ANTENNAS AND WAVE PROPAGATION

LAB ASSIGNMENT 6

EXPERIMENT 6

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BATCH: 2018-2022
DIVISION: G2; EA 3

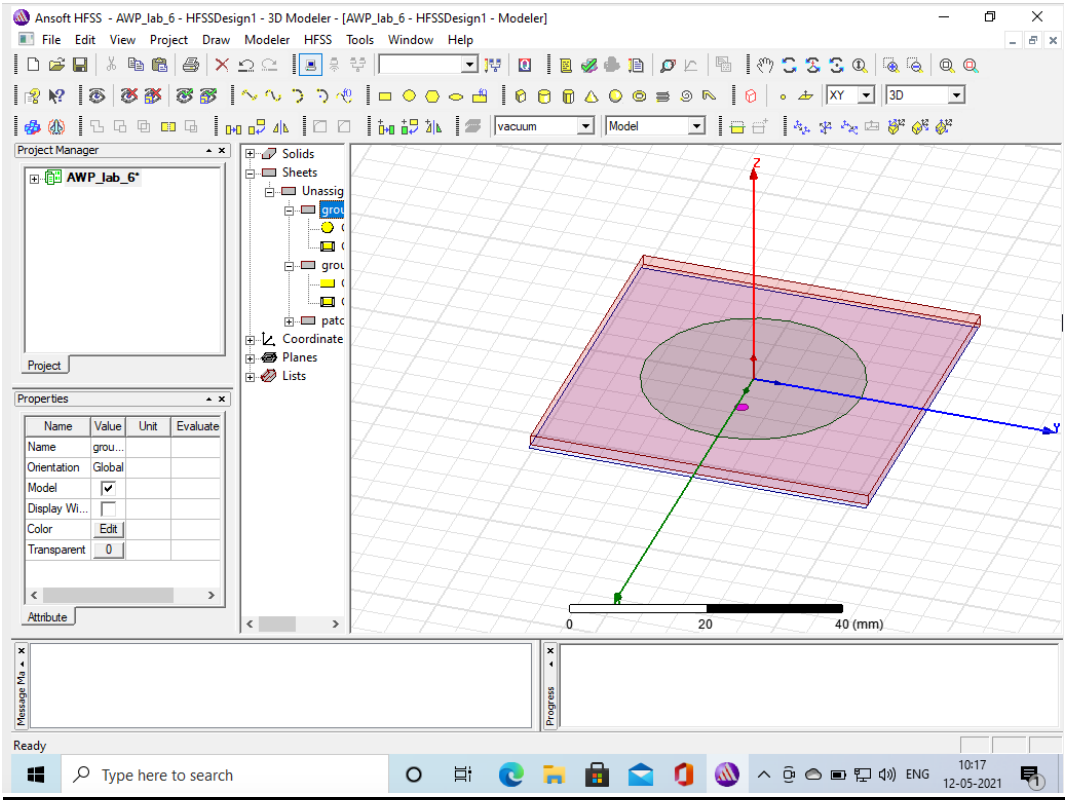
AIM: Design a circular MSA with coaxial feed to resonate between 2 -2.5 GHz.

THEORY: The antenna acts a transducer by converting electric currents to EM-waves in transmission, by converting EM-waves to electric currents in case of reception of signal.

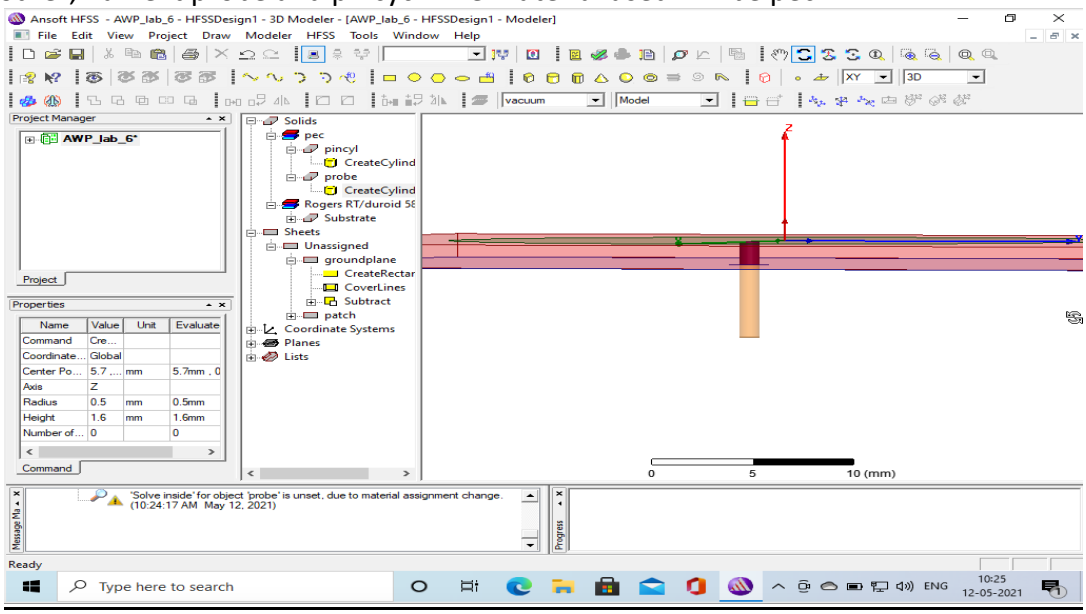
The Coaxial feed or probe feed is one of the most common techniques used for feeding microstrip patch antennas. As seen from figure, the inner conductor of the coaxial connector extends through the dielectric and is soldered to the radiating patch, while the outer conductor is connected to the ground plane.

PROCEDURE AND SCREENSHOTS OF THE DESIGN [IN BRIEF]:

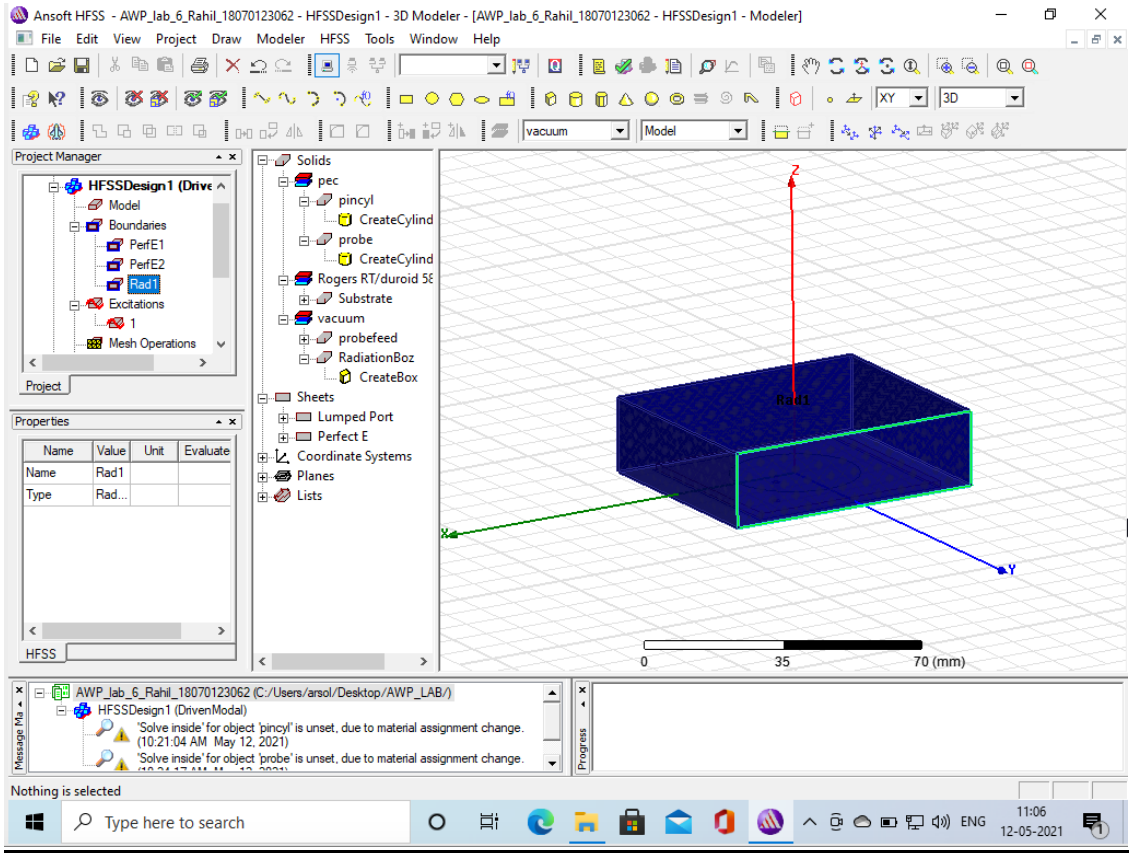
1. The antenna will be of 2.4 GHZ.
2. We will first design a Substrate Box. Then we give the dimensions to it which were calculated by Co-Axial Feed Calculator. The material used will be Rogers RT.
3. Then we design the Ground layer of the design in a circular shape.
4. Then we design the groundcut a smaller radius circular shape on top of our Ground layer.



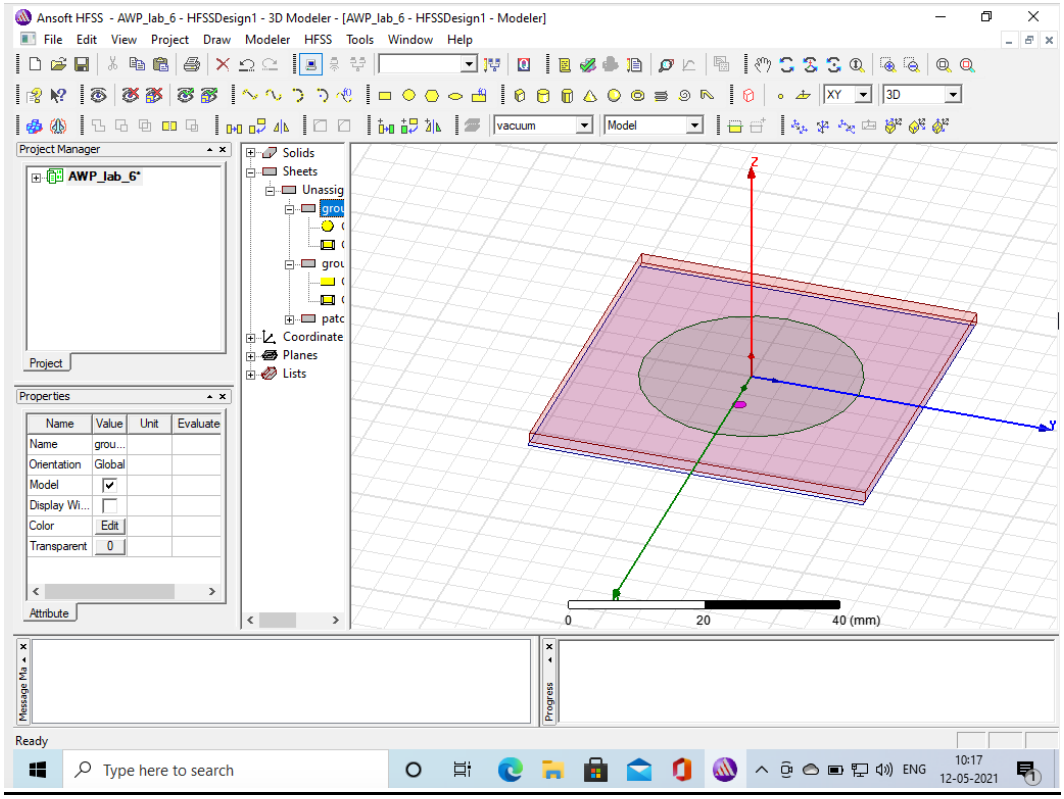
5. Now we select ground and groundcut layer and subtract it.
6. Now in the missing slot of the groundcut layer we will insert two cylinders upon one another, name it probe and pincycl. The material used will be pec.

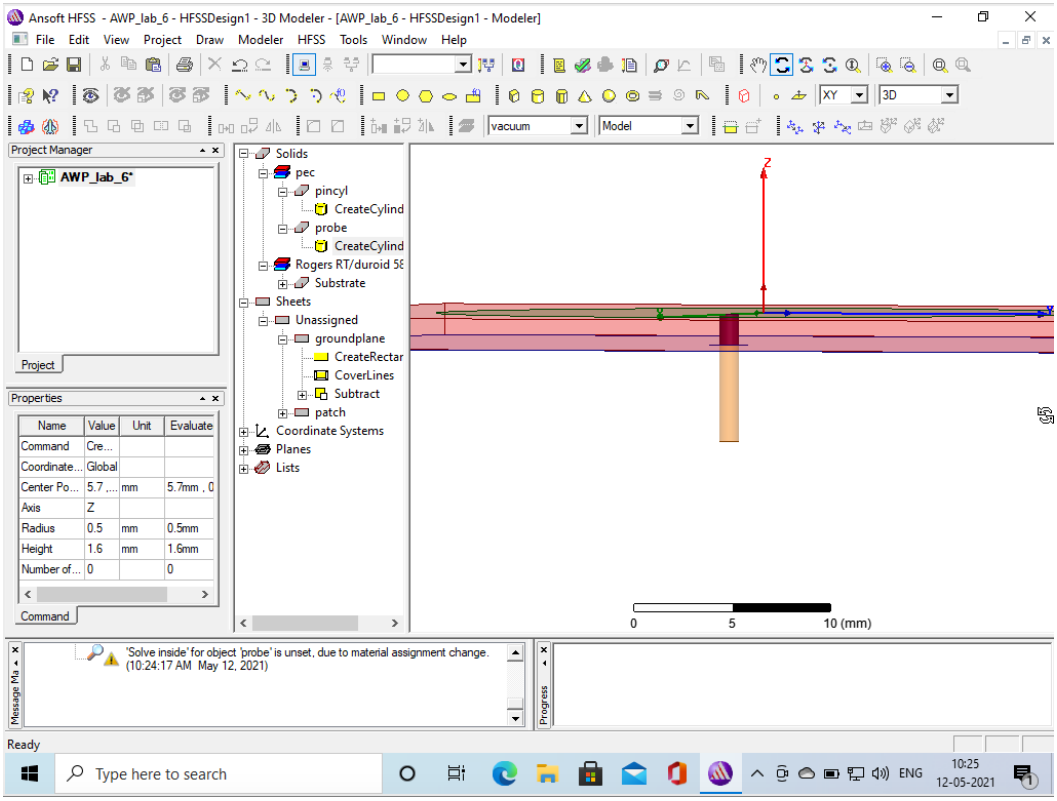


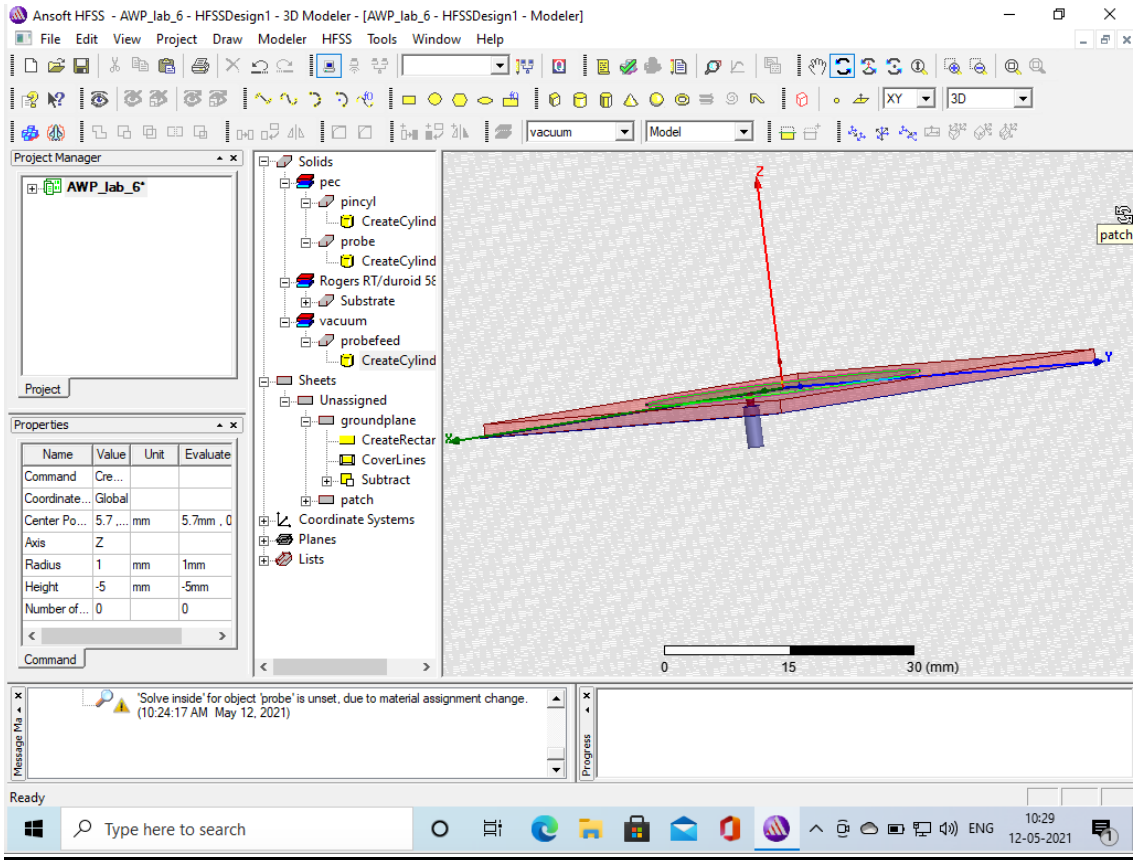
7. After the two cylinders we will then create a 3rd Cylinder and name it probe feed from which we will give the co-axial feed to the antenna.
8. Then we will right click and provide excitation to the probe feed of the antenna. We have provided Lumped Port to the Probe Feed layer.
9. Then we select all the faces and provide Radiation to the Antenna.
10. Check for Validation Check and inset a solution analysis to the design.



FINAL DESIGN SCREENSHOTS:






Ansoft HFSS - AWP_lab_6 - HFSSDesign1 - 3D Modeler - [AWP_lab_6 - HFSSDesign1 - Modeler]
File Edit View Project Draw Modeler HFSS Tools Window Help
Project Manager
AWP_lab_6*
Project
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Axis Z
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Command
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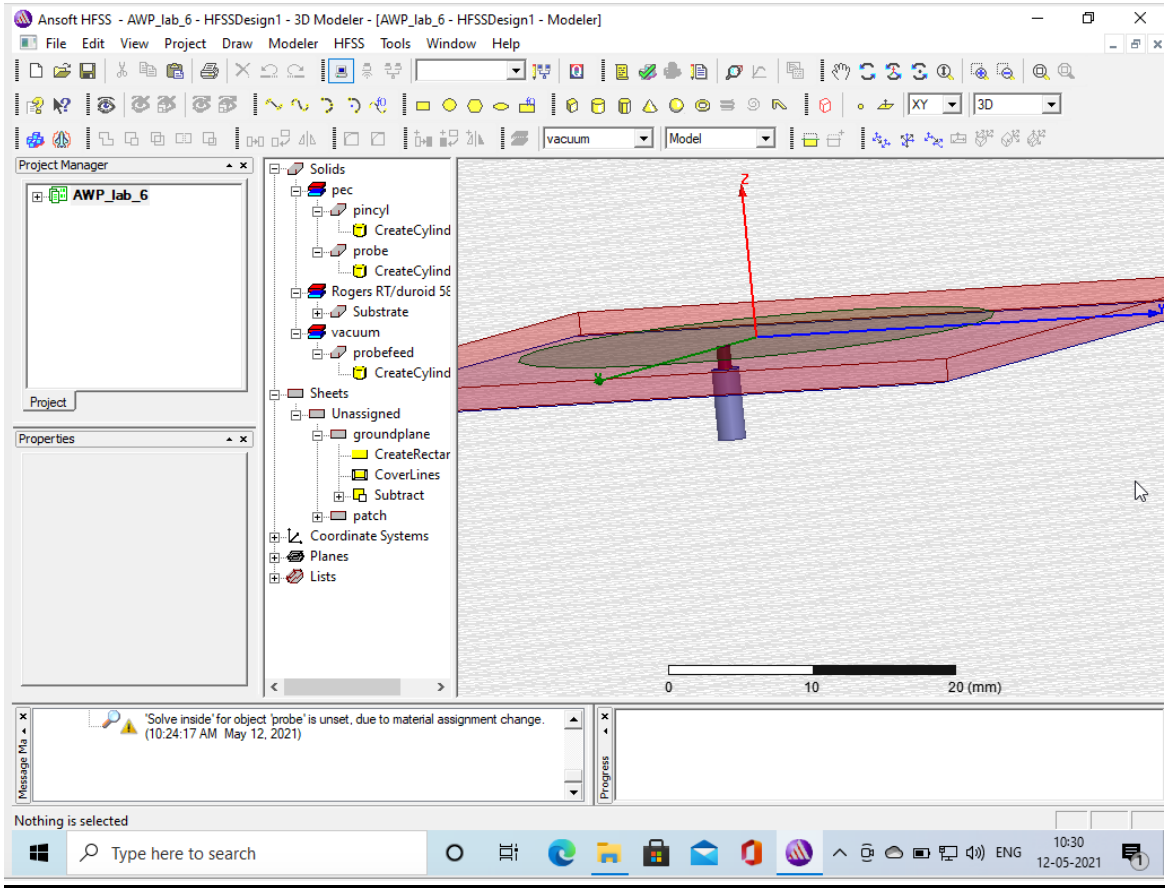
probe
CreateCylind
Rogers RT/duroid 5
Substrate
vacuum
probefeed
CreateCylind
Sheets
Unassigned
groundplane
CreateRectar
CoverLines
Subtract
patch
Coordinate Systems
Planes
Lists
patch
0 15 30 (mm)
'Solve inside' for object 'probe' is unset, due to material assignment change.
(10:24:17 AM May 12, 2021)
Message Ma
Progress
Ready
Type here to search
ENG
10:29
12-05-2021


Ansoft HFSS - AWP_lab_6 - HFSSDesign1 - 3D Modeler - [AWP_lab_6 - HFSSDesign1 - Modeler]
File Edit View Project Draw Modeler HFSS Tools Window Help
Project Manager
AWP_lab_6
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CreateCylind
probe
CreateCylind
Rogers RT/duroid 5
Substrate
vacuum
probefeed
CreateCylind
Sheets
Unassigned
groundplane
CreateRectar
CoverLines
Subtract
patch
Coordinate Systems
Planes
Lists
0 10 20 (mm)
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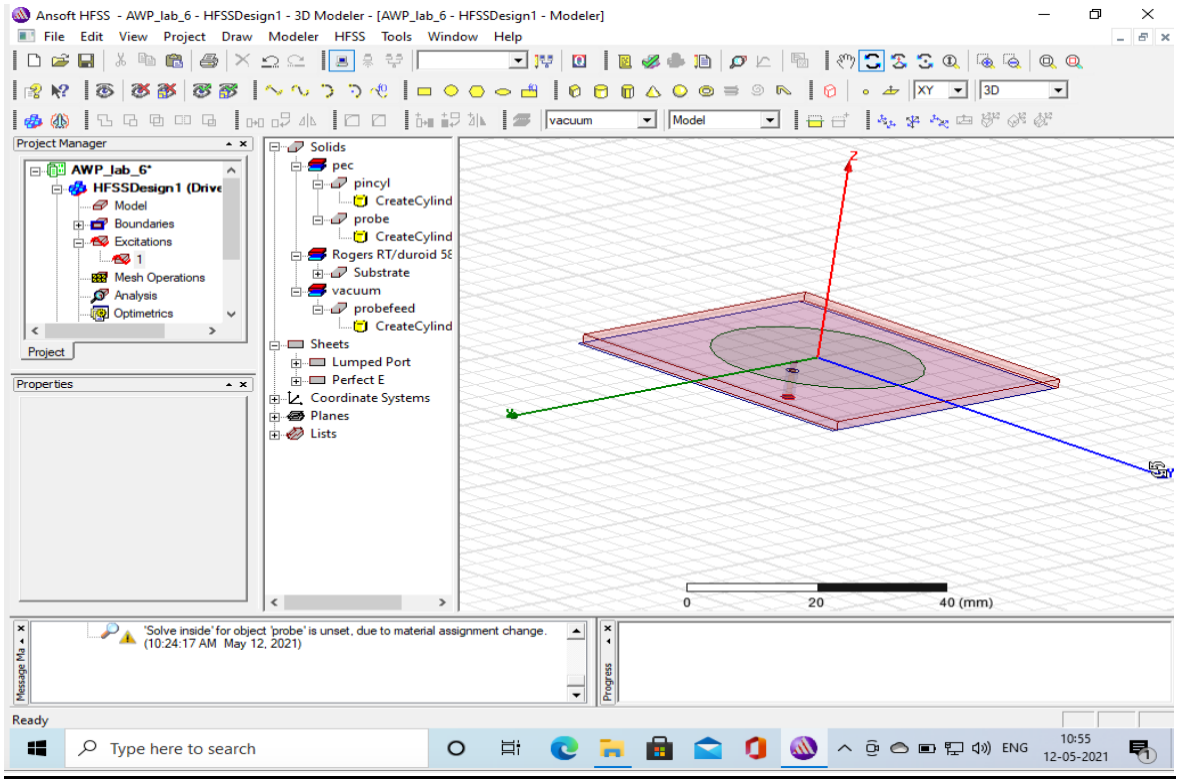
12-05-2021


Ansoft HFSS - AWP_lab_6 - HFSSDesign1 - 3D Modeler - [AWP_lab_6 - HFSSDesign1 - Modeler]
File Edit View Project Draw Modeler HFSS Tools Window Help
Project Manager
AWP_lab_6*
HFSSDesign1 (Drive
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Excitations
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Mesh Operations
Analysis
Optimetrics
Project
Properties
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pincyl
CreateCylind
probe
CreateCylind
Rogers RT/duroid 58
Substrate
vacuum
probefeed
CreateCylind
Sheets
Lumped Port
Perfect E
Coordinate Systems
Planes
Lists
vacuum
Model
XY
3D
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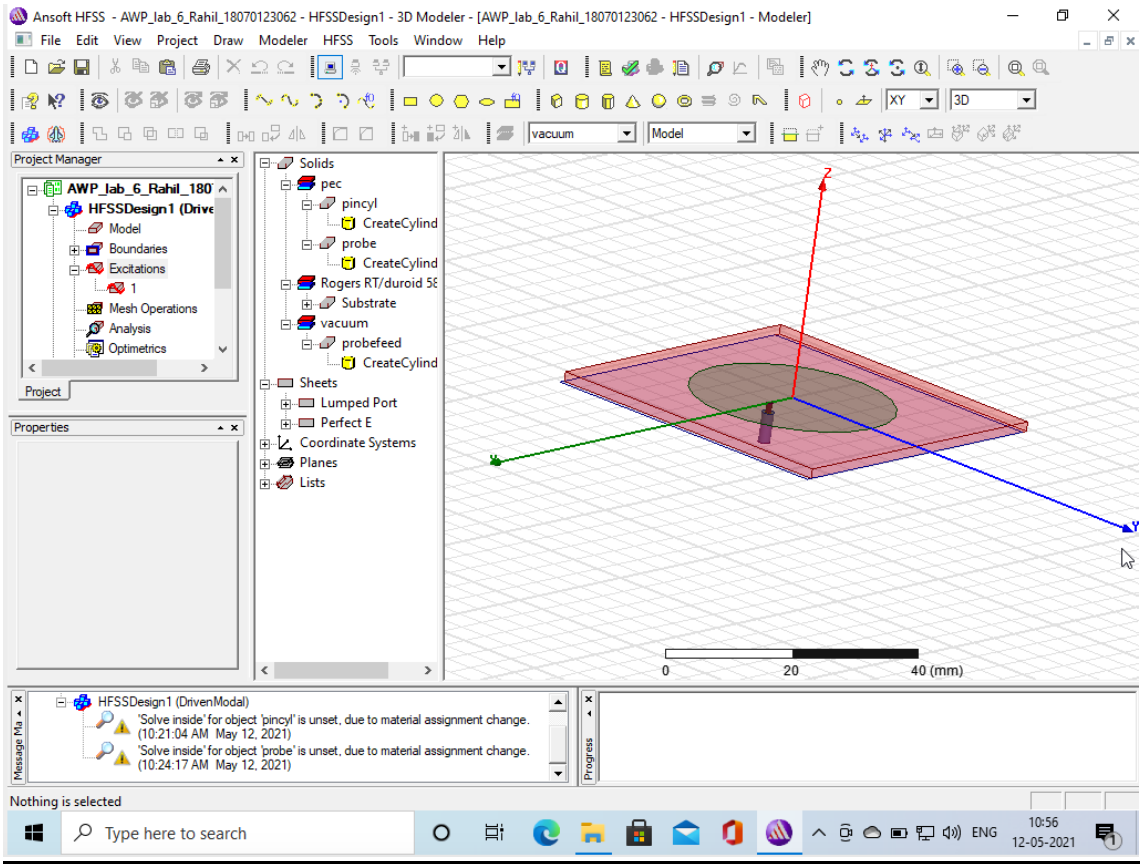
40 (mm)
'Solve inside' for object 'probe' is unset, due to material assignment change.
(10:24:17 AM May 12, 2021)
Message Ma
Progress
Ready
Type here to search
ENG
10:55
12-05-2021


Ansoft HFSS - AWP_lab_6_Rahil_18070123062 - HFSSDesign1 - 3D Modeler - [AWP_lab_6_Rahil_18070123062 - HFSSDesign1 - Modeler]
File Edit View Project Draw Modeler HFSS Tools Window Help
Project Manager
AWP_lab_6_Rahil_180
HFSSDesign1 (Drive
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Excitations
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Mesh Operations
Analysis
Optimetrics
Project
Properties
Solids
pec
pincyl
CreateCylind
probe
CreateCylind
Rogers RT/duroid 58
Substrate
vacuum
probefeed
CreateCylind
Sheets
Lumped Port
Perfect E
Coordinate Systems
Planes
Lists
vacuum
Model
XY
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40 (mm)
HFSSDesign1 (DrivenModal)
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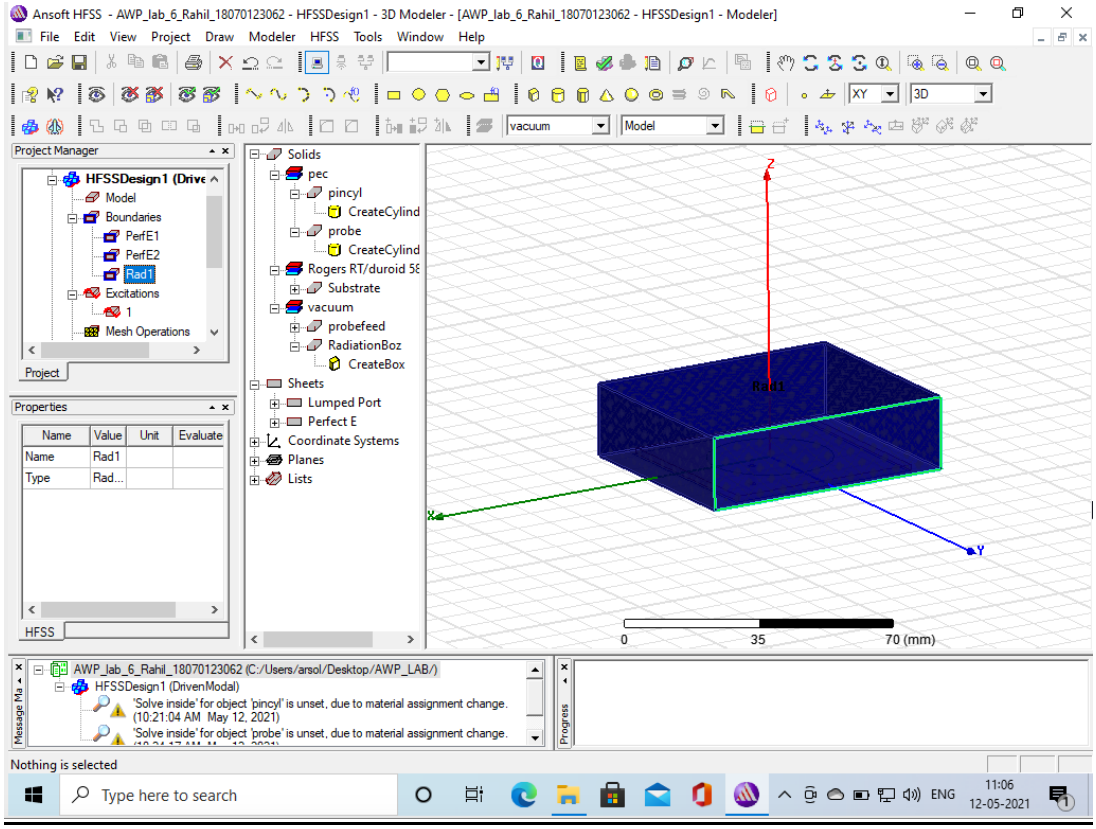
(10:21:04 AM May 12, 2021)
'Solve inside' for object 'probe' is unset, due to material assignment change.
(10:24:17 AM May 12, 2021)
Message Ma
Progress
Nothing is selected
Type here to search
ENG
10:56
12-05-2021


Ansoft HFSS - AWP_lab_6_Rahil_18070123062 - HFSSDesign1 - 3D Modeler - [AWP_lab_6_Rahil_18070123062 - HFSSDesign1 - Modeler]
File Edit View Project Draw Modeler HFSS Tools Window Help
Project Manager
HFSSDesign1 (Drive
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Boundaries
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Excitations
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Mesh Operations
Project
Properties
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Name Rad1
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vacuum
probefeed
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Coordinate Systems
Planes
Lists
Rad1
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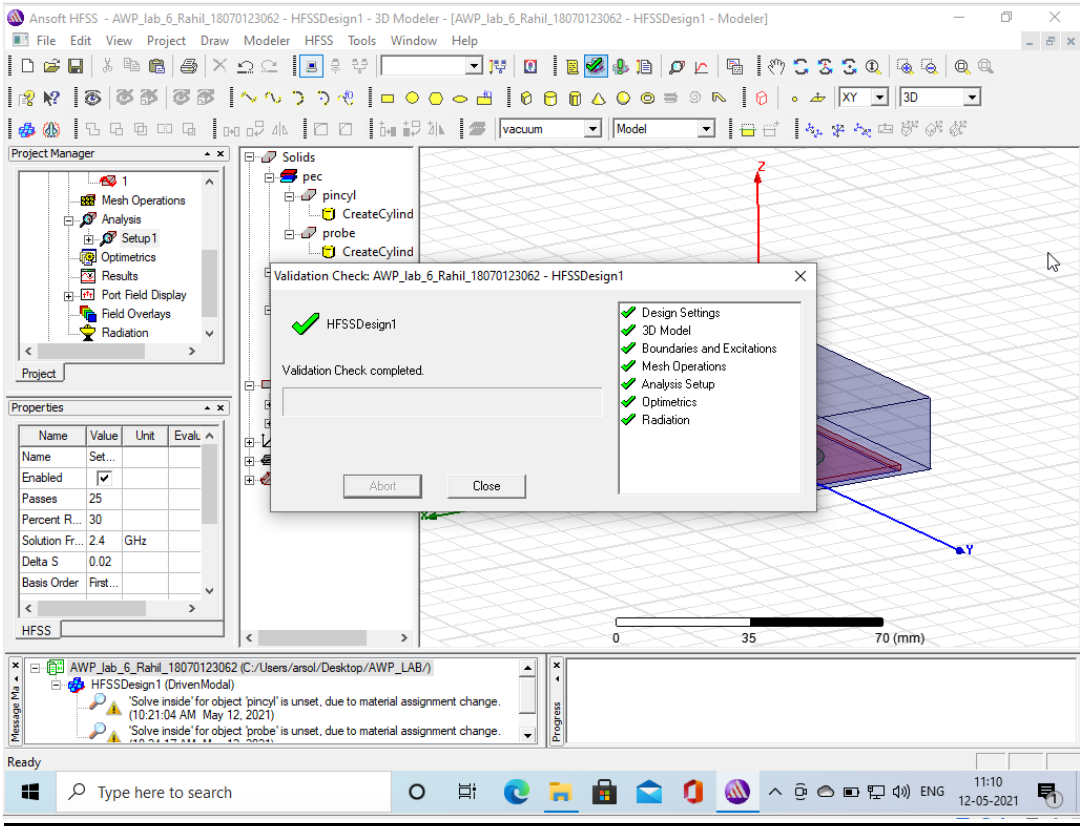
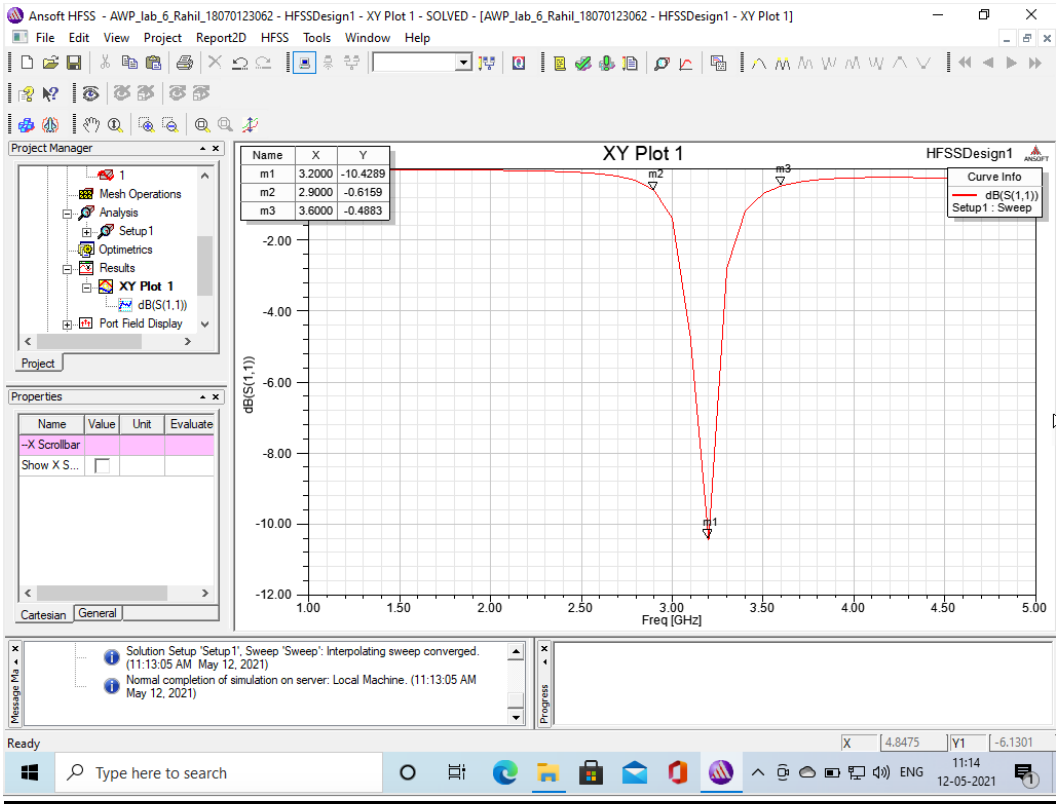
AWP_lab_6_Rahil_18070123062 (C:/Users/arsol/Desktop/AWP_LAB/)
HFSSDesign1 (DrivenModal)
'Solve inside' for object 'pincyl' is unset, due to material assignment change. (10:21:04 AM May 12, 2021)
'Solve inside' for object 'probe' is unset, due to material assignment change.
Message Ma
Progress
Nothing is selected
Type here to search
ENG
11:06
12-05-2021

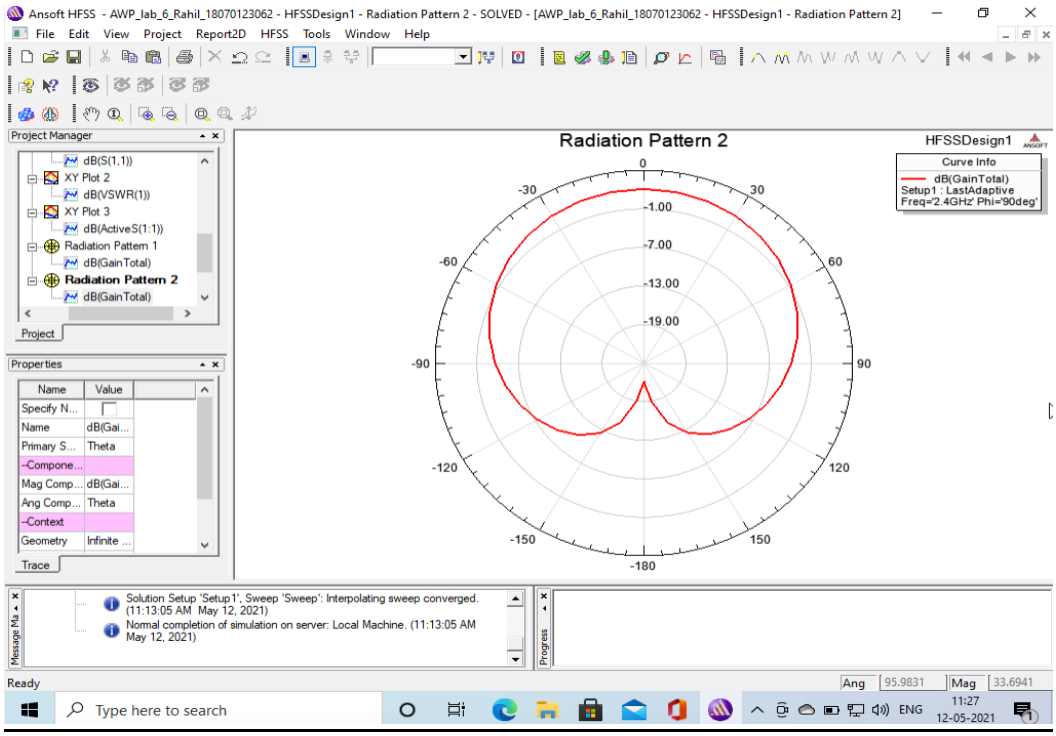

Ansoft HFSS - AWP_lab_6_Rahil_18070123062 - HFSSDesign1 - 3D Modeler - [AWP_lab_6_Rahil_18070123062 - HFSSDesign1 - Modeler]
File Edit View Project Draw Modeler HFSS Tools Window Help
Project Manager
1
Mesh Operations
Analysis
Setup1
Optimetrics
Results
Port Field Display
Field Overlays
Radiation
Project
Properties
Name Value Unit Evalu
Name Set...
Enabled
Passes 25
Percent R... 30
Solution Fr... 2.4 GHz
Delta S 0.02
Basis Order First...
HFSS
Validation Check: AWP_lab_6_Rahil_18070123062 - HFSSDesign1
HFSSDesign1
Validation Check completed.
Abort
Close
Design Settings
3D Model
Boundaries and Excitations
Mesh Operations
Analysis Setup
Optimetrics
Radiation
Solids
pec
pincyl
CreateCylind
probe
CreateCylind
0 35 70 (mm)
AWP_lab_6_Rahil_18070123062 (C:/Users/arsol/Desktop/AWP_LAB/)
HFSSDesign1 (DrivenModal)
'Solve inside' for object 'pincyl' is unset, due to material assignment change. (10:21:04 AM May 12, 2021)
'Solve inside' for object 'probe' is unset, due to material assignment change.
Ready
Type here to search
ENG
11:10
12-05-2021

FINAL GRAPH OUTPUTS:

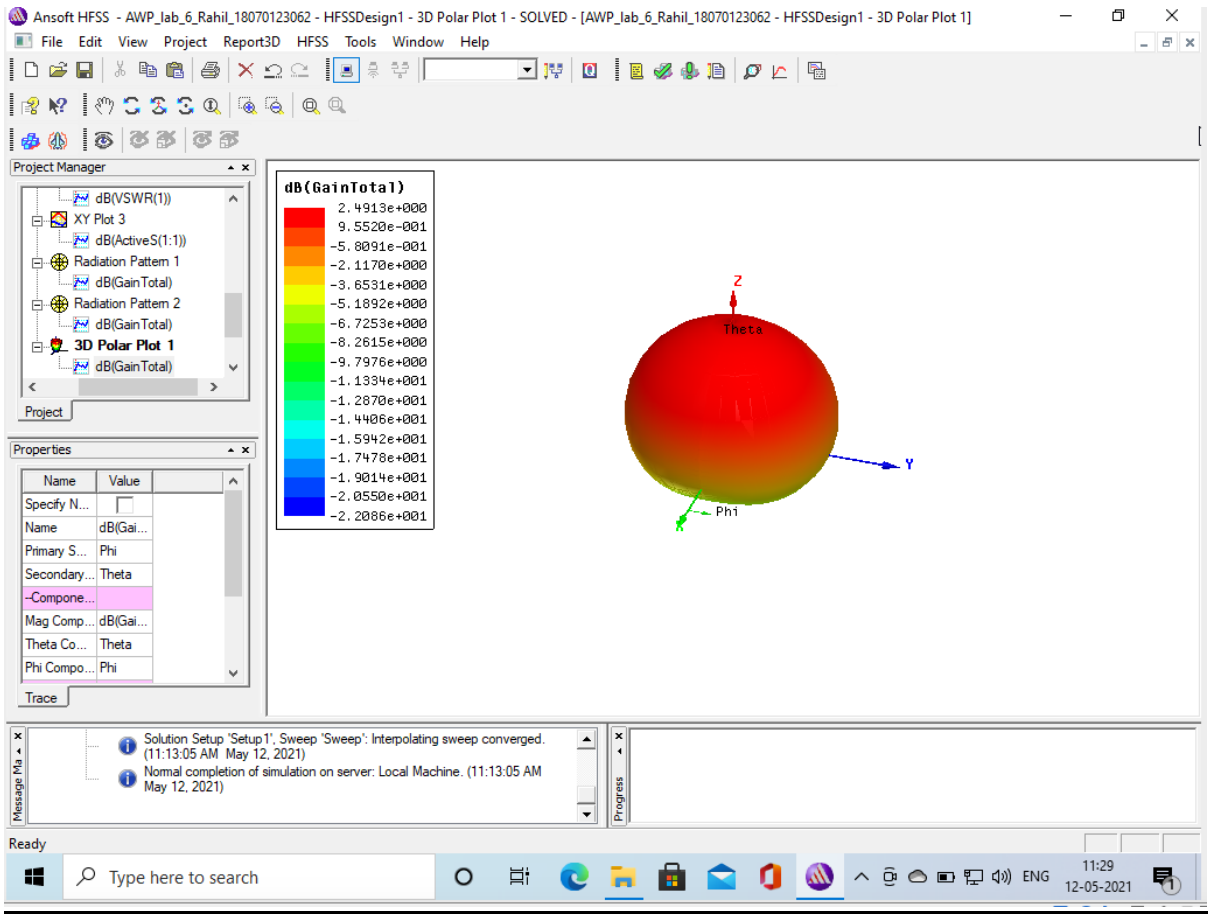
1. S-Parameter:



2. Radiation Pattern Plot:



3. 3-D Polar Plot:



CONCLUSION: From this experiment we have learnt how to design the circular co-axial feed antenna on HFSS software.