clc

clear all

close all

Power=85000;%input('Enter the power to be transmitted: ')

Length=160;%('Enter the length of TL: ')

pf=0.9;%('Enter the power factor: ')

f=50;

%data specified in question

llv=[11 33 66 110 132 166 230];

line.loading=1e06.\*[0.024 0.2 0.6 11 20 35 90];

cross.area=[0.1935 0.2580 0.3225 0.3870 0.4515 0.5160 0.5805 0.6450 0.9675 1.290 1.6125];

current\_capacity=[100 127 148 170 190 210 230 255 350 425 505];

nominal\_area=1e-3.\*[161 322 387 484 645 645 805 968 1125 1290 1613];

strands=[30 26 54];

alu\_strand=[6 6 6 6 6 7 30 30 30 30 30];

diameter=1e-3.\*[708 1005 1097 1227 1417 1458 1654 1814 1956 2013 2347];

radius=diameter/2;

resistance\_per\_km=1e-4.\*[10891 5400 4550 3640 2720 2700 2200 1832 1572 1370 1091];

Ds=[0.826 0.809 0.810];

spacing=[1 1.3 2.6 5 6 8 10.2];

% Tables

Table\_v=[transpose(llv) transpose(line.loading)] ;

Table\_Conductor\_area=[transpose(cross.area) transpose(current\_capacity)];

Table\_Nominal\_area\_selection=[transpose(nominal\_area) transpose(cross.area)];

Table\_Strand\_selection=[transpose(alu\_strand) transpose(nominal\_area)];

Table\_Diameter\_selection=[transpose(diameter) transpose(nominal\_area)];

Table\_Resistance\_selection=[transpose(resistance\_per\_km) transpose(nominal\_area)];

Table\_Strands\_selection=[];

Table\_Selection\_Ds=[transpose(Ds) transpose(strands)];

Table\_Spacing\_selection=[transpose(spacing) transpose(llv)] ;

%Power(total)that is to be transmitted over the length

KWKM=Power\*Length;

% selection of voltage level for transmitting p(total)

Vr=sel(KWKM,Table\_v);

% Loop initialization

p=0;

while p==0

Ir=(Power/(sqrt(3)\*Vr\*pf)); % Current Calculation

conductor\_area=sel(Ir,Table\_Conductor\_area); % Size selection

Area=sel(conductor\_area,Table\_Nominal\_area\_selection);% Selection of nominal area

Strand=sel(Area,Table\_Strand\_selection); %selection of aluminium strands

Diameter=sel(Area,Table\_Diameter\_selection);%selection of diameter

resistance=sel(Area,Table\_Resistance\_selection); %selection of resistance

Ds=(sel(Strand,Table\_Selection\_Ds))\*(Diameter/2); %selection of Ds

Spacing=sel(Vr,Table\_Spacing\_selection);%selection of spacing

Dm=Spacing\*100;

%Calculation of inductance

l=((2)\*(10^-7)\*(log(Dm/Ds)))\*160\*1000;

%Calculation of capacitance

Cap=((5.563)\*(10^-11)/(log(Dm/(Diameter/2))))\*160\*1000;

%Calculation of Inductive reactance

Xl=2\*pi\*f\*l;

%Calculation for Series Impedance

Z=(resistance\*Length)+(i\*Xl);

% Calculation for Shunt Admitance

Y=i\*2\*pi\*f\*Cap;

%Transmission line parameters

A=1+((Y\*Z)/2);

B=Z;

D=A;

C=Y\*(1+((Y\*Z)/4));

%receiving end voltage

VR=(Vr\*1000)/sqrt(3);

%receiving end current

I\_r=complex(Ir\*cos(acos(0.9)),-Ir\*sin(acos(0.9)));

%sending end voltage

V.s=(A\*VR)+(B\*I\_r);

Vs=abs(V.s);

%sending end current

I.s=(C\*VR)+(D\*I\_r);

Is=abs(I.s);

%Voltage Regulation

per\_Vr=((abs(Vs)- VR))/ VR \*100

% condition for efficiency

angle\_Is=angle(I.s);

angle\_Vs=angle(V.s);

Vin=sqrt(3)\*Vs;

power\_factor=cos(angle\_Is+angle\_Vs);

Pin=(sqrt(3)\*Vin\*Is\*power\_factor)/1e3;

efficiency = (Power/Pin)\*100

%Checking condition for voltage regulation

if per\_Vr<=12.5

p=1;

else

Vr=increment(Vr,llv);

end

end

Function files

function [x] = sel(y,tab)

n=size(tab);

t=n(1,1);

for m= 2:1:t

if y>tab(m-1,2) && y<=tab(m,2)

x=tab(m,1)

end

end

end

function [y] = increment(x,Vl)

con=0;

ii=0;

while con==0

ii=ii+1;

if x==Vl(ii)

y=Vl(ii+1);

con=1;

end

end

end