Audit Course Session 3

AUDIT COURSE
ELECTRONIC CIRCUITS 2: SIMULATION BASED STUDY

Kindly update your name and roll no, once this document is shared with you
Time slot to complete your work is **40 MINUTES**
Date: 25/1/2021
Kindly upload your schematic & waveform images here, every 10 minutes, indicating your progress and intention to completion of WORK within time slot allotted

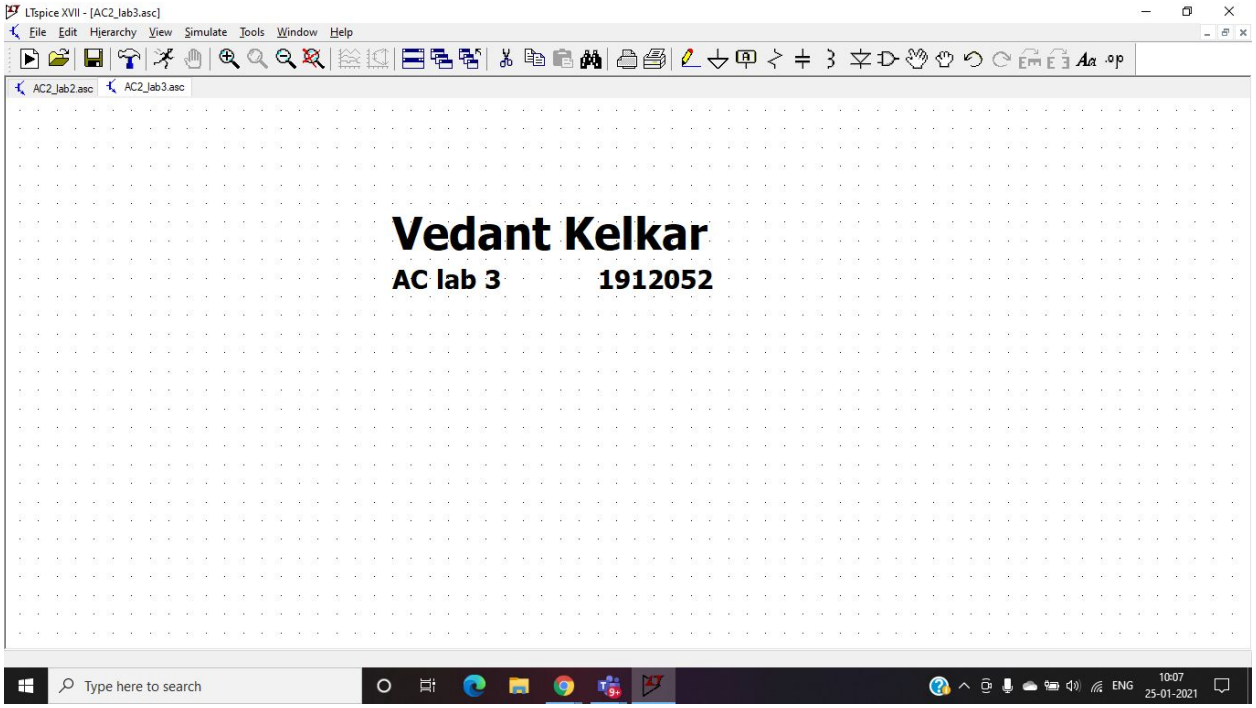
Time slot allotted to you all for the completion of Session 1 is 40 MINUTES

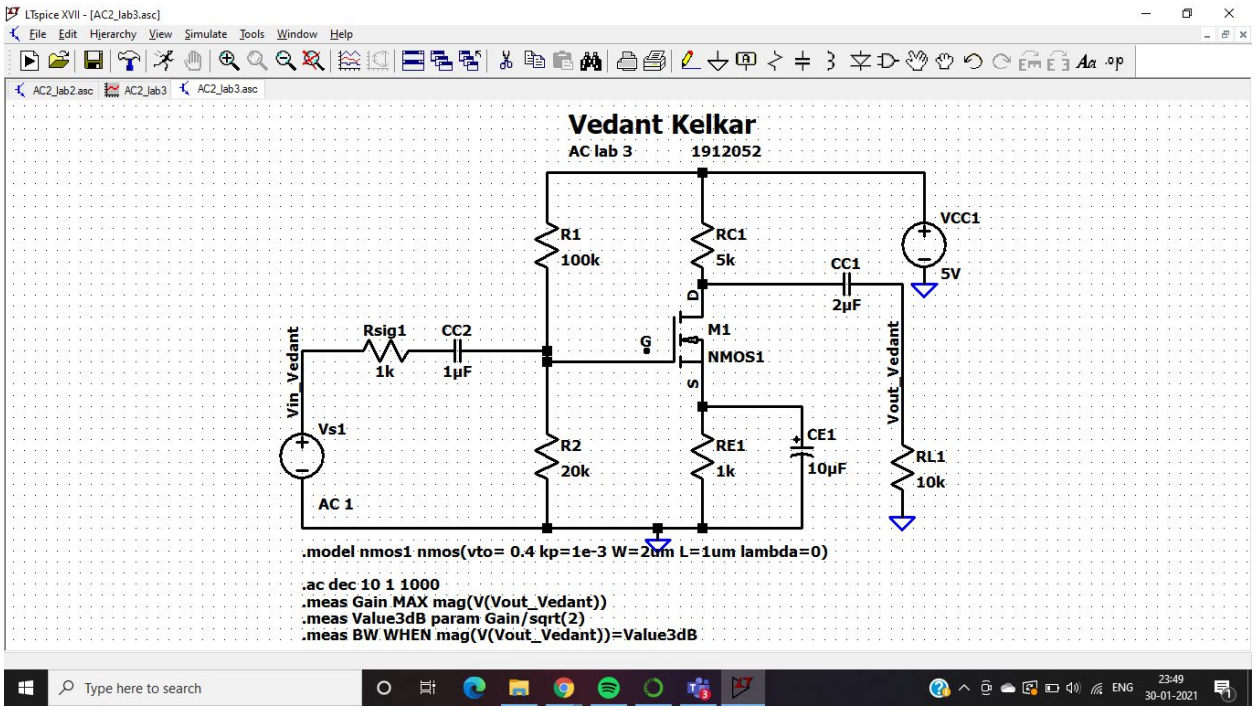
Kindly upload your work (only circuit schematic & waveform in LTSpice) in the shared google doc between this time slot only.

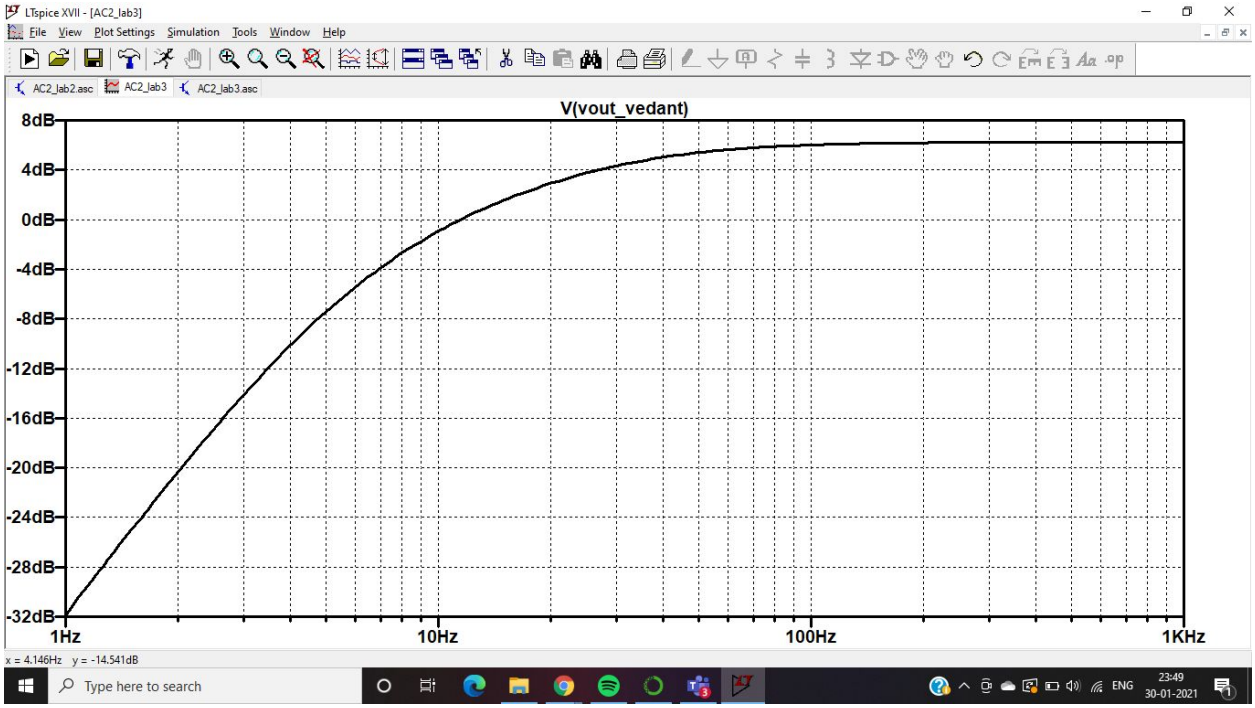
Follow these instruction strictly:
1, Start sharp ON TIME, by posting your name and roll no and **screenshot of your LT spice work screen (time and date MUST BE VISIBLE)**
2. Upload your work every 10 minutes, i.e LT spice work screen
3. This means you will upload LT spice work screen 4 times during this time slot.
4. Point 3 indicates your readiness and presences for completion of Session 3

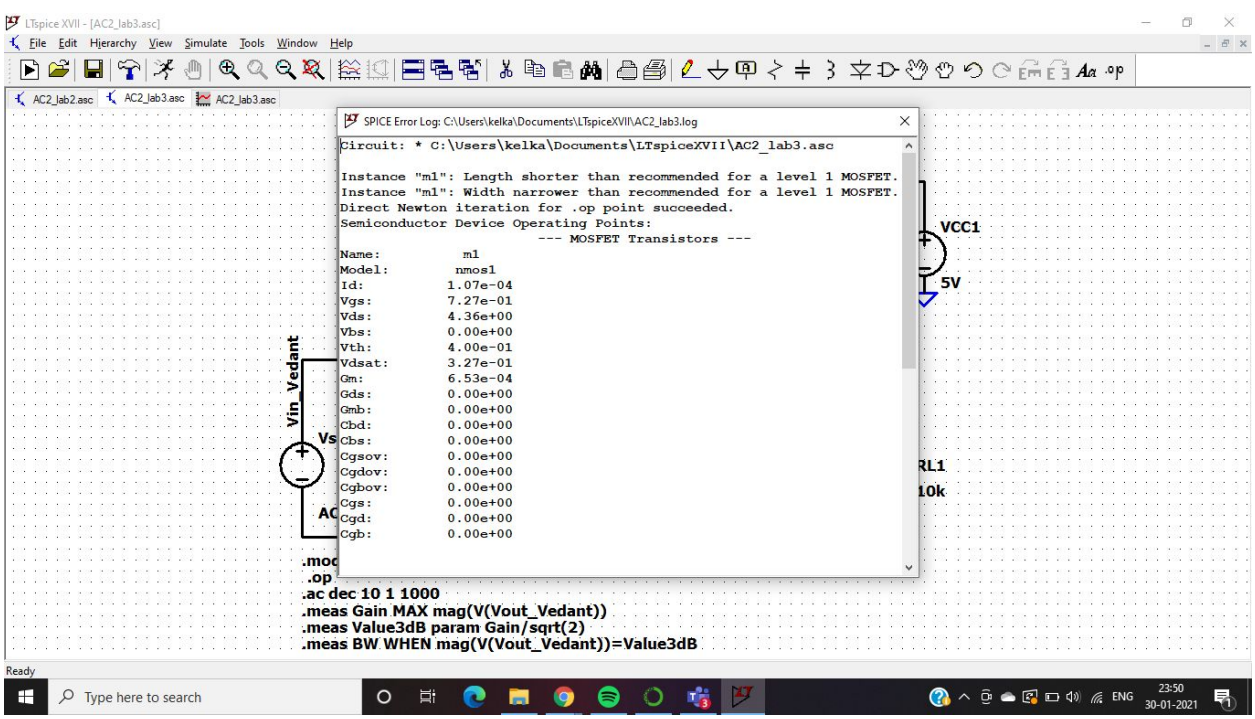
You are entitled for 1 CREDIT per session only if you follow above instruction to the details

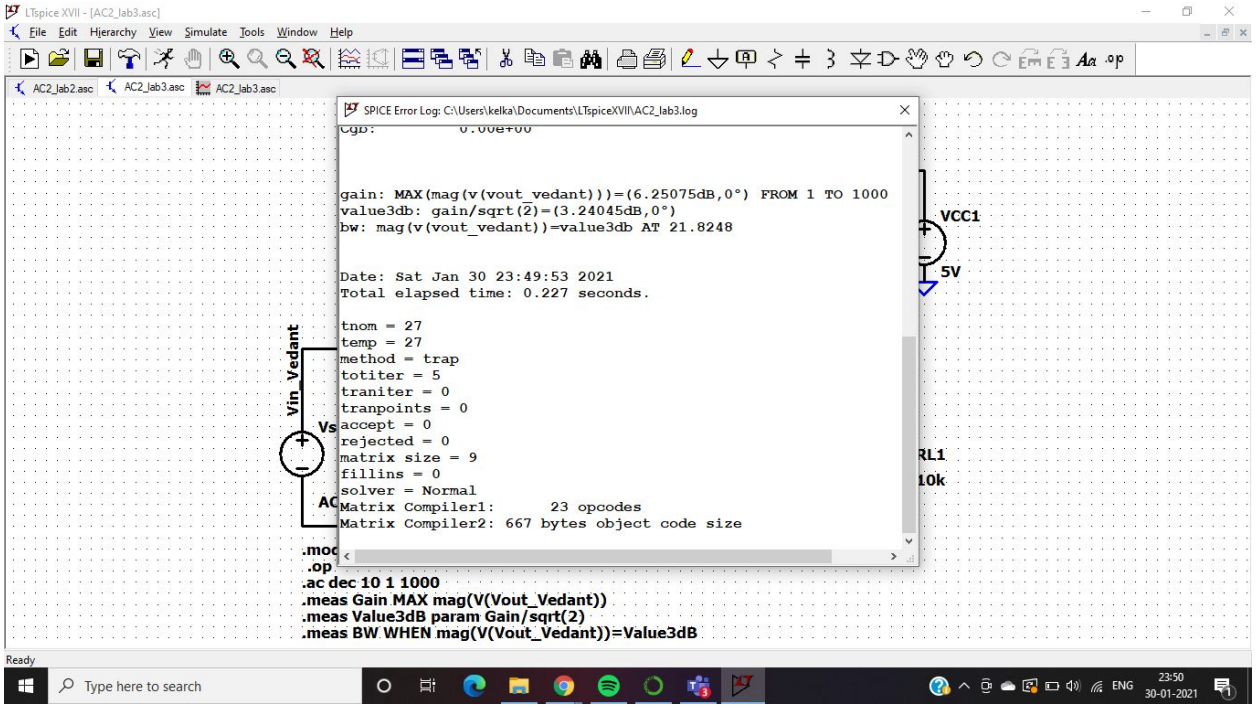
STUDENTS WORK AREA STARTS HERE


LTspice XVII - [AC2_lab3.asc]
File Edit Hierarchy View Simulate Tools Window Help
AC2_lab2.asc AC2_lab3.asc
Vedant Kelkar
AC lab 3 1912052
Type here to search
ENG
10:07
25-01-2021


LTspice XVII - [AC2_lab3.asc]
File Edit Hierarchy View Simulate Tools Window Help
AC2_lab2.asc AC2_lab3 AC2_lab3.asc
Vedant Kelkar
AC lab 3 1912052
R1
100k
RC1
5k
VCC1
5V
CC1
2µF
D
M1
NMOS1
G
S
Rsig1
1k
CC2
1µF
Vin_Vedant
Vs1
AC 1
R2
20k
RE1
1k
CE1
10µF
Vout_Vedant
RL1
10k
.model nmos1 nmos(vto= 0.4 kp=1e-3 W=2um L=1um lambda=0)
.ac dec 10 1 1000
.meas Gain MAX mag(V(Vout_Vedant))
.meas Value3dB param Gain/sqrt(2)
.meas BW WHEN mag(V(Vout_Vedant))=Value3dB
Type here to search
ENG
23:49
30-01-2021

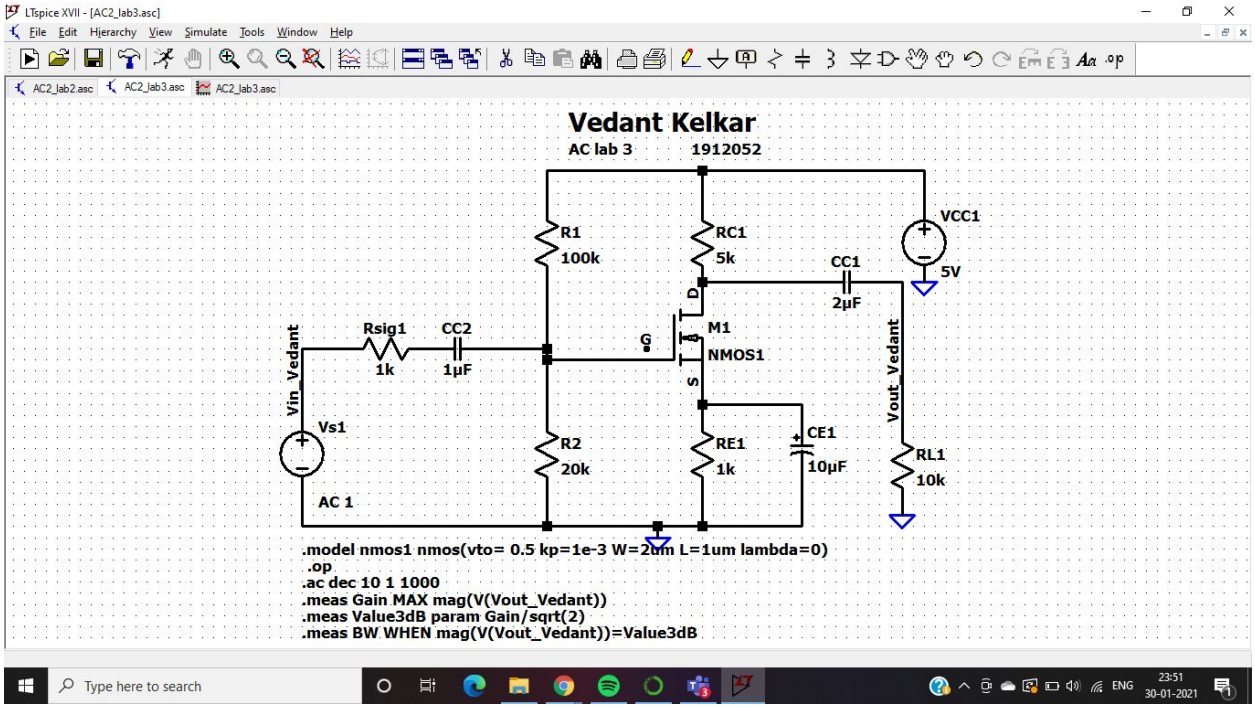

LTspice XVII - [AC2_lab3]
File View Plot Settings Simulation Tools Window Help
AC2_lab2.asc AC2_lab3 AC2_lab3.asc
V(vout_vedant)
8dB
4dB
0dB
-4dB
-8dB
-12dB
-16dB
-20dB
-24dB
-28dB
-32dB
1Hz
10Hz
100Hz
1KHz
x = 4.146Hz y = -14.541dB
Type here to search
ENG
23:49
30-01-2021

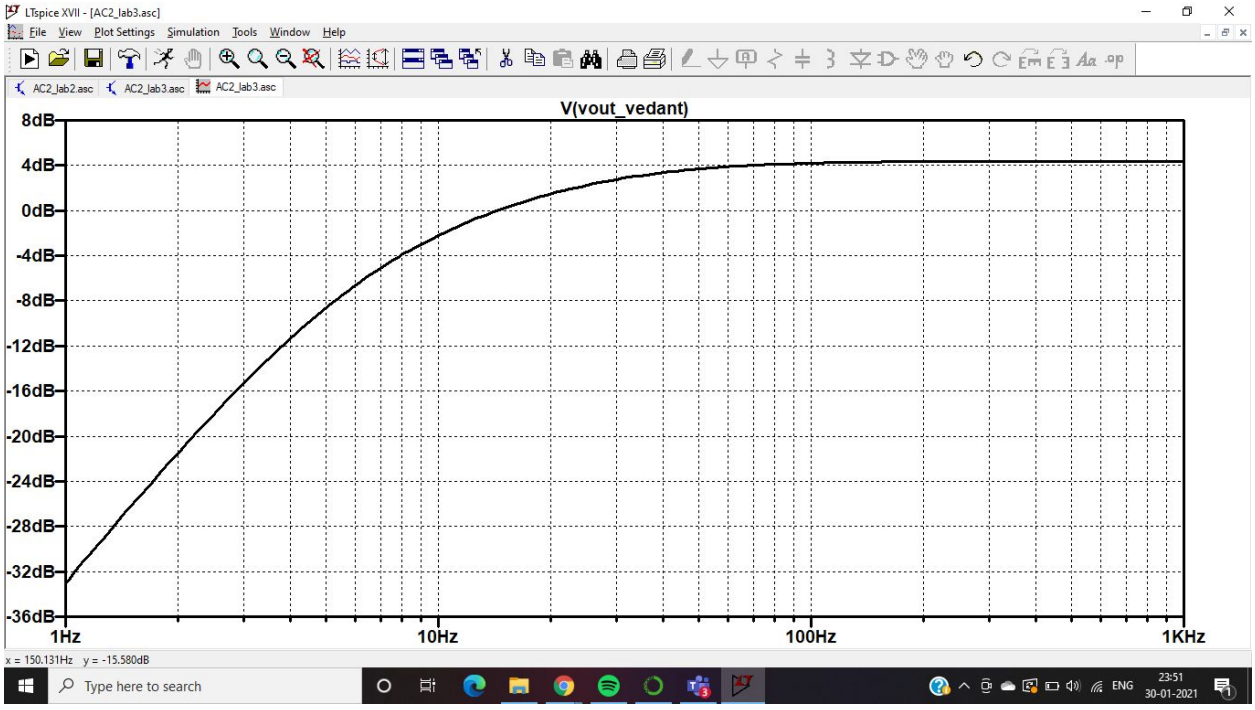

LTspice XVII - [AC2_lab3.asc]
File Edit Hierarchy View Simulate Tools Window Help
AC2_lab2.asc AC2_lab3.asc AC2_lab3.asc
SPICE Error Log: C:\Users\kelka\Documents\LTspiceXVII\AC2_lab3.log
Circuit: * C:\Users\kelka\Documents\LTspiceXVII\AC2_lab3.asc
Instance "m1": Length shorter than recommended for a level 1 MOSFET.
Instance "m1": Width narrower than recommended for a level 1 MOSFET.
Direct Newton iteration for .op point succeeded.
Semiconductor Device Operating Points:
--- MOSFET Transistors ---
Name: m1
Model: nmos1
Id: 1.07e-04
Vgs: 7.27e-01
Vds: 4.36e+00
Vbs: 0.00e+00
Vth: 4.00e-01
Vdsat: 3.27e-01
Gm: 6.53e-04
Gds: 0.00e+00
Gmb: 0.00e+00
Cbd: 0.00e+00
Cbs: 0.00e+00
Cgsov: 0.00e+00
Cgdov: 0.00e+00
Cgbov: 0.00e+00
Cgs: 0.00e+00
Cgd: 0.00e+00
Cgb: 0.00e+00
VCC1
5V
Vin_Vedant
RL1
10k
.op
.ac dec 10 1 1000
.meas Gain MAX mag(V(Vout_Vedant))
.meas Value3dB param Gain/sqrt(2)
.meas BW WHEN mag(V(Vout_Vedant))=Value3dB
Ready
Type here to search
ENG
23:50
30-01-2021

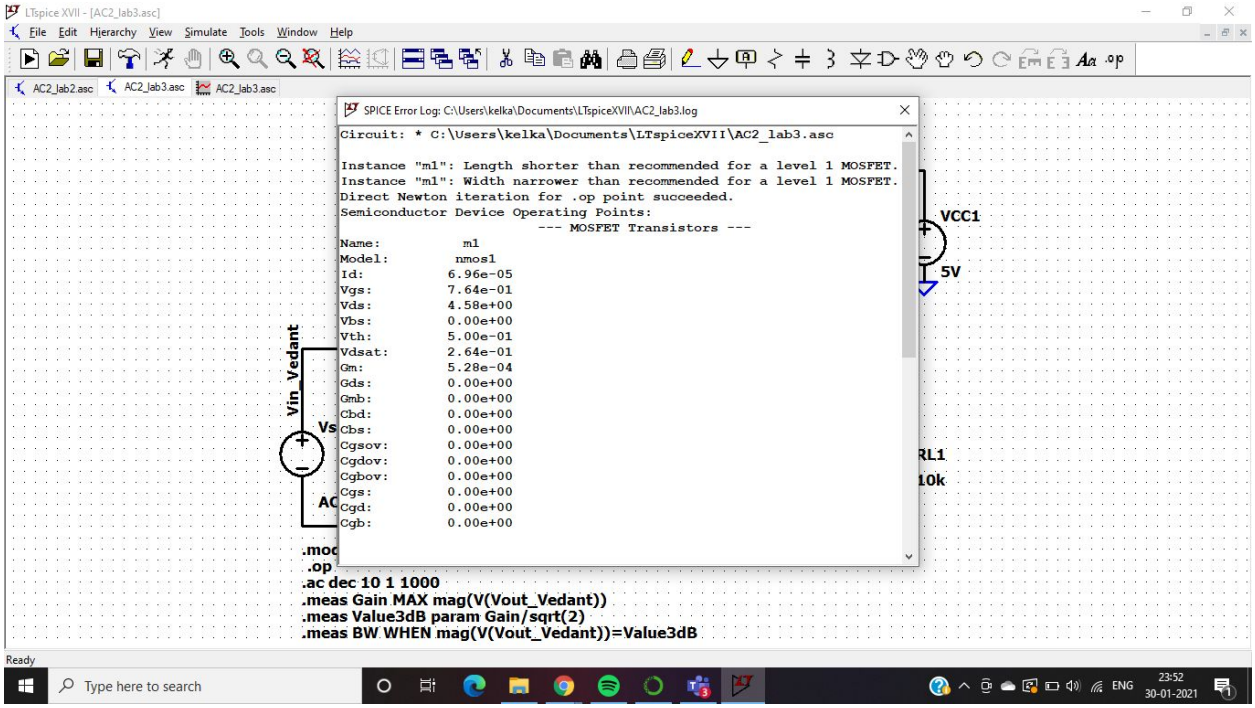


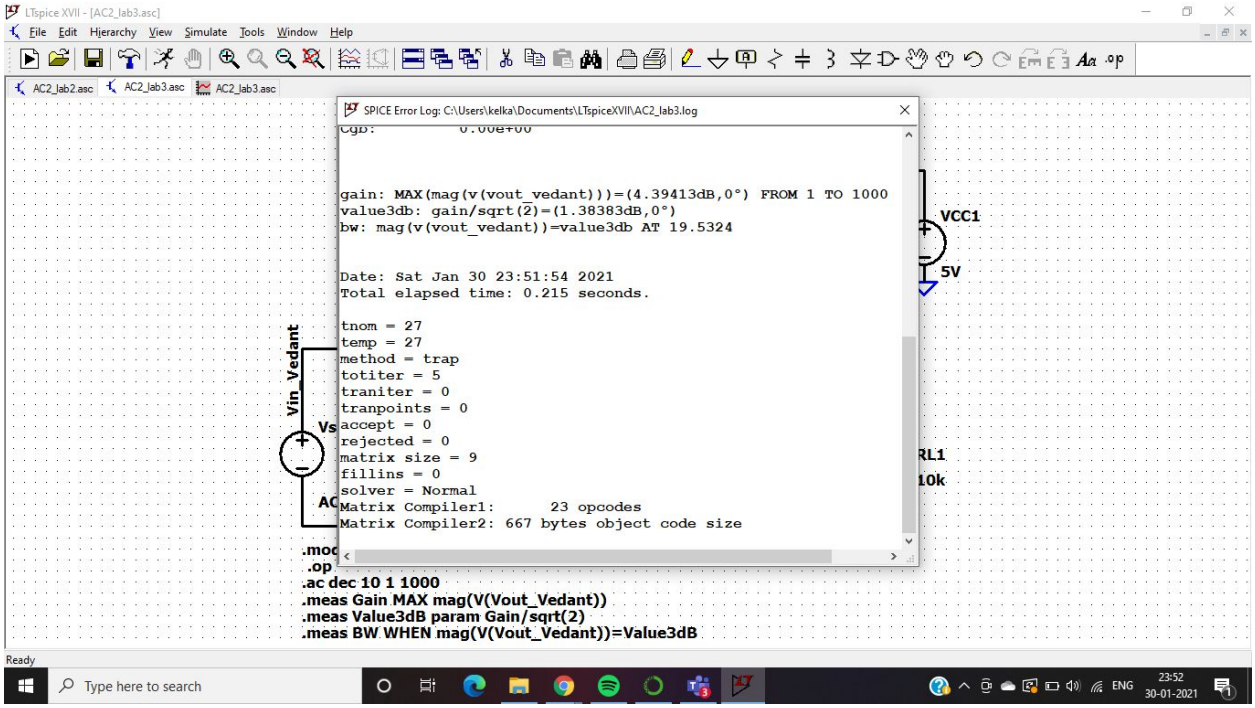
	SIM
Id	107 A
Vgs	0.727 V
gm	653 mA/V
fL	21.8248 Hz
Avmid	6.25075 dB

EX1


LTspice XVII - [AC2_lab3.asc]
File Edit Hierarchy View Simulate Tools Window Help
AC2_lab2.asc AC2_lab3.asc AC2_lab3.asc
Vedant Kelkar
AC lab 3 1912052
R1
100k
RC1
5k
VCC1
5V
CC1
2µF
D
M1
NMOS1
G
S
Rsig1
1k
CC2
1µF
Vin_Vedant
Vout_Vedant
Vs1
AC 1
R2
20k
RE1
1k
CE1
10µF
RL1
10k
.model nmos1 nmos(vto= 0.5 kp=1e-3 W=2um L=1um lambda=0)
.op
.ac dec 10 1 1000
.meas Gain MAX mag(V(Vout_Vedant))
.meas Value3dB param Gain/sqrt(2)
.meas BW WHEN mag(V(Vout_Vedant))=Value3dB
Type here to search
ENG
23:51
30-01-2021

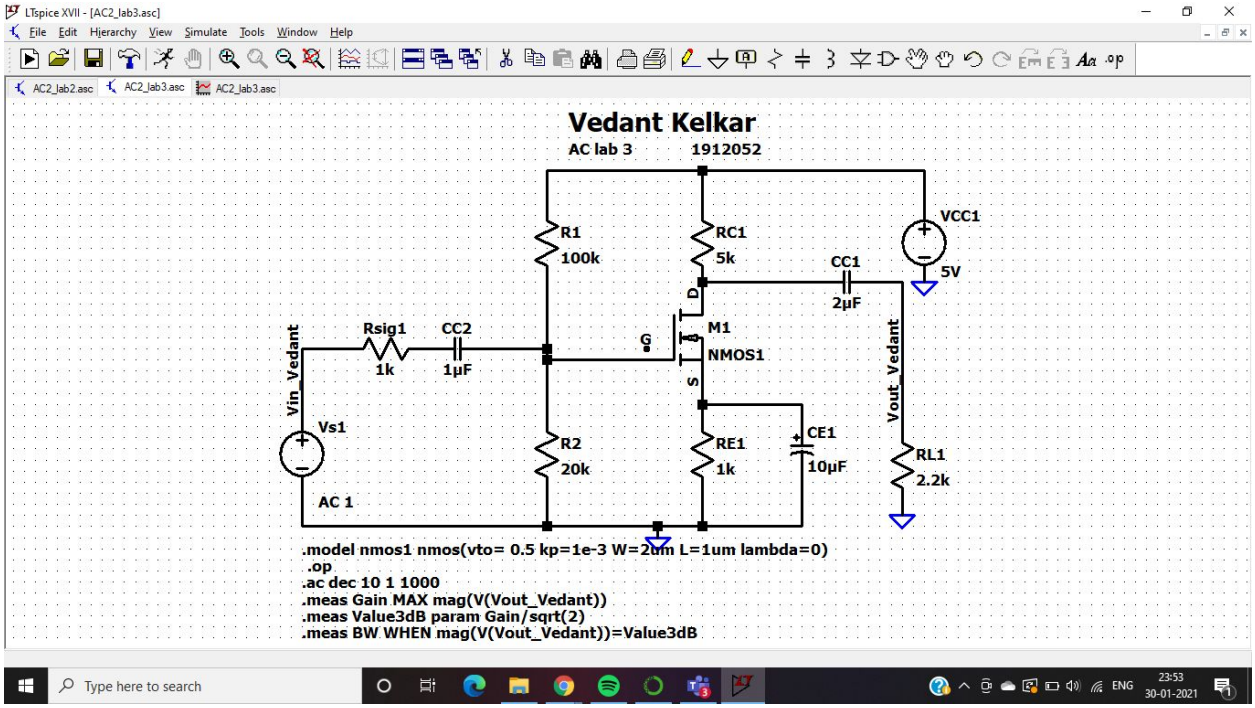

LTspice XVII - [AC2_lab3.asc]
File View Plot Settings Simulation Tools Window Help
AC2_lab2.asc AC2_lab3.asc AC2_lab3.asc
V(vout_vedant)
8dB
4dB
0dB
-4dB
-8dB
-12dB
-16dB
-20dB
-24dB
-28dB
-32dB
-36dB
1Hz
10Hz
100Hz
1KHz
x = 150.131Hz y = -15.580dB
Type here to search
ENG
23:51
30-01-2021

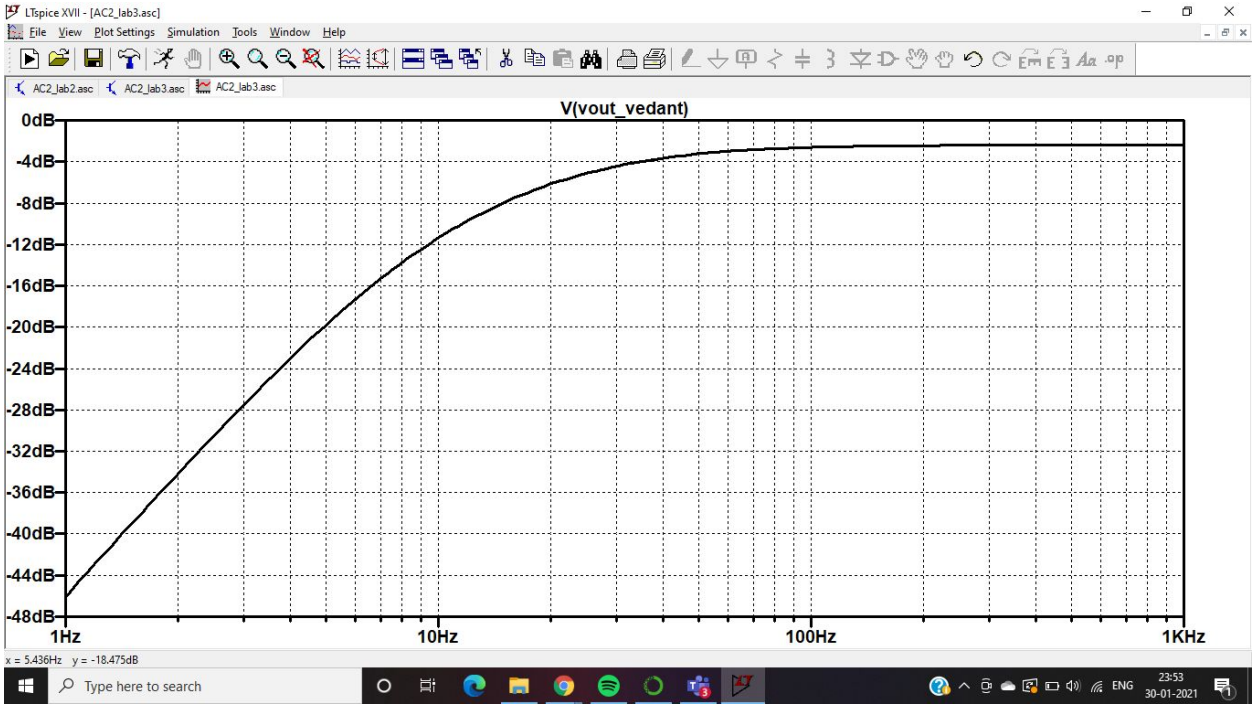


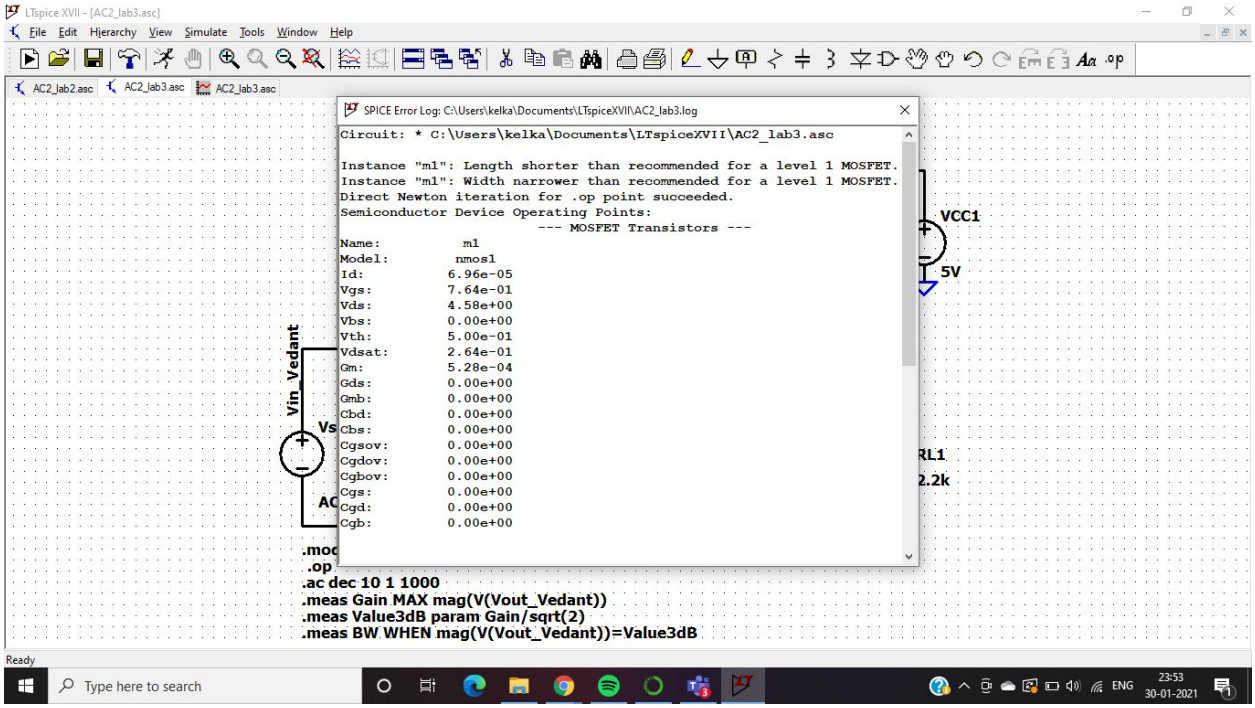


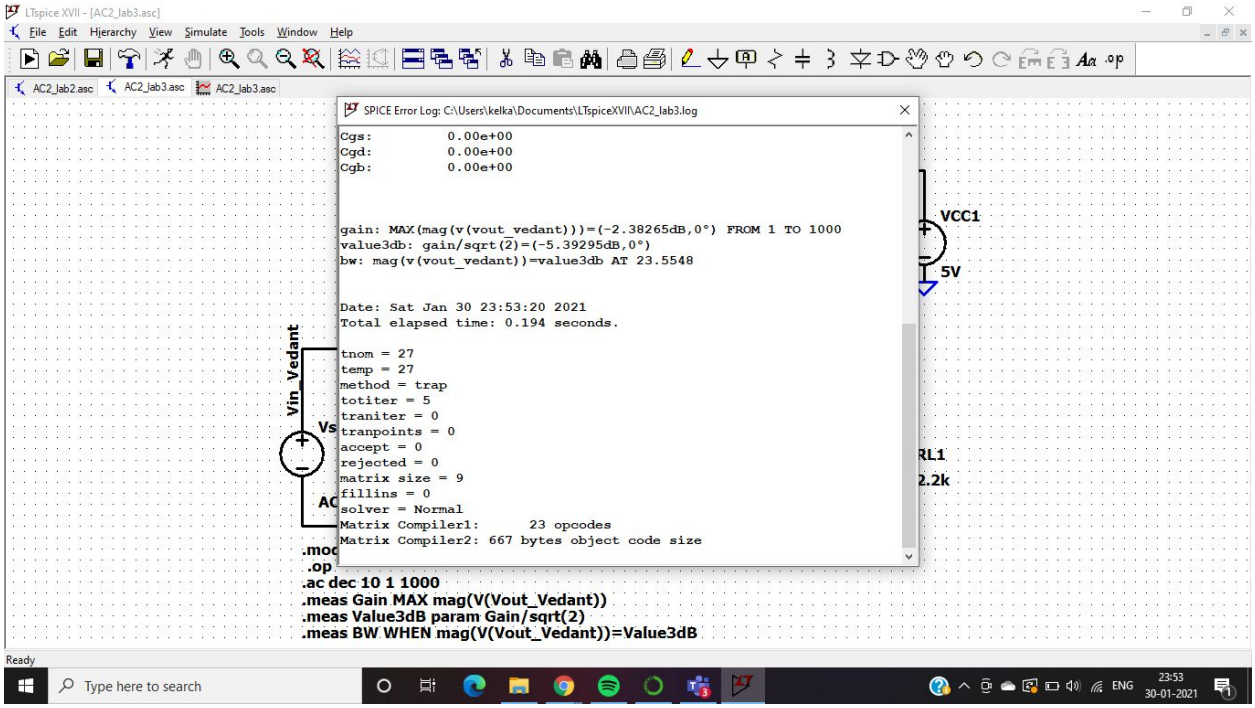
Avmid	4.3941dB

EX2


LTspice XVII - [AC2_lab3.asc]
File Edit Hierarchy View Simulate Tools Window Help
AC2_lab2.asc AC2_lab3.asc AC2_lab3.asc
Vedant Kelkar
AC lab 3 1912052
R1
100k
RC1
5k
VCC1
5V
CC1
2µF
D
M1
NMOS1
G
S
Rsig1
1k
CC2
1µF
Vin_Vedant
Vs1
AC 1
R2
20k
RE1
1k
CE1
10µF
Vout_Vedant
RL1
2.2k
.model nmos1 nmos(vto= 0.5 kp=1e-3 W=2um L=1um lambda=0)
.op
.ac dec 10 1 1000
.meas Gain MAX mag(V(Vout_Vedant))
.meas Value3dB param Gain/sqrt(2)
.meas BW WHEN mag(V(Vout_Vedant))=Value3dB
Type here to search
ENG
23:53
30-01-2021

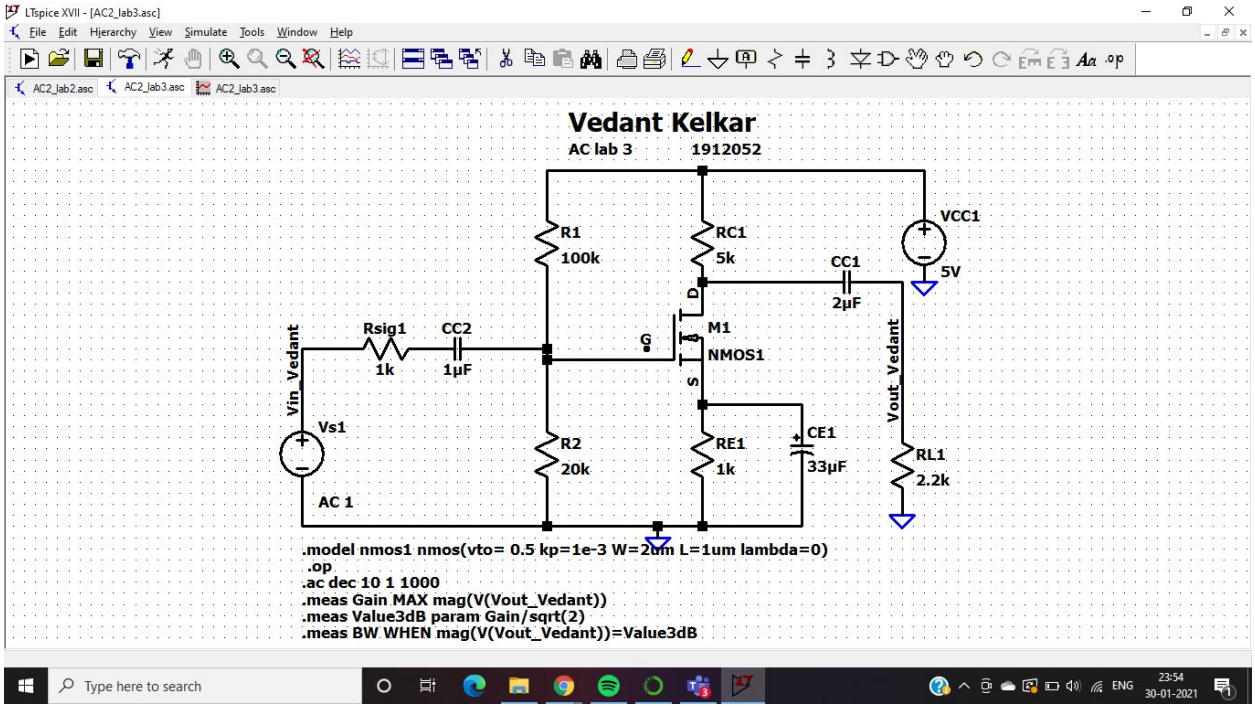

LTspice XVII - [AC2_lab3.asc]
File View Plot Settings Simulation Tools Window Help
AC2_lab2.asc AC2_lab3.asc AC2_lab3.asc
V(vout_vedant)
0dB
-4dB
-8dB
-12dB
-16dB
-20dB
-24dB
-28dB
-32dB
-36dB
-40dB
-44dB
-48dB
1Hz
10Hz
100Hz
1KHz
x = 5.436Hz y = -18.475dB
Type here to search
ENG
23:53
30-01-2021

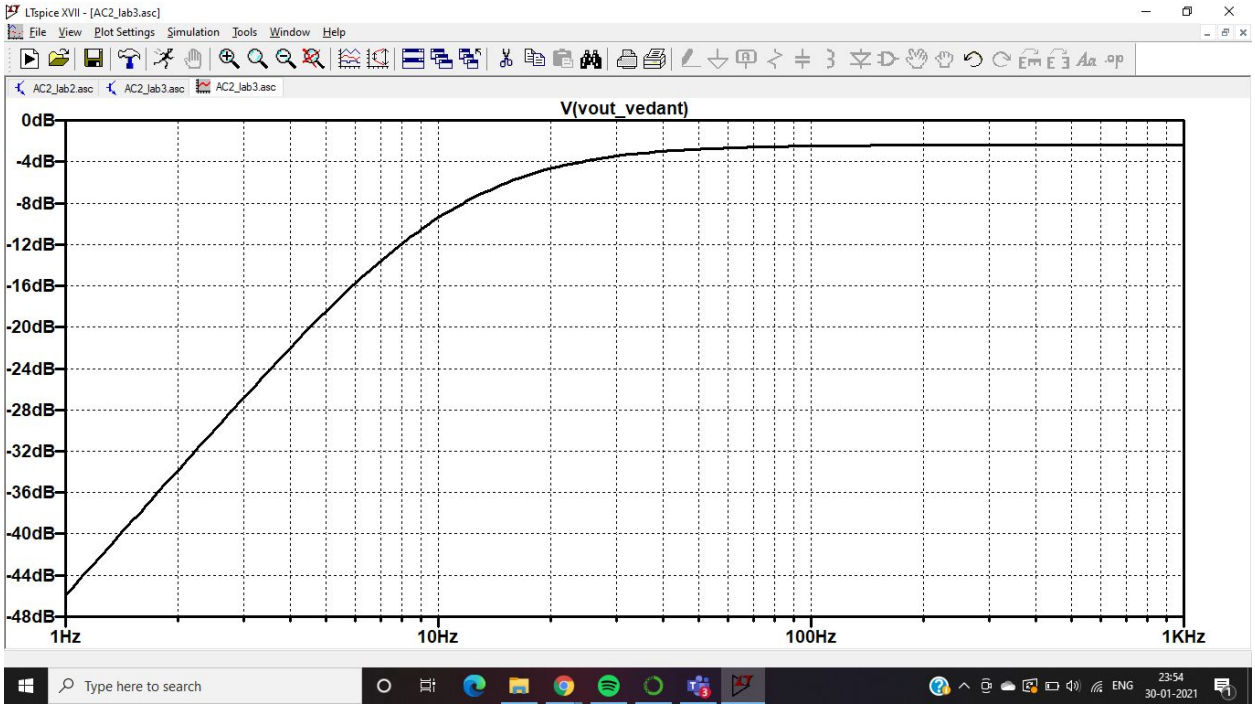


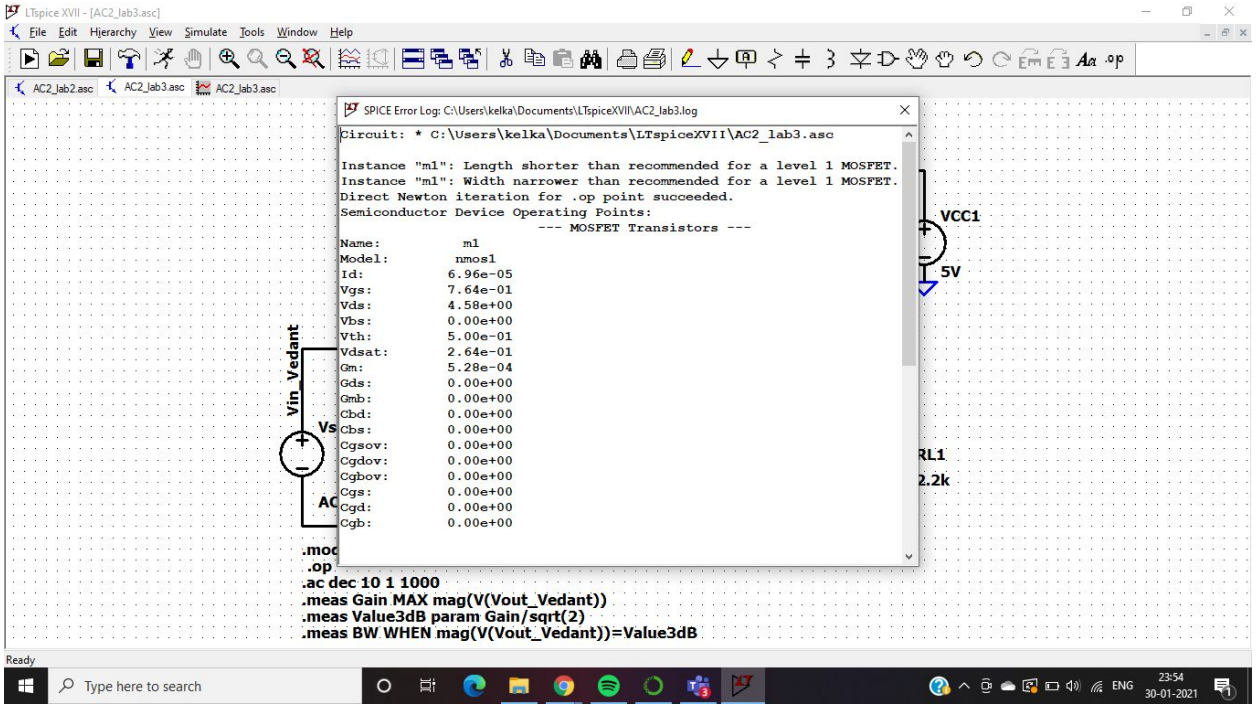


Avmid	-2.3826dB

EX3

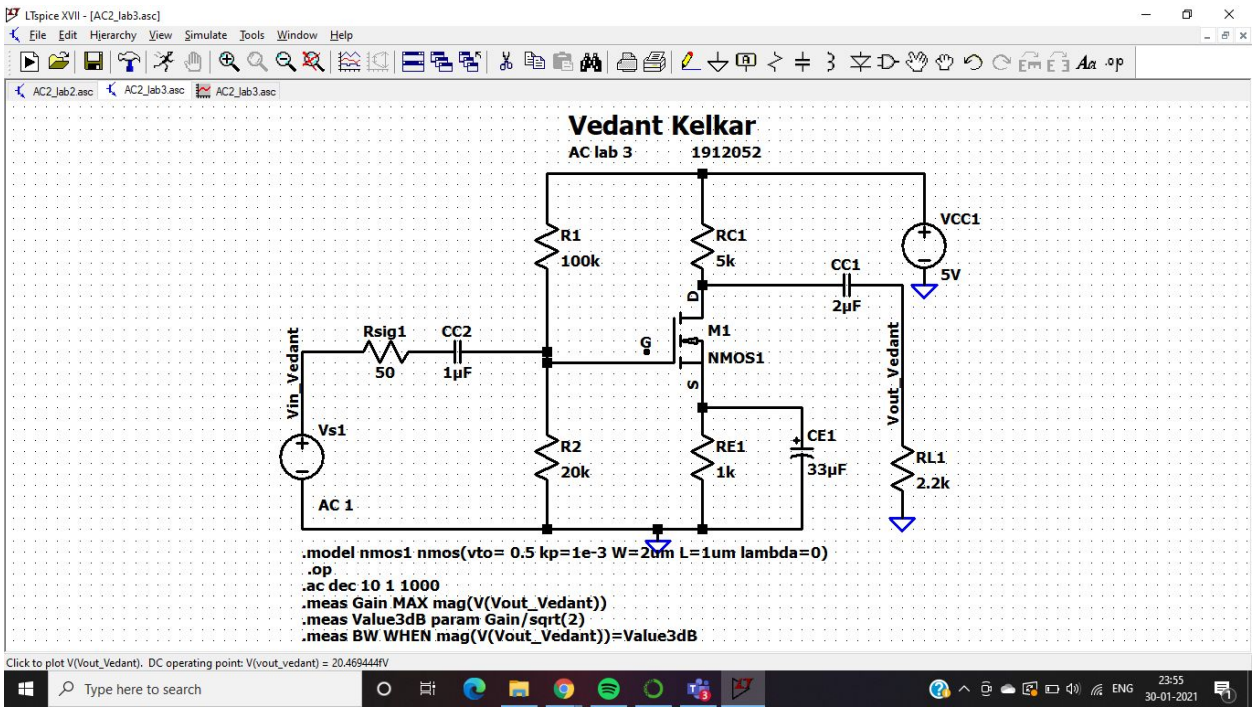

LTspice XVII - [AC2_lab3.asc]
File Edit Hierarchy View Simulate Tools Window Help
AC2_lab2.asc AC2_lab3.asc AC2_lab3.asc
Vedant Kelkar
AC lab 3 1912052
R1
100k
RC1
5k
VCC1
5V
CC1
2µF
D
M1
NMOS1
G
S
Rsig1
1k
CC2
1µF
Vin_Vedant
Vs1
AC 1
R2
20k
RE1
1k
CE1
33µF
Vout_Vedant
RL1
2.2k
.model nmos1 nmos(vto= 0.5 kp=1e-3 W=2um L=1um lambda=0)
.op
.ac dec 10 1 1000
.meas Gain MAX mag(V(Vout_Vedant))
.meas Value3dB param Gain/sqrt(2)
.meas BW WHEN mag(V(Vout_Vedant))=Value3dB
Type here to search
ENG
23:54
30-01-2021

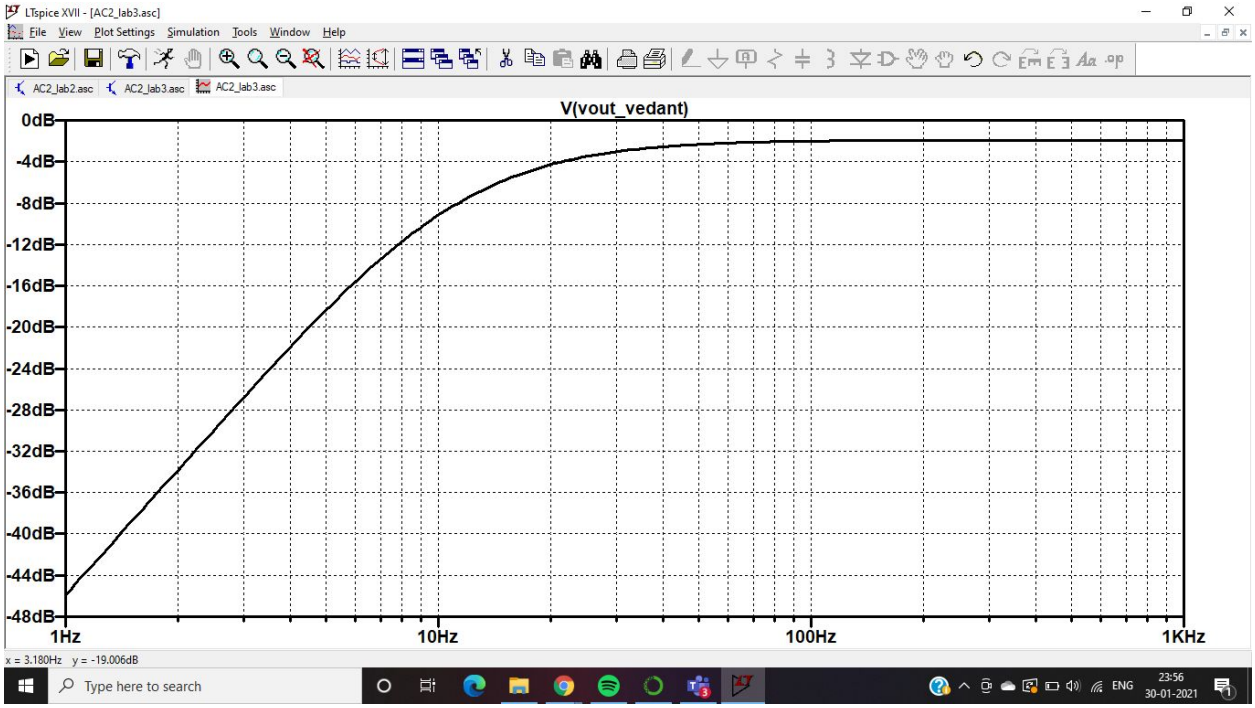

LTspice XVII - [AC2_lab3.asc]
File View Plot Settings Simulation Tools Window Help
AC2_lab2.asc AC2_lab3.asc AC2_lab3.asc
V(vout_vedant)
0dB
-4dB
-8dB
-12dB
-16dB
-20dB
-24dB
-28dB
-32dB
-36dB
-40dB
-44dB
-48dB
1Hz
10Hz
100Hz
1KHz
Type here to search
ENG
23:54
30-01-2021

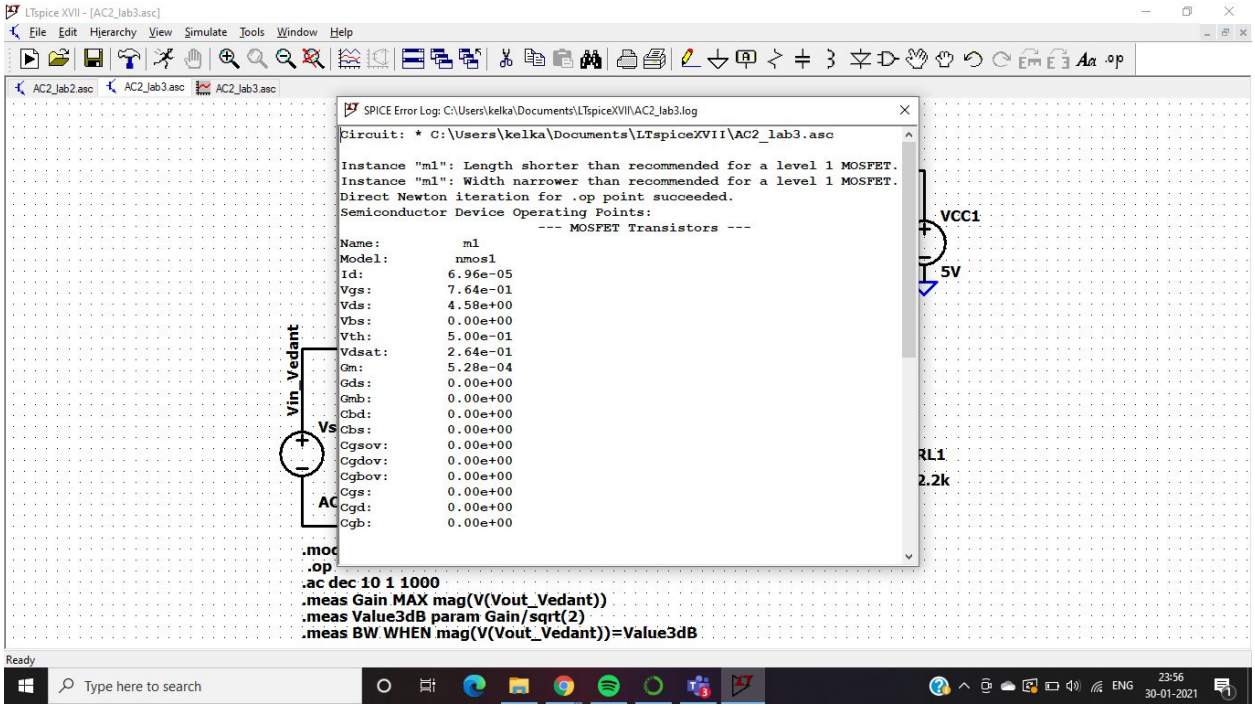


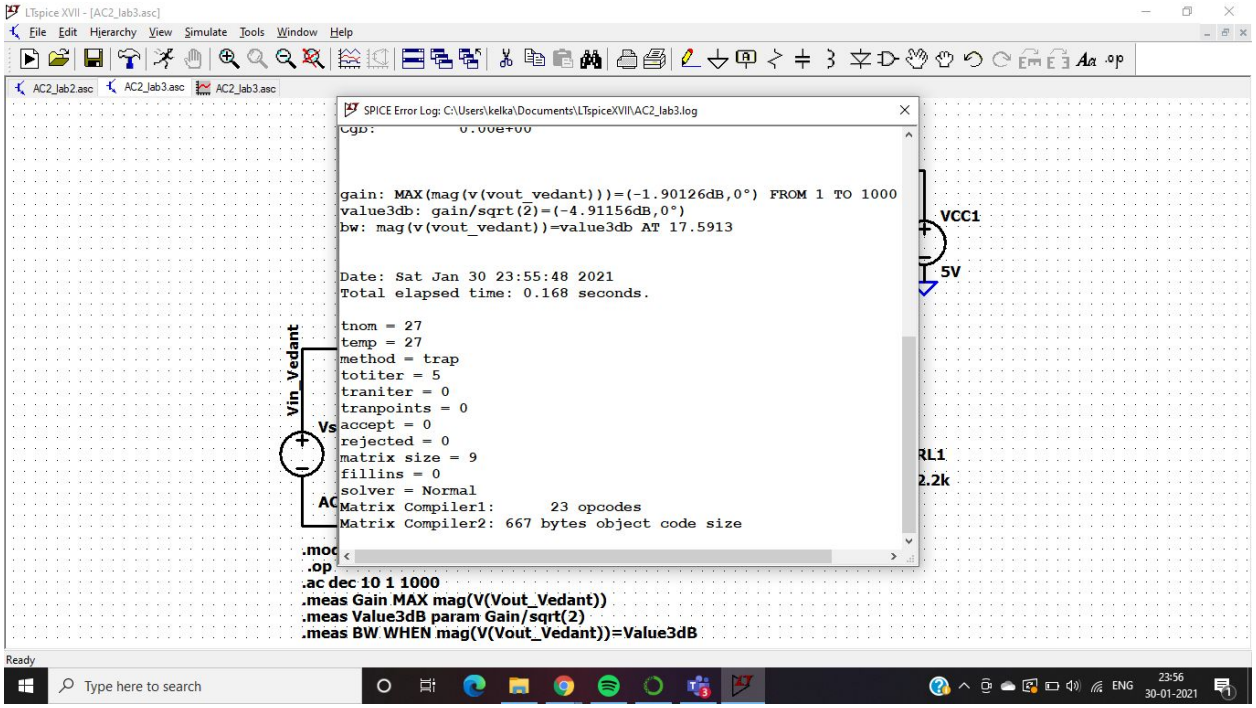
Avmid	-2.381dB

EX4




LTspice XVII - [AC2_lab3.asc]
File View Plot Settings Simulation Tools Window Help
AC2_lab2.asc AC2_lab3.asc AC2_lab3.asc
V(vout_vedant)
0dB
-4dB
-8dB
-12dB
-16dB
-20dB
-24dB
-28dB
-32dB
-36dB
-40dB
-44dB
-48dB
1Hz
10Hz
100Hz
1KHz
x = 3.180Hz y = -19.006dB
Type here to search
ENG
23:56
30-01-2021


LTspice XVII - [AC2_lab3.asc]
File Edit Hierarchy View Simulate Tools Window Help
AC2_lab2.asc AC2_lab3.asc AC2_lab3.asc
SPICE Error Log: C:\Users\kelka\Documents\LTspiceXVII\AC2_lab3.log
Circuit: * C:\Users\kelka\Documents\LTspiceXVII\AC2_lab3.asc
Instance "m1": Length shorter than recommended for a level 1 MOSFET.
Instance "m1": Width narrower than recommended for a level 1 MOSFET.
Direct Newton iteration for .op point succeeded.
Semiconductor Device Operating Points:
--- MOSFET Transistors ---
Name: m1
Model: nmos1
Id: 6.96e-05
Vgs: 7.64e-01
Vds: 4.58e+00
Vbs: 0.00e+00
Vth: 5.00e-01
Vdsat: 2.64e-01
Gm: 5.28e-04
Gds: 0.00e+00
Gmb: 0.00e+00
Cbd: 0.00e+00
Cbs: 0.00e+00
Cgsov: 0.00e+00
Cgdov: 0.00e+00
Cgbov: 0.00e+00
Cgs: 0.00e+00
Cgd: 0.00e+00
Cgb: 0.00e+00
VCC1
5V
Vin_Vedant
.op
.ac dec 10 1 1000
.meas Gain MAX mag(V(Vout_Vedant))
.meas Value3dB param Gain/sqrt(2)
.meas BW WHEN mag(V(Vout_Vedant))=Value3dB
Ready
Type here to search
ENG
23:56
30-01-2021



Avmid	-1.9012dB

As we change the various values according to the given exercices some of the involved parameters change(increase or decrease) . We can notice the significant change in the fl fh and the bandwidth.

Suggestions: Write (few lines) what the changes in Exercise have effect on the amplifier.

AC LAB 3 is approved with suggestions: Inderjit Singh Dhanjal