MATLAB ASSIGNMENT-1

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BATCH:- E2

Q-1: - Develop program in MATLAB to determine GMRL and GMRC for a composite conductor having 7 identical strands of radius 'r' each?

Ans

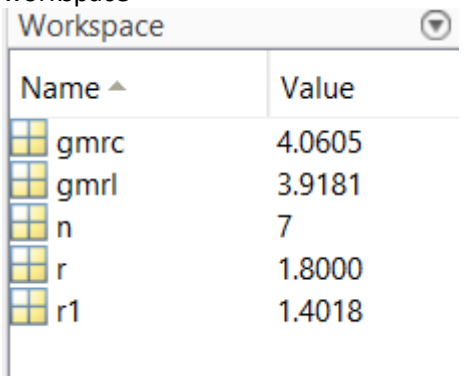
Code->

```
r = input("enter the value of radius");
n = 7;
r1 = 0.7788*r;
gmrl = (((r1*2*r*2*sqrt(3)*r*4*r*2*r*2*r*2*r*2*sqrt(3)*r)^6)*(r1*((2*r)^6)))^(1/(n*n));
gmrc = (((r*2*r*2*sqrt(3)*r*4*r*2*r*2*r*2*r*2*sqrt(3)*r)^6)*(r*((2*r)^6)))^(1/(n*n));
```

command line code->

enter the value of radius = 1.8

workspace->



Q-2: - Develop program in MATLAB to determine GMRL and GMRC of bundle conductor having bundle spacing of 'd' having total number of conductor 2, 3 (equilateral triangle configuration) or 4 (square configuration) each of radius 'r'.

Ans

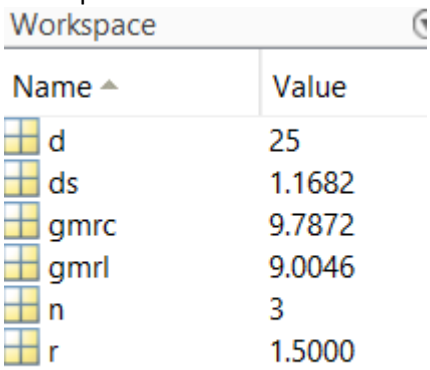
Code→

```
r = input("enter the radius of the conductor = ");
d = input("enter the distance between the conductors = ");
n = input("enter the number of the conductors = ");


ds = 0.7788*r;
gmrl =0;
gmrc =0;
```

```
if(n == 2)
   gmrl = (d*ds)^(1/2);
    gmrc =(r*d)^(1/2);
elseif(n==3)
    gmrl = (ds*d*d)^(1/3);
    gmrc = (r*d*d)^(1/3);
elseif n==4
   gmrc = (2^(1/8))*((r*d*d*d)^(1/4))
   gmrl = (2^(1/8))*((ds*d*d*d)^(1/4))

end
disp(gmrl)
disp(gmrc)
```

command line code→
enter the radius of the conductor = 1.5
enter the distance between the conductors = 25
enter the number of the conductors = 3
9.0046

9.7872
Workspace→



Q-3:-Develop program in MATLAB to determine line constants L and C for an overhead 3 phase general transmission line considering following options:

I. Type of conductor
- **1. Single conductor**
- **2. Bundle conductor (with configuration)**

II. Number of Three phase circuits
- **1. Single circuit**
- **2. Double circuit vertical configuration**
- **3. Double circuit Horizontal configuration**

III. For double circuit configuration - the circuit arrangement
- **1. abc-c'b'a'**
- **2. abc-a'b'c'**

IV. Whether the line is transposed or not

Ans
Code→

```
clc ;
clear;
[GMD,GMRL,GMRC] = gmd;
L = 2*(10^(-1*7))*log(GMD/GMRL);
C = (2*3.14*8.85*(10^(-1*12)))/log(GMD/GMRC);
```

Gmd function code→

```
function[GMD,GMRL,GMRC] = gmd
clc;
clear;

par=[
' Parameters of transposed transmission lines     '
'                                    '
' Number of three phase circuits         Enter   '
' -----------------------------         -----   '
' Single circuit line                      1     '
' Double circuit vertical configuration    2     '
' Double circuit horizontal configuration  3     '
' To quit                                  0     '
'                                     '];
disp(par);

nc= input('select number of menu');
if nc==0
   return;


elseif nc==1
ckt1 = [
 '         b                                                '
 '         O                For spacing unit use             '
 '        / \                m within quotes or           '
 '       /   \               ft within quotes.              '
 '      /     \                                             '
 '   D12     D23                                           '
 '    /          \                a              b             c '
 '   /             \              O----D12----O----D23----O '
 a/                 \c                          '
 O------D13------O    OR        ----------D13---------- '];


  disp(ckt1);
  disp('the unit considered for spacing is m ');

  space=input('enter row vector[D12,D23,D13] =');
  D12= space(1); D23= space(2);D13=space(3);
  GMD=(D12*D23*D13)^(1/3);


 elseif nc==2
```

```
ckt2 = [
' Circuit Arrangements       a O-----S11-----O  c`(a`)    '
' --------------------          |                          '
' (1) abc-c`b`a                H12                         '
' (2) abc-a`b`c`                 |                         '
'                             b O--------S22--------O b`(b`)   '
'                                |                         '
'                               H23                          '
'                               c|         a`(c`)            '
'                                O----S33----O               '];


   disp(ckt2);
   nph= input(" Enter (1 or 2') ->");

   disp('the unit considered for spacing is m ');
   S=input('The enter the row vector [S11,S22,S33]=');
   H= input('The enter the row vector [H12,H23]=');

   S11=S(1); S22=S(2); S33=S(3);H12=H(1); H23=H(2);
   a1=-S11/2 + j*H12;
   b1=-S22/2 + j*0;
   c1=-S33/2 - j*H23;

   if nph == 1
   a2=S33/2 - j*H23;
   b2=S22/2 + j*0;
   c2=S11/2 + j*H12;

   elseif nph==2
   c2=S33/2 - j*H23;
   b2=S22/2 + j*0;
   a2=S11/2 + j*H12;
   end

elseif nc==3
 ckt3 = [
'      a              b          c              a`(c`)        b`(b`)     c`(a`)'
'      O---D12---O---D23---O-----S11------O---D12---O---D23---O '
'       --------D13--------                    --------D13--------      '
'                                                                      '
' Circuit Arrangements                 For spacing unit use        '
' --------------------                 m within quotes or          '
' (1) abc-a`b`c`                       ft within quotes.           '
' (2) abc-c`b`a`                                                   ' ];
   disp(ckt3);

   nph=input('enter (1 or 2)->');

   disp('THE unit considered for spacing is m');
```

```
   S=input('The enter the row vector [D12,D23,D13]=');

   S11=input('enter Distance between two circuits, S11=');

   D12=S(1);D23=S(2);D13=S(3);
   a1= -(D13+S11/2);
   b1= -(D23+S11/2);
   c1= -S11/2;

   if nph==1
    a1= S11/2;
    b2= D12 + S11/2;
    c2= D13 + S11/2;

   elseif nph==2

    a2 = D13+S11/2;
    b2 = D12+S11/2;
    c2 = S11/2;
   end
end
if nc==2 | nc==3
   Da1b1 = abs(a1-b1); Da1b2 =abs(a1-b2);
   Da1c1 = abs(a1-c1); Da1c2 =abs(a1-c2);
   Db1c1 = abs(b1-c1); Db1c2 =abs(b1 - c2);

   Da2b1 = abs(a2-b1); Da2b2 =abs(a2-b2);
   Da2c1 = abs(a2-c1); Da2c2 =abs(a2-c2);
   Db2c1 = abs(b2-c1); Db2c2 =abs(b2-c2);

   Da1a2 = abs(a1-a2);
   Db1b2 = abs(b1 -b2);
   Dc1c2 = abs(c1 - c2);

   DAB=(Da1b1*Da1b2* Da2b1*Da2b2)^0.25;
  DBC=(Db1c1*Db1c2*Db2c1*Db2c2)^.25;
  DCA=(Da1c1*Da1c2*Da2c1*Da2c2)^.25;
  GMD=(DAB*DBC*DCA)^(1/3);


end

disp('the unit considered for conductor sizes and bundle spacing in cm')

dia = input ("conductor diameter in cm=");
Ds = input ("geometric mean in cm=");      r = dia/2;
nb= input('enter no of bundel enter (1 for singlecond.) = ');

if nb>1
   d = input('bundle spacing in cm = ');
```

```
else
   d = 0;
end

Ds = Ds/100;    r = r/100;   d= d/100;

if nb == 1
   Dsb = Ds;                    rb = r;
elseif nb == 2
   Dsb = (d*Ds)^(1/2);            rb = (d*r)^(1/2);
elseif nb == 3
   Dsb = (d^2*Ds)^(1/3);          rb = (d^2*r)^(1/3);
elseif nb == 4
   Dsb = 2^0.125*(d^3*Ds)^(1/4);    rb = 2^0.125*(d^3*r)^(1/4);
end




if nc==1
   GMRL=Dsb;   GMRC= rb;
elseif nc==2 | nc==3
   DSA=sqrt(Dsb*Da1a2);    rA=sqrt(rb*Da1a2);
   DSB=sqrt(Dsb*Db1b2);    rB=sqrt(rb*Db1b2);
   DSC=sqrt(Dsb*Dc1c2);    rC=sqrt(rb*Dc1c2);
   GMRL=(DSA*DSB*DSC)^(1/3);   GMRC = (rA*rB*rC)^(1/3);

End
```

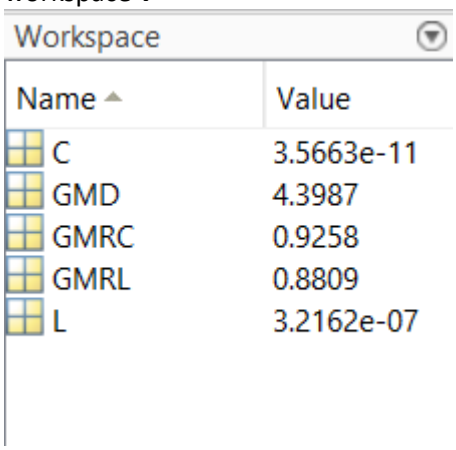
Command line code→

Parameters of transposed transmission lines

```
 Number of three phase circuits         Enter
 -----------------------------         -----
 Single circuit line                     1
 Double circuit vertical configuration     2
 Double circuit horizontal configuration   3
 To quit                                 0

select number of menu2
 Circuit Arrangements       a O-----S11-----O  c`(a`)
 --------------------                 |
 (1) abc-c`b`a`                 H12
 (2) abc-a`b`c`                   |
                              b O--------S22--------O b`(b`)
                                   |
                                H23
                                  c|          a`(c`)
                                   O----S33----O
 Enter (1 or 2') ->1
the unit considered for spacing is m
```

The enter the row vector [S11,S22,S33]=[4,5.5,4]
The enter the row vector [H12,H23]=[3,3]
the unit considered for conductor sizes and bundle spacing in cm
conductor diameter in cm=1.5
geometric mean in cm=0.504
enter no of bundel enter (1 for singlecond.) = 4
bundle spacing in cm = 30

workspace→



Q-4:- Develop program in MATLAB for A double circuit 3 phase transmission line is composed of two ACSR, 2,16,7000-cmil, 72/7 Kiwi conductor per phase with vertical configuration as shown in the figure. the conductor have the diameter of 4.4069 cm and a GMR of 1.7374 cm. The bundle spacing is 45 cm. Find the inductance and capacitance per phase per kilometre of the line and verify the result using MATLAB program developed in Ex. 3, if the line is untransposed. Neglect the effect of earth. (cmil-A circular mil is a unit of area, equal to the area of a circle with a diameter of one mil (one thousandth of an inch).

Ans

Code→

```
clc;
clear;
[GMD,GMRL,GMRC] =gmd;
L = 2*(10^(-1*7))*log(GMD/GMRL);
C = (2*3.14*8.85*(10^(-1*12)))/log(GMD/GMRC);
```

Command line→

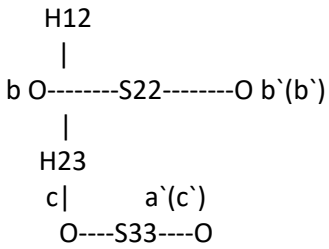
Parameters of transposed transmission lines

Number of three phase circuits	Enter
Single circuit line	1
Double circuit vertical configuration	2
Double circuit horizontal configuration	3
To quit	0

select number of menu2

```
Circuit Arrangements       a O-----S11-----O  c`(a`)
--------------------                |
```

(1) abc-c`b`a`
(2) abc-a`b`c`



Enter (1 or 2') ->1
the unit considered for spacing is m
The enter the row vector [S11,S22,S33]=[16,24,17]
The enter the row vector [H12,H23]=[10,9]
the unit considered for conductor sizes and bundle spacing in cm
conductor diameter in cm=4.4069
geometric mean in cm=1.7374
enter no of bundel enter (1 for singlecond.) = 2
bundle spacing in cm = 45