1a) An overhead line has a span of 250m. the tension in the line is 750 kg per 1500 kg while the conductor weights 1000m. calculate maximum sag in conductor

SOURCE CODE:

```
clc;

clear;

L=input('span length=');

T=input('tension=');

W=0.75:0.05:1

S=(W*L^2)/(8*T);

plot(W,S);

xlabel('weight in kg')

ylabel('sag in meters');

title('calculation of sag with various conductor weight');

disp(S,'sag;=');
```

OUTPUT:

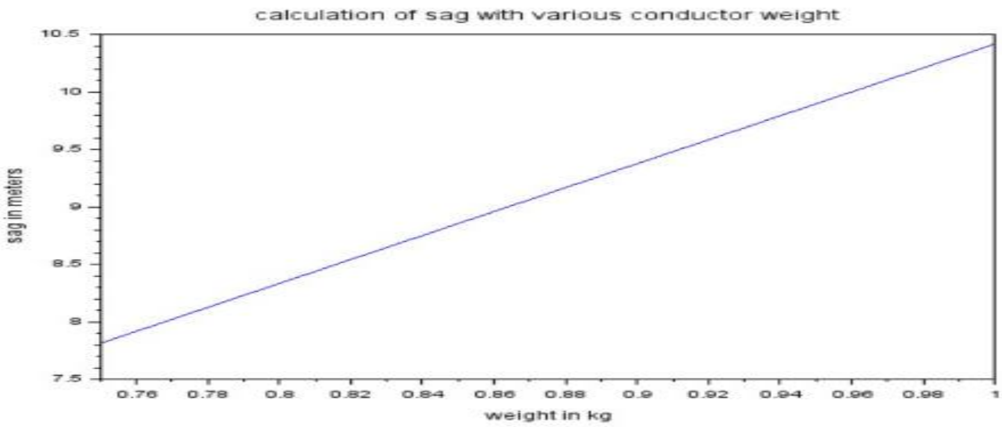
```
span length=250

ultimate strength=1500

         column 1 to 5
   7.8125    8.3333333    8.8541667    9.375    9.8958333
         column 6
   10.416667
  "sag;="

  "Figure saved."
-->
```

GRAPH:



1b) A 132 kV transmission line has the following data Wt. of conductor = 680 kg/km Length of span = 260 m, Ultimate strength = 3100 kg, Safety factor = 2. Calculate the height above ground at which the conductor should be supported. Ground clearance required is 10 metres

SOURCE CODE:

```
clc;
clear;
L=input('span length=');
Tu=input('ultimate strength=');
FOS=input('ENTER FACTOR OF SAFETY=')
T=(Tu/FOS);
W=0.68:0.02:0.9
S=(W*L^2)/(8*T);
plot(W,S);
xlabel('weight in kg')
ylabel('sag in meters');
title('calculation of sag with various conductor weight')
disp(S,'sag;=');
```

OUTPUT:

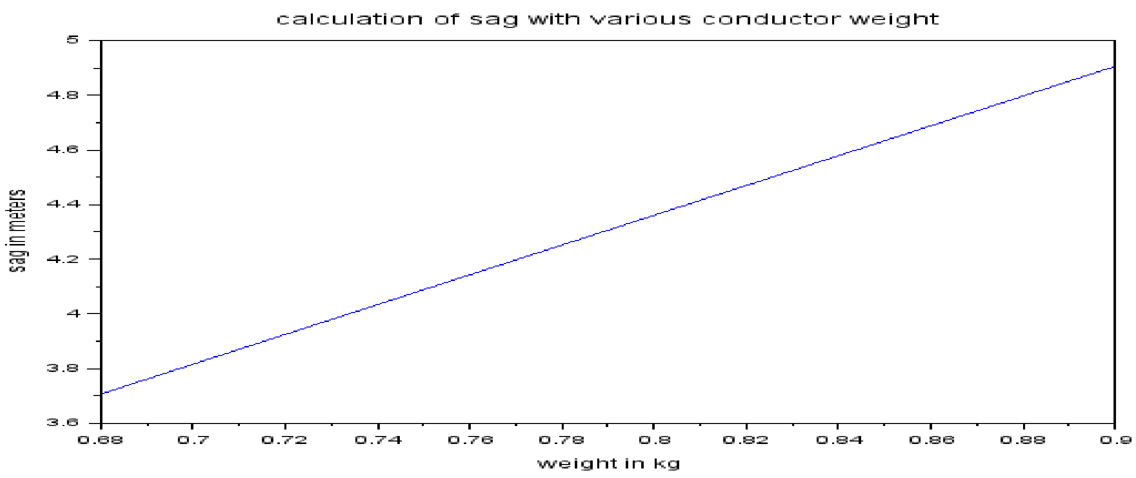
```
span length=260

ultimate strength=3100

ENTER FACTOR OF SAFETY=2

        column 1 to 10
   3.7070968    3.816129    3.9251613    4.0341935    4.1432258    4.2522581    4.3612903    4.4703226    4.5793548    4.6883871
        column 11 to 12
   4.7974194    4.9064516
  "sag;="
```

GRAPH:



2a) The towers of height 30 m and 90 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500 m. If the tension in the conductor is 1600 kg find the minimum clearance of the conductor and water and clearance mid-way between the supports. Weight of conductor is 1-5 kg/m. Bases of the towers can be considered to be at water level.

SOURCE CODE:

```
clc;
clear;
L=input('span length=');
W=input('Weight in kg=')
h=input('Height=');
T=input('Tension=');
A=[1 1;-1 1];
B=[500;256];
x=A\B;
x1=x(1);
x2=x(2);
disp('x1=',x1);
disp('x2=',x2);
S=(W*x1^2)/(2*T);
Clr1=30-S;
disp('Clearance of the lowest point O from the water level=',Clr1);
mid=250-x1;
Smid=(W*mid^2)/(2*T);
disp('Sag at midpoint P=',Smid);
Clr2=Clr1+Smid;
disp('Clearance of midpoint P from the water level=',Clr2);
```

OUTPUT:

```
span length=500

Weight in kg=1.5

Height=60

Tension=1600

  "x1="
   122.
  "x2="
   378.
  "Clearance of the lowest point O from the water level="
   23.023125
  "Sag at midpoint P="
   7.68
  "Clearance of midpoint P from the water level="
   30.703125
```

2b) A to line has a span of 275 m between level supports. The conductor has an effective diameter of 1.96 cm and diameter and weights o.865 kg/m. its ultimate strength is 8060kg. if the conductor has the coating of radial thickness 1.27 cm and is subjected to a wind pressure of 3.9 gm/m^2 of projected area calculate sag for a safety factor 2 weight of 1 c of ice is 0.91 gm.

SOURCE CODE:

```
clc;
clear;
L=input('span length=');
d=input('diameter=');
W=input('weigth=');
Tu=input('ultimate strength=');
t=input('radial thickness=');
p=input('pressure=');
T=Tu/2;
V=%pi*t*(d+t)*100;
disp('Volume of ICE per metre in cm3=',V);
Wi=0.91*V;
disp('Weight of Ice per metre length=',Wi);
Ww=p*[(d+(2*t))*100];
disp('Wind force per metre length=',Ww);
Wt=sqrt((W+(Wi/1000))^2+(Ww/1000)^2);
disp('Total weight of the conductor=',Wt);
S=(Wt*L^2)/(8*T);
disp('sag;=',S);
```

OUTPUT:

```
span length=275

diameter=1.96

weigth=0.865

ultimate strength=8060

radial thickness=1.27

pressure=3.9

  "Volume of ICE per metre in cm3="
   1288.7127
  "Weight of Ice per metre length="
   1172.7286
  "Wind force per metre length="
   1755.
  "Total weight of the conductor="
   2.6893053

-->
```

3 a) A single phase line has two parallel conductors 2 metres apart. The diameter of each conductor is 1-2 cm. Calculate the loop inductance per km of the line.

SOURCE CODE:

```
clc;

clear;

d=input('enter the spacing between conductor in meter:');

dia=input('enter the diameter of the conductor in meter:');

r=dia/2;

l=input('enter the length of the line in km:');

li=10^(-7)*(1+4*(log(d/r)))*1000

disp('The loop inductance for the given transmission line in Henry per km;=',li)
```

OUTPUT:

```
enter the spacing between conductor in meter:2

enter the diameter of the conductor in meter:0.012

enter the length of the line in km:1000

  "The loop inductance for the given transmission line in Henry per km;="
   0.0024237

-->
```

3 b) The conductor of the 10km long single phase 10 km 2-wire line 1.5m they are separated by a distance of 1.5m. The diameter of each conductor is um1cm if the conductor or off copper. find the inductance of the circuit.

SOURCE CODE:

```
clc;
clear;
l=input('Enter the length of the line in km:');
d=input('Enter the distance between conductor in meter:');
dia=input('Enter the diameter of the each conductor in meter:');
r=dia/2;
li=4*10^(-7)*log(d/(0.7788*r));
disp('The loop inductance for the given transmission line in Henry per m;=',li);
likm=li*1000;
disp('The loop inductance for the given transmission line in Henry per km;=',likm);
lkm=likm*l;
disp('The loop inductance for the given transmission line in Henry per km;=',lkm);
```

OUTPUT:

```
Enter the length of the line in km:10

Enter the distance between conductor in meter:1.5

Enter the diameter of the each conductor in meter:0.01

  "The loop inductance for the given transmission line in Henry per m;="
   0.0000024
  "The loop inductance for the given transmission line in Henry per km;="
   0.0023815
  "The loop inductance for the given transmission line in Henry per km;="
   0.0238151

-->
```

4) Find the inductance per km of a 3-phase transmission line using 1-24 cm diameter conductors when these are placed at the corners of an equilateral triangle of each side 2 m.

SOURCE CODE:

```
clc;
clear;
d=input('Enter the spacing between conductor in centimeter:');
r=input('Enter the radius of the conductor in centimeter:');
Ip=10^(-7)*(0.5+(2*log (d/r)));
disp('The inductance of 3 phase Symmetrical Tr.Line per meter (H/m): ', Ip);
Ip_km=Ip*1000;
disp('Inductance per kilometer (H/km): ',Ip_km);
```

OUTPUT:

```
Enter the spacing between conductor in centimeter:200

Enter the radius of the conductor in centimeter:0.62

  "The inductance of 3 phase Symmetrical Tr.Line per meter (H/m): "
   0.0000012
  "Inductance per kilometer (H/km): "
   0.0012053

-->
```

5) Calculate the inductance of each conductor in a 3-phase, 3-wire system when the conductors are arranged in a horizontal plane with spacing such that D31 = 4 m; D12 = D23 = 2m. The conductors are transposed and have a diameter of 2-5 cm.

SOURCE CODE:

```
clc;
clear;
d1=input('Enter the spacing between conductor in meter D12:');
d2=input('Enter the spacing between conductor in meter D23:');
d3=input('Enter the spacing between conductor in meter D31:');
r=input('Enter the radius of the conductor in meter:');
Deq=(d1*d2*d3)^(1/3);
Iphm=10^(-7)*(0.5+(2*log (Deq/r)));
disp('The inductance of 3 phase Unsymmetrical Tr.Line per meter (H/m):',Iphm);
Iph_km=Iphm*1000;
disp('Inductance per kilometer (H/km):',Iph_km);
```

OUTPUT:

```
Enter the spacing between conductor in meter D12:2

Enter the spacing between conductor in meter D23:2

Enter the spacing between conductor in meter D31:4

Enter the radius of the conductor in meter:0.0125

  "The inductance of 3 phase Unsymmetrical Tr.Line per meter (H/m):"
   0.0000011
  "Inductance per kilometer (H/km):"
   0.0011112

-->
```

6) A single-phase transmission line has two parallel conductors 3 metres apart, radius of each conductor being 1 cm. Calculate the capacitance of the line per km. Given that = 8 * 854 * 10 ^ - 12 * F / m .

SOURCE CODE:

```
clc;

clear;

d=input('Enter the spacing between conductor in centimeter =');

r=input('Enter the radius of the conductor in centimeter =');

Cl=%pi*8.854*10^(-12)/log (d/r);

disp('The Capacitance of the single phase line in F/m =', Cl);

Cl_km=Cl*1000;

disp('The Capacitance of single phase Line in F/km = ',Cl_km);
```

OUTPUT:

```
Enter the spacing between conductor in centimeter = 300

Enter the radius of the conductor in centimeter = 1

  "The Capacitance of the single phase line in F/m ="
   4.877D-12
  "The Capacitance of single phase Line in F/km = "
   4.877D-09

-->
```

7) A 3-phase overhead transmission line has its conductors arranged at the corners of an equilateral triangle of 2 m side. Calculate the capacitance of each line conductor per km. Given that diameter of each conductor is 1-25 cm.

SOURCE CODE:

```
clc;
clear;
d=input('Enter the spacing between conductor in centimeter =');
r=input('Enter the radius of the conductor in centimeter =');
Cl=%pi*2*8.854*10^(-12)/log (d/r);
disp('The Capacitance of the each Conductor in 3 phase Tr line in F/m =', Cl);
Cl_km=Cl*1000;
disp('The Capacitance of the each Conductor in 3 phase Tr line F/km = ',Cl_km);
```

OUTPUT:

```
Enter the spacing between conductor in centimeter =200

Enter the radius of the conductor in centimeter =0.625

  "The Capacitance of the each Conductor in 3 phase Tr line in F/m ="
   9.644D-12
  "The Capacitance  of the each Conductor in 3 phase Tr line F/km = "
   9.644D-09

-->
```

8) A 3-phase, 50 Hz, 66 kV overhead line conductors are placed in a horizontal plane as shown in Fig. 9.26. The conductor diameter is 1-25 cm. If the line length is 100 km, calculate (i) capacitance per phase, (ii) charging current per phase, assuming complete transposition of the line.

SOURCE CODE:

```
clc;
clear;
d1=input('Enter the spacing between conductor in meter D1=');
d2=input('Enter the spacing between conductor in meter D2=');
d3=input('Enter the spacing between conductor in meter D3=');
dia=input('Enter the diameter of the conductor in meter =');
Vline=input('Enter the voltage in kilovolts=');
f=input('Enter the frequency in HZ =');
deq=(d1*d2*d3)^(1/3);
r=dia/2;
NC=%pi*2*8.854*10^(-12)/log (deq/r);
disp('The line neutral capacitance in F/m =', NC);
NC_km=NC*1000;
disp('The The line neutral capacitance in F/km = ',NC_km);
NC_100km=NC*100;
disp('the line to neutral capacitance for 100km line is =',NC_100km);
Ic=((Vline*1000)/1.732)*2*%pi*f*NC;
disp('the charging current per phase is=',Ic);
```

OUTPUT:

```
Enter the spacing between conductor in meter D1=2

Enter the spacing between conductor in meter D2=2.5

Enter the spacing between conductor in meter D3=4.5

Enter the diameter of the conductor in meter =0.0125

Enter the volatge in kilovolts=66

Enter the frequency in HZ =50

  "The line neutral capacitance in F/m ="
   9.100D-12
  "The The line neutral capacitance in F/km = "
   9.100D-09
  "the line to neutral capacitance for 100km line is ="
   9.100D-10
  "the charging current per phase is="
   0.0001089

-->
```

9. A 2-wire d.c. distributor cable AB is 2 km long and supplies loads of 100.4, 1504,2004 and 50A situated 500 m, 1000 m, 1000 m and 2000 m from the feeding point A. Each conductor has a resistance of 0-01 2 per 1000 m. Calculate the p.d. at each load point if a p.d. of 300 V is maintained at point A.

Source code:

```
VA = 300;
R_per_km = 0.01*2;
length_AC = 500;
length_CD = 500;
length_DE = 600;
length_EB = 400;
R_AC = R_per_km * length_AC / 1000;
R_CD = R_per_km * length_CD / 1000;
R_DE = R_per_km * length_DE / 1000;
R_EB = R_per_km * length_EB / 1000;
disp('Section Resistances are = ', R_AC,R_CD,R_DE,R_EB);
I_EB = 50;
I_DE = 50 + 200;
I_CD = I_DE + 150;
I_AC = I_CD + 100;
disp('Section Currents are = ',I_EB,I_DE,I_CD, I_AC);
VC = VA - (I_AC * R_AC);
VD = VC - (I_CD * R_CD);
VE = VD - (I_DE * R_DE);
VB = VE - (I_EB * R_EB);
disp("P.D. at load point C (VC): ", string(VC), " V");
disp("P.D. at load point D (VD): ", string(VD), " V");
disp("P.D. at load point E (VE): ", string(VE), " V");
disp("P.D. at load point B (VB): ", string(VB), " V");
```

OUTPUT:

```
"Section Resistances are = "
 0.01
 0.01
 0.012
 0.008
"Section Currents are = "
 50.
 250.
 400.
 500.
"P.D. at load point C (VC): "
"295"
" V"
"P.D. at load point D (VD): "
"291"
" V"
"P.D. at load point E (VE): "
"288"
" V"
"P.D. at load point B (VB): "
"287.6"
" V"

-->
```

10. A 3-phase transmission line is being supported by three disc insulators. The potentials across top unit (i.e., near to the tower) and middle unit are 8 kV and 11 kV respectively. Calculate (i) the ratio of capacitance between pin and earth to the self-capacitance of each unit (ii)the line voltage and (iii) string efficiency.

SOURCE CODE:

```
V1 = 8;

V2 = 11;

n = 3;

k = (V2 / V1) - 1;

V3 = V2+(V1+V2)*k;

V_total = V1 + V2 + V3;

V_line = 1.732*V_total;

string_efficiency = (V_total/(n*V3))*100;

disp('Ratio of capacitance between pin and earth (C0) to self-capacitance (C)=',k);

disp('Line Voltage (kV)=',V_line);

disp('String Efficiency (%)=',string_efficiency);
```

OUTPUT:

```
"Ratio of capacitance between pin and earth (C0) to self-capacitance (C)="
 0.375
"Line Voltage (kV)="
 64.3005
"String Efficiency (%)="
 68.275862

-->
```

+

11. A short 3-φ transmission line with an impedance of (6 + j 8) Ω per phase has sending and receiving end voltages of 120 kV and 110 kV respectively for some receiving end load at a p.f. of 0•9 lagging. Determine (i) power output and (ii) sending end power factor.

Source code:

```
V_s = 120e3;
V_r = 110e3;
R=6;
XL=8;
Z = R + %i * XL;
pf_r = 0.9;
V_s_phase = V_s / sqrt(3);
disp('Sending End Voltage per phase in Volts=',V_s_phase);
V_r_phase = V_r / sqrt(3);
disp('Receiving End Voltage per phase in Volts=',V_r_phase);
theta_r = acos(pf_r);
disp('Phase angle of the load =',theta_r)
Sintheta=sin(theta_r);
disp('Sin of pf angle',Sintheta);
I_r=(V_s_phase - V_r_phase)/((R*pf_r)+(XL*Sintheta))
P_r = 3* V_r_phase * I_r*pf_r;
disp('Power output in watts = ‘, P_r);
P_r_MW = P_r / 1e6;
disp('The power output at receiving end (P_r) in MW = ',P_r_MW);
pf_s = ((V_r_phase*pf_r)+(I_r*R))/V_s_phase;
disp('Sending End Power Factor: ',pf_s);
```

OUTPUT:

```
"Sending End Voltage per phase in Volts="
 69282.032
"Receiving End Voltage per phase in Volts="
 63508.530
"Phase angle of the load ="
 0.4510268
"Sin of pf angle"
 0.4358899
"Power output in watts = "
 1.114D+08
"The power output at receiving end (P_r) in MW = "
 111.39718
"Sending End Power Factor: "
 0.8812612

-->
```

12. A single core cable of conductor diameter 2 cm and lead sheath of diameter 5.3 cm is to be used on a 60 kV, 3-phase system. Two intersheaths of diameter 3-1 cm and 4-2 cm are introduced between the core and lead sheath. If the maximum stress in the layers is the same, find the voltages on the inters heats

SOURCE CODE:

```
d = 2;
d1 = 3.1;
d2 = 4.2;
D = 5.3;
V_phase = 66 * sqrt(2) / sqrt(3);
g1_max_factor = 2.28;
g2_max_factor = 2.12;
g3_max_factor = 2.04;
V1_ratio = 2.28 / 2.12;
V2_ratio = 2.28 / 2.04;
V = V_phase;
V1 = V / (1 + V1_ratio + V2_ratio);
V2 = V1 * V1_ratio;
V3 = V1 * V2_ratio;
Voltage_first_intersheath = V - V1;
Voltage_second_intersheath = V - V1 - V2;
disp('Voltage on first intersheath= ' ,Voltage_first_intersheath );
disp('Voltage on second intersheath= ', Voltage_second_intersheath);
```

OUTPUT:

```
 "Voltage on first intersheath= "
  37.012241
 "Voltage on second intersheath= "
  18.862008

-->
```

13. Calculation of transmission line parameters using End Condenser method A (medium) single phase transmission line 100 km long has the following constants : Resistance/km = 0•25 Ω ; Reactance/km = 0•8 Ω Susceptance/km = 14 × 10−6 Siemen ; Receiving end line voltage = 66,000 Assuming that the total capacitance of the line is localised at the receiving end alone, determine (i) the sending end current (ii) the sending end voltage (iii) regulation and (iv) supply power factor. The line is delivering 15,000 kW at 0.8 power factor lagging.

SOURCE CODE:

```
R_per_km = 0.25;
X_per_km = 0.8;
B_per_km = 14e-6;
length = 100;
Vr = 66000;                  // Receiving end line voltage (V)
P_load = 15000;              // Power delivered (kW)
pf_load = 0.8;               // Power factor (lagging)
R_total = R_per_km * length;
X_total = X_per_km * length;
B_total = B_per_km * length;
Z_total=R_total+%i*X_total;
disp('Total resistance of the line',R_total)
disp('Total reactance of the line',X_total)
disp('Total susceptance of the line',B_total)
disp('Total Impedance',Z_total);
S_load = P_load * 1000;           // Convert kW to W
Ir = S_load /(Vr * pf_load);
disp('Receiving end current in Amps',Ir);
theta_load = acos(pf_load);         // Load angle in radians
Ir_real = Ir * cos(theta_load);      // Real component of current
Ir_reactive = Ir * sin(theta_load);  // Reactive component of current
disp('Receiving end current in complex form',Ir_real-%i*Ir_reactive);
// Calculate sending end current (Is) considering capacitive effect at receiving end
Ic = Vr * B_total;                  // Capacitive current at receiving end (Amps)
Is_real = Ir_real;                  // Real part of sending end current remains same
Is_reactive = -Ir_reactive + Ic;      // Add capacitive current to reactive part
Is = sqrt(Is_real^2 + Is_reactive^2); // Magnitude of sending end current
```

```
disp('Sending End Current (Is): ', string(Is) , " A");
Vs=Vr + (Is * Z_total);                 // Calculate sending end voltage (Vs)
disp('Sending End Voltage (Vs): ', string(Vs) , " V");
regulation = ((Vs - Vr) / Vr) * 100;  // Voltage regulation percentage
disp('Voltage Regulation: ', abs(regulation), " %");
pf_supply = Is_real / Is;             // Supply power factor (cosine of angle)
disp('Supply Power Factor: ', string(pf_supply));
```

OUTPUT:

```
  "Total resistance of the line"    25
  "Total reactance of the line"    80
  "Total susceptance of the line"    0.0014
  "Total Impedance"    25. + 80.i
  "Receiving end current in Amps"    284.09091
  "Receiving end current in complex form"    227.27273 - 170.45455i
  "Sending End Current (Is): "   "240.30274"   " A"
  "Sending End Voltage (Vs): "   "72007.568+%i*19224.219"   " V"
  "Voltage Regulation: "    30.516726   " %"
  "Supply Power Factor: "   "0.9457767"
```

14. Calculation of Transmission Line Parameters using Nominal−T Method A 3-phase, 50-Hz overhead transmission line 100 km long has the following constants:

Resistance/km/phase = 0.1 Inductive reactance/km/phase = 0•2 Capacitive susceptance/km/phase = 0•04 × 10− 4 Siemen. Determine (i) the sending end current (ii) sending end voltage (iii) sending end power factor and (iv) transmission efficiency when supplying a balanced load of 10,000 kW at 66 kV, p.f. 0•8 lagging. Use nominal T method.

SOURCE CODE:

```
R_km_phase = 0.1;
Xl_km_phase = 0.2;
B_km_phase = 0.04 * 10^(-4);
L = 100;
VR_line= 66000;
VR_phase = VR_line / sqrt(3);
disp('Receiving end voltage per phase in V=',VR_phase);
S_load = 10000 * 10^3;
pf_load = 0.8;
theta_R = acos(pf_load);
R = R_km_phase * L;
XL = Xl_km_phase * L;
Y = %i * B_km_phase * L;
disp('Total Resistance in ohms =',R)
disp('Total Reactance in ohms=',XL)
disp('Total Susceptance in mho',Y)
IR = S_load / (sqrt(3) * VR_line *pf_load);
disp('Receiving end current magnitude in A',IR);
Z = R + %i * XL;
IR_angle = -theta_R;
IR_phasor = IR * exp(%i * IR_angle);
disp('Receiving end current in complex form A',IR_phasor);
VC = VR_phase + IR_phasor * (Z/2);
IC = Y * VC;
IS = IR_phasor + IC;
disp('Sending end current (IS): ' , abs(IS) , " A");
VS = VC + IS * (Z/2);
```

```
disp('Sending end voltage (VS): ', abs(VS) / 1000 , " kV");
theta_S = atan(imag(IS) / real(IS));
pf_S = cos(theta_S);
disp('Sending end power factor: ' , pf_S);
P_sending = 3 * abs(VS) * abs(IS) * pf_S;
P_received = S_load;
efficiency = (P_received / P_sending) * 100;
disp('Transmission efficiency: ', efficiency , " %");
```

OUTPUT:

```
 "Receiving end voltage per phase in V="
  38105.118
 "Total Resistance in ohms ="
  10.
 "Total Reactance in ohms="
  20.
 "Total Susceptance in mho"
  0. + 0.0004i
 "Receiving end current magnitude in A"
  109.34664
 "Receiving end current in complex form A"
  87.477314 - 65.607985i
 "Sending end current (IS): "
  100.53321
 " A"
 "Sending end voltage (VS): "
  40.151204
 " kV"
 "Sending end power factor: "
  0.8679581
 "Transmission efficiency: "
  95.141903
 " %"

-->
```

15. A 3-phase, 50Hz, 150 km line has a resistance, inductive reactance and capacitive shunt admittance of 0•1 Ω, 0•5 Ω and 3 × 10−6 S per km per phase. If the line delivers 50 MW at 110 kV and 0•8 p.f. lagging, determine the sending end voltage and current. Assume a nominal π circuit for the line.

SOURCE CODE:

```
R = 0.1 * 150;
X = 0.5 * 150;
Y = 3e-6 * 150;
Vr = 110e3 / sqrt(3);
Pr = 50e6;
pf = 0.8;
Ir_mag = Pr / (3 * Vr * pf);
phi_r = acos(pf);
Ir = Ir_mag * (cos(-phi_r) + %i * sin(-phi_r));
Ic1 = %i * Y / 2 * Vr;
Il = Ir + Ic1;
Z = R + %i * X;
Vs = Vr + Il * Z;
Vs_line = abs(Vs) * sqrt(3);
Ic2 = %i * Y / 2 * Vs;
Is = Il + Ic2;
disp(abs(Vs), "Phase Sending end Voltage (V): ");
disp(Vs_line, "Line-to-line Sending end Voltage (V): ");
disp(abs(Ir), "Magnitude of Receiving end Current (A): ");
disp(abs(Il), "Magnitude of Line Current (A): ");
disp(abs(Is), "Magnitude of Sending end Current (A): ");
```

OUTPUT:

```
   82885.561
  "Phase Sending end Voltage (V): "
   143562.00
  "Line-to-line Sending end Voltage (V): "
   328.03993
  "Magnitude of Receiving end Current (A): "
   319.67074
  "Magnitude of Line Current (A): "
   306.38482
  "Magnitude of Sending end Current (A): "

-->
```