# SAVEETHA SCHOOL OF ENGINEERIING,

**SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES**

# TRANSMISSION LINES

**& WAVEGUIDES**

# ECA15

**NAME:**

# REG.NO:

**LAB MANUEL**



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**Investigating the significance of Characteristic Impedance (Zo), and Propagation Constant (γ) of a Transmission Line using the following parameters**

# Resistance

1. **Capacitance**

# Inductance

1. **Conductance**

# Experiment Number:1

**AIM:** Finding Characteristic Impedance, and Propagation Constant of a Transmission Line for the given values of R,L,G and C

# SOFTWARE REQUIRED:

SCILAB Version 6.1.1

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

# PROGRAM:

clear; clc;

R=10;L=.0037;f=1000;G=.4\*(10^-6);C=.0083\*(10^-6);

w=2\*%pi\* f; Z=R+(%i\*

w\*L);

Y=G+(%i\*

w\*C); Zo=sqrt(Z/ Y);

C=round(re

al(Zo)); D=round(i mag(Zo));

printf('-Zo = %f + j(%f) ohms\n',C,D); P=sqrt(Z\*Y); a=real(P); a1=round(a\*1000 0)/10000;

printf('-Attenuation constant a = %f neper/km\n',a1); b=imag(P); b1=round(b\*10000)/10000;

printf('-Phase constant b = %f radians/km',b1);

# OUTPUT:

Variable R

Constants L=.0037; f=1000; G=.4\*(10^-6); C=.0083\*(10^-6).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Inputs (R)** | **Outputs** | | |
| **Z0(ohms)** | **α(neper/km)** | **β(radians/km)** |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |

Variable L

Constants R=20; f=1000; G=.4\*(10^-6); C=.0083\*(10^-6);

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Inputs (L)** | **Outputs** | | |
| **Z0(ohms)** | **α (neper/km)** | **β (radians/km)** |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |

Variable f

Constants R=20; L=.009; G=.4\*(10^-6); C=.0083\*(10^-6);

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Inputs (f)** | **Outputs** | | |
| **Z0(ohms)** | **α (neper/km)** | **β (radians/km)** |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |

Variable C

Constants R=20; L=.009; f=2500; G=.4\*(10^-6);

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Inputs (C)** | **Outputs** | | |
| **Z0(ohms)** | **α (neper/km)** | **β (radians/km)** |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |

# RESULT:

The characteristic impedance and propagation constant of a transmission line is calculated using SCILAB and the impact of primary constants on secondary constants are investigated.

# Estimation of Primary Constants (R,L,G &C) from Secondary Constants (Zo & γ )of an open wire transmission line

**Experiment Number:2**

**AIM:** To estimate the primary constants of a transmission line from Secondary Constants (Zo & γ )of an open wire transmission line

# SOFTWARE REQUIRED:

SCILAB

**PROCEDURE:** ● Open SCILAB software

* + - Open file-new
    - Put the input values
    - Type the program
    - Execute the program
    - End the program

# PROGRAM:

clear; clc;

Zo=2039.6;f=800; //value of Zo as taken in solution P=0.054\* exp(%i\*(%pi/(180/87.9)));

w=2\*%pi\*f;

Z=Zo\*P;

R=real(Z);

printf('-Resistance R = %f ohms/km\n',R); L=(imag(Z))/w;

printf('-Inductance L = %f mH/km\n',L\*(10^3)); Y=P/Zo;

G=real(Y);

printf('-Conductance G = %f micromhos/km\n',G\*(10^6)); C=((imag(Y))/w)\*(10^6);c=round(C\*10000)/10000 printf('-Capacitance C = %f microfarads/km\n',c);

# OUTPUT:

Variable Zo; Constant F= 800 Hz;

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No** | **Input (Zo)**  **ohms** | **Outputs** | | | |
| **R(ohms/km)** | **L(mH/km)** | **G(microohms/km)** | **C(microfarads/km)** |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |

Variable f;

Constant Zo=3000 Ω;

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S. No** | **Input(f)**  **MHz** | **Outputs** | | | |
| **R(ohms/km)** | **L(mH/km)** | **G(microohms/km)** | **C(microfarads/km)** |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |

# RESULT:

The primary constants of a transmission line are estimated using SCILAB and the impact of frequency and characteristic impedance on the output is studied.

# Examining the impact of open and short circuited loads on a)Characteristic Impedance

1. **Propagation Constant**

# Experiment Number:3

**AIM:** To examine the impact of open and short circuited loads on Characteristic Impedance and Propagation Constant

# SOFTWAREREQUIRED:

SCILAB

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

# PROGRAM:

clear; clc;

Zoc=2000\*exp(%i\*(-%pi/(180/80)));Zsc=20\*exp(%i\*(%pi/(180/20)));l=0.5;w=10000;

//value of length of cable as taken in solution Zo=sqrt(Zoc\*Zsc);

C=real(Zo);

D=imag(Zo);

printf("-Zo = %f /\_ %f ohms\n",abs(Zo),atan(D,C)\*180/%pi); A=atanh(sqrt(Zsc/Zoc));

P=A/l; a=real(P);

printf("-a = %f neper/km\n",fix(a\*10000)/10000); b=imag(P);

printf("-b = %f henry/km",round(b\*10000)/10000);

# OUTPUT: Z

o c

= C

o n s t a n t V

a r i a b l e

- Z

s c

|  |  |  |
| --- | --- | --- |
| Zsc | Zo | γ |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

V

a

Z r

s i

c a

= b

C l

o e

n -

1. Z
2. o

a c

n t

|  |  |  |
| --- | --- | --- |
| Zoc | Zo | γ |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# RESULT:

The impact of open and short circuited loads on Characteristic Impedance and Propagation Constant is investigated over various values of Zsc and Zoc.

# Evaluation of current and voltage of short circuited Lossless transmission line at the receiving end

**Experiment Number:4**

**AIM:** To evaluate the value of current and voltage of short circuited Lossless transmission line at the receiving end

# SOFTWAREREQUIRED:

SCILAB

# PROCEDURE:

* Open SCILAB software
* Open file-new
* Put the input values
* Type the program
* Execute the program
* End the program

# PROGRAM:

clear; clc;

Zo=600;a=0.1;b=0.05;x=10;Is=20\*(10^-3); Vr=0;

printf("-Receiving end voltage Vr=0 because the receiving end has been short ciruited\n"); P=a+(%i\*b);

Ir=Is/(cosh(10\*P));

A=real(Ir);

B=imag(Ir);

printf("-Received current is Ir = %f /\_ %f mA ",round(abs(Ir)\*(10^3)\*100)/100,fix(atan(B,A)\*180\*10/%pi)/10);

# OUTPUT:

|  |  |
| --- | --- |
| α | Current IR (mA) |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

|  |  |
| --- | --- |
| β | Current IR (mA) |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**RESULT:**The value of current and voltage of short circuited Lossless transmission line at the receiving end are determined using SCILAB for various values of short circuited load impedance.

# Analysis of SWR (Standing Wave Ratio) Transmission Lines by varying

1. **load impedance b)characteristic impedance**

# Experiment Number:5

**AIM:** To analyze the impact of load impedance and characteristic impedance on SWR

# SOFTWAREREQUIRED:

SCILAB Version 6.1.1

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

# PROGRAM:

clc; clear; close;

Zo=200;ZR=650-(%i\*475);

K=(ZR-Zo)/(ZR+Zo);

ampK=sqrt((real(K)^2)+(imag(K)^2)); S=(1+ampK)/(1-ampK);

printf("(c)Standing wave ratio = %f",round(S\*1000)/1000);

# OUTPUT:

**Zo=50 ohms Variable: ZR**

|  |  |
| --- | --- |
| **ZR Ohms** | **SWR** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# ZR=50/\_40o ohms Variable: Zo

|  |  |
| --- | --- |
| **Zo Ohms** | **SWR** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**RESULT:**

The impact of load impedance and characteristic impedance on SWR is estimated using SCILAB by varying the of the load impedance and characteristic impedance

# Exploration of the relationship between position of Voltage minima nearest to the load by varying magnitude of reflection coefficient K

**Experiment Number:6**

**AIM:** To explore the relationship between position of Voltage minima nearest to the load by varying magnitude of reflection coefficient K

# SOFTWAREREQUIRED:

SCILAB Version 6.1.1

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

# PROGRAM:

clear; clc;

Zo=50;f=300\*(10^6);ZR=50+(%i\*50);

lo=300/(f\*(10^-6)); //where f is in megahertz ,lo=wavelength of wave in air K=(ZR-Zo)/(ZR+Zo);

ampK=sqrt((real(K)^2)+(imag(K)^2)); S=(1+ampK)/(1-ampK);

printf("-VSWR = %f\n",round(S\*100)/100); phi=atan(imag(K)/real(K)); ymax=phi\*lo/(2\*2\*%pi); ymin=ymax+(lo/4);

printf("-Position of voltage minimum nearest load = %f metres",round(ymin\*10000)/10000);

# OUTPUT: Z

**o**

# = 5

**0**

# o h m s V

**a r i a b l e**

# : Z

**R**

|  |  |
| --- | --- |
| ZR Ohms | **SWR** |
|  |  |
|  |  |
|  |  |
|  |  |

# ZR=50/\_40o ohms Variable: Zo

|  |  |
| --- | --- |
| **Zo Ohms** | **SWR** |
|  |  |
|  |  |
|  |  |
|  |  |

RESULT: The relationship between position of Voltage minima nearest to the load is studied by varying magnitude of reflection coefficient K using Scilab.

.

# Designing a Quarter wave transformer by varying following parameters

1. **frequency**

# input impedance

1. **characteristic impedance**

# Experiment Number:7

**AIM:** To Design a Quarter wave transformer by varying following parameters

1. frequency
2. input impedance
3. characteristic impedance

# SOFTWAREREQUIRED:

SCILAB

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

**PROGRAM:**

clear; clc;

Zr=100;s=9;d=0.1;

Zs=50;

Ro=sqrt(Zs\*Zr);f=100\*(10^6); r=d/2;

Zof=276\*log10(s/r);

Zoq=sqrt(Zr\*Zof);

L=300/(f\*(10^-6));

printf("length of lambda/4 transformer = %f lambda\n",L);

printf("characteristic impedance of quarter wave line = %f ",fix(Ro\*10000)/10000);

# OUTPUT:

**ZR=50 ohms Variable: ZS**

|  |  |
| --- | --- |
| **ZS** | **Ro** |
|  |  |
|  |  |
|  |  |
|  |  |

# ZS=50 ohms Variable: ZR

|  |  |
| --- | --- |
| **ZR** | **Ro** |
|  |  |
|  |  |
|  |  |
|  |  |

|  |  |
| --- | --- |
| **Frequency** | **Length of λ/4 transformer** |
|  |  |
|  |  |
|  |  |
|  |  |

RESULT: Quarter wave transformer by varying frequency, input impedance and characteristic impedance

# Strategize impedance matching with characteristic impedance and load impedance through the measurement of

1. **Location of the stub**

# Length of the stub

**Experiment Number:8**

**AIM:** To calculate the location and length of single stub for varying characteristic impedance and load impedance

# SOFTWAREREQUIRED:

SCILAB

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

# PROGRAM:

clear; clear; clc;

ZR=100;Zo=600;f=100\*(10^6);

lo=300/(f\*(10^-6)); //lo=wavelength Ls=(lo/(2\*%pi))\*(atan(sqrt(ZR/Zo)));

printf("-Point of attachment = %f cms\n",round(Ls\*(10^2)\*10)/10) Lt=(lo/(2\*%pi))\*(%pi+(atan((sqrt(ZR\*Zo))/(ZR-Zo))));

printf("-Length of the short circuited stub = %f cms",round(Lt\*(10^2)));

# OUTPUT:

Variables ZR;

Constants Zo = 600; f=100\*(10^6);

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | |
| **ZR**  **Ohms** | **Point of attachment** | **Length of short-circuited stub** |
| 100 |  |  |
| 150 |  |  |
| 200 |  |  |
| 250 |  |  |
| 350 |  |  |

Variable Zo;

Constants ZR =100; f=100\*(10^6);

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | |
| **Zo**  **Ohms** | **Point of attachment** | **Length of short-circuited stub** |
| 600 |  |  |
| 900 |  |  |
| 1200 |  |  |
| 1500 |  |  |
| 1800 |  |  |

# RESULT:

The location and length of single stub are calculated using SCILAB.

# Analysis of Electromagnetic Waves across the two parallel plates estimating the following

1. **Critical Wavelength**

# Guide Wavelength Experiment Number:9

**AIM**: To analyze the critical and guide wavelength of Electromagnetic waves between parallel plates

# SOFTWAREREQUIRED:

SCILAB Version 6.1.1

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

# PROGRAM:

clear; clc;

c=3\*(10^8); f=3000\*(10^8);

lo=c/f; l=lo\*(10^4); m=1;n=0;a=7.62;

lc=2\*a;

printf("-Critical wavelength = %f cm\n",lc); lg=sqrt((l\*l\*lc\*lc)/((lc\*lc)-(l\*l)));

printf("-Guide wavelength = %f cm",round(lg\*10)/10);

# OUTPUT:

|  |  |  |
| --- | --- | --- |
| **Spacing a(cm)** | **Critical wavelength** | **Guide wavelength** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**RESULT:**

The critical wavelength and guide wavelength of Electromagnetic waves between two parallel plates are calculated using SCILAB

# Determination of Dominant mode of Rectangular waveguides by examining the TE and TM modes

**Experiment Number:10**

**AIM:** To determine the dominant mode in a waveguide by examining the TE and TM modes

# SOFTWAREREQUIRED:

SCILAB Version 6.1.1

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

# PROGRAM:

clc; clear; close;

//TE10 Mode a=8.636\*10^-2; b=4.318\*10^-2;

f=4\*10^9;

V=3\*10^8;

m=input("enter the value of m= "); n=input("enter the value of n= ");

fc=(V/(2\*3.14))\*sqrt((m\*3.14/a)^2+(n\*3.14/b)^2); disp("Cut off frquency=",fc\*10^-9);

# OUTPUT:

Variable: a , Constant: Zs = 600; N=477; C=3\*(10^8),b=5 cm;

|  |  |
| --- | --- |
| **TE Mode (m,n)** | **Cutoff frequency GHz** |
| **TE 1,0** |  |
| **TE 1,1** |  |
| **TE 1,2** |  |
| **TE 2,1** |  |
| **TE 2,2** |  |

|  |  |
| --- | --- |
| **TM Mode (m,n)** | **Cutoff frequency GHz** |
| **TM 3,1** |  |
| **TM 1,1** |  |
| **TM 2,1** |  |
| **TM 1,2** |  |
| **TM 1,3** |  |

# RESULT:

The dominant mode in a waveguide is estimated using SCILAB.

# Calculation of Group velocity, Phase velocity and phase constant of EM waves in rectangular waveguides

**Experiment Number:11**

**AIM:** To find the group velocity, phase velocity and phase constant of Electromagnetic waves in Rectangular Waveguides

# SOFTWARE REQUIRED:

SCILAB Version 6.1.1

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

# PROGRAM:

clc; clear; close;

//TE10 Mode a=8.636\*10^-2; b=4.318\*10^-2;

f=4\*10^9;

V=3\*10^8;

m=input("enter the value of m= "); n=input("enter the value of n= ");

fc=(V/(2\*3.14))\*sqrt((m\*3.14/a)^2+(n\*3.14/b)^2); disp("Cut off frquency=",fc\*10^-9);

//let phase velocity = A A=V/sqrt(1-(fc/f)^2);

disp("Phase velocity in Mm/sec=",A\*10^-6);

//let group velocity = B B=V\*V/A;

disp("Group velocity in Mm/sec =", B\*10^-6);

# OUTPUT:

variable a;

constant b=4; f=9\*(10^9); c=3\*(10^8); n=377;

|  |  |  |
| --- | --- | --- |
| **Input a (cm)** | **Output** | |
| **Phase velocity(m/sec)** | **Group Velocity(m/sec)** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Variable f requency

Constants a=4; b=4; c=3\*(10^8); n=377;

|  |  |  |
| --- | --- | --- |
| **Freq uenc y (Hz)** | **Output** | |
| **Phase velocity(m/sec)** | **Group Velocity(m/sec)** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# RESULT:

The group velocity, phase velocity and phase constant of waves in a rectangular waveguide are estimated using SCILAB.

# . Examining the propagation characteristics of circular waveguide in terms of a)Cutoff wavelength

1. **Guide wavelength**

# characteristic impedance

**Experiment Number:12**

**AIM:** To determine the propagation characteristics of circular waveguide in terms of Cutoff wavelength. Guide wavelength and characteristic impedance

# SOFTWAREREQUIRED:

SCILAB Version 6.1.1

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

# PROGRAM:

clear; clc;

c=3\*(10^8);f=8\*(10^9);r=2.5;h=1.84;n=377;

l=c/f; lo=l\*(10^2); lc=2\*%pi\*r/h;

printf("-Cutoff wavelength = %f cm\n",round(lc\*100)/100); lp=lo/(sqrt(1-((lo/lc)^2)));

printf("-Guide wavelength = %f cm\n",round(lp\*100)/100); Zo=n/(sqrt(1-((lo/lc)^2)));

printf("-Characteristic wave impedance = %f ohm",fix(Zo\*10)/10);

# OUTPUT:

|  |  |  |  |
| --- | --- | --- | --- |
| **a (cm)** | **λg m** | **λc m** | **Zo Ohms** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**RESULT:** The propagation characteristics of circular waveguide in terms of Cutoff wavelength Guide wavelength and characteristic impedance

# Inference of Q Factor of Rectangular Cavity Resonator for TE101 mode with the following inputs

1. **Dimension a in x axis**

# Dimension b in y axis

1. **Dimension p in z axis**

# Experiment Number:13

**AIM:** To determine the Q Factor of Rectangular Cavity Resonator for TE101 mode by varying three dimensions

# SOFTWAREREQUIRED:

SCILAB

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

# PROGRAM:

clear; clc;

a=5\*10^-2,b=4\*10^-2,c=10\*10^-2,C=5.8\*10^7,Uo=4\*%pi\*10^-7; f101=3.335\*10^9;

d=sqrt(1/(%pi\*f101\*Uo\*C)); Q=(a\*a+c\*c)\*a\*b\*c/(d\*(2\*b\*(a^3 + c^3)+a\*c\*(a\*a+c\*c))); disp(Q,'Quality factor of TE101 = ');

# OUTPUT:

**Constant: b, d Variable :a**

|  |  |
| --- | --- |
| **a (cm)** | **Q factor** |
|  |  |
|  |  |
|  |  |
|  |  |

# Constant: a, d Variable :b

|  |  |
| --- | --- |
| **b (cm)** | **Q factor** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Constant: a, b Variable :d**

|  |  |
| --- | --- |
| **d(cm)** | **Q factor** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**RESULT:** The Q Factor of Rectangular Cavity Resonator for TE101 mode by varying three dimensions is determined using Scilab

# Computation of Resonant Frequency of Rectangular Cavity Resonator for a)Transverse Electric mode

1. **Transverse Magnetic mode**

# Experiment Number:14

**AIM:** To find the Resonant Frequency of Rectangular Cavity Resonator for TE and TM mode

# SOFTWAREREQUIRED:

SCILAB Version 6.1.1

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

# PROGRAM:

clc; clear;

format('e',11); a=0.05; b=0.04; c=0.03;

v=3\*10^8; p=1;

//for m=0,n=1. m=0;

n=1;

fr011=v/2\*sqrt((m/a)^2+(n/b)^2+(p/c)^2); disp(fr011,"fr011(in Hz)=");

//for m=1,n=0.

m=1; n=0;

fr101=v/2\*sqrt((m/a)^2+(n/b)^2+(p/c)^2); disp(fr101,"fr101(in Hz)=");

# OUTPUT:

|  |  |  |  |
| --- | --- | --- | --- |
| **a (cm)** | **fr (TE101) MHz** | **b (cm)** | **fr (TE011) MHz** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**RESULT:**

The Resonant Frequency of Rectangular Cavity Resonator for TE mode is determined using SCILAB

# Estimation of Resonant Frequency in a Cylindrical Cavity Resonator for a)Transverse Electric mode

1. **Transverse Magnetic mode**

# Experiment Number:15

**AIM:** To determine the resonant frequency of a Cylindrical Cavity Resonator for TE and TM mode

# SOFTWAREREQUIRED:

SCILAB Version 6.1.1

# PROCEDURE:

* + Open SCILAB software
  + Open file-new
  + Put the input values
  + Type the program
  + Execute the program
  + End the program

# PROGRAM:

**TE Mode**

clc; clear;

a=0.0274;

v=3\*10^8;

Xnm=3.832

;

d=2\*a; TE011=v/2\*%pi\*sqrt((Xnm/a)^2+(%pi/d)^2)\*10^-9; printf("TE011(in Hz)=%f GHZ",TE011);

# TM Mode

clc; clear;

a=0.0274;

v=3\*10^8;

Xnm=2.405

;

d=2\*a; TM011=v/2\*%pi\*sqrt((Xnm/a)^2+(%pi/d)^2)\*10^-9; printf("TM011(in Hz)=%f GHZ",TM011); **OUTPUT:**

|  |  |  |
| --- | --- | --- |
| **a (cm)** | **fr (TE101) MHz** | **fr (TM011) MHz** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**RESULT:** The resonant frequency of a Cylindrical Cavity Resonator for TE and TM mode are determined using Scilab