text{km}/\mu\text{F}$

8) Neglecting shunt conductance, the phase admittance of the system is *2 points*

- $j3.17$ μS/km
- $j0.31$ μS/km
- $j0.65$ mS/km
- $j6.55$ μS/km

No, the answer is incorrect.
Score: 0
Accepted Answers:
j3.17 μS/km

Data for Q. 9, Q. 10, and Q. 11: A single-phase underground cable (50 Hz) is shown in the following figure. The relative permittivity of the insulation material is 3. Resistance of conductor and shield are 0.2 Ω/km and 0.7 Ω/km, respectively. The GMR of the phase conductor is 0.015 m and radius (mean) of the sheath is 0.05 m.



9) The primitive impedance matrix of the system is *4 points*

$$Z_{\text{Pri}} = \begin{bmatrix} \hat{Z}_{aa} & \hat{Z}_{an} \\ \hat{Z}_{an} & \hat{Z}_{nn} \end{bmatrix}$$

- $Z_{\text{Pri}} = \begin{bmatrix} 0.7493 + j0.6179 & 0.0493 + j0.6449 \\ 0.0493 + j0.6449 & 0.2493 + j0.6935 \end{bmatrix} \ \Omega/\text{km}$
- $Z_{\text{Pri}} = \begin{bmatrix} 0.2493 + j0.6935 & 0.0493 + j0.6179 \\ 0.0493 + j0.6179 & 0.7493 + j0.6179 \end{bmatrix} \ \Omega/\text{km}$
- $Z_{\text{Pri}} = \begin{bmatrix} 0.7493 + j0.3467 & 0.0493 + j0.3224 \\ 0.0493 + j0.3224 & 0.2493 + j0.3089 \end{bmatrix} \ \Omega/\text{km}$
- $Z_{\text{Pri}} = \begin{bmatrix} 0.2493 + j0.3089 & 0.0493 + j0.3224 \\ 0.0493 + j0.3224 & 0.7493 + j0.3467 \end{bmatrix} \ \Omega/\text{km}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$Z_{\text{Pri}} = \begin{bmatrix} 0.2493 + j0.6935 & 0.0493 + j0.6179 \\ 0.0493 + j0.6179 & 0.7493 + j0.6179 \end{bmatrix} \ \Omega/\text{km}$

10) The phase-impedance Z_{phase} of the system is *2 points*

- $Z_{Phase} = 0.3579 + j0.1363 \ \Omega/\text{km}$
- $Z_{Phase} = 0.7000 + j0.0270 \ \Omega/\text{km}$
- $Z_{Phase} = 0.8579 + j0.0607 \ \Omega/\text{km}$
- $Z_{Phase} = 0.5107 + j0.3960 \ \Omega/\text{km}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$Z_{Phase} = 0.5107 + j0.3960 \ \Omega/\text{km}$

11) Neglecting shunt conductance, the phase admittance of the system is *4 points*

- $j43.55$ μS/km
- $j107.10$ μS/km
- $j26.77$ μS/km
- $j40.16$ μS/km

No, the answer is incorrect.
Score: 0
Accepted Answers:
j43.55 μS/km