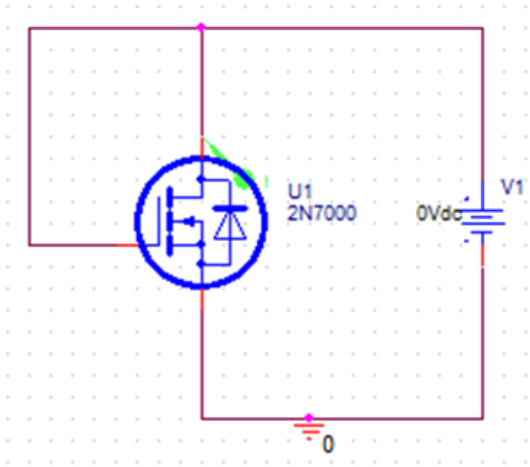
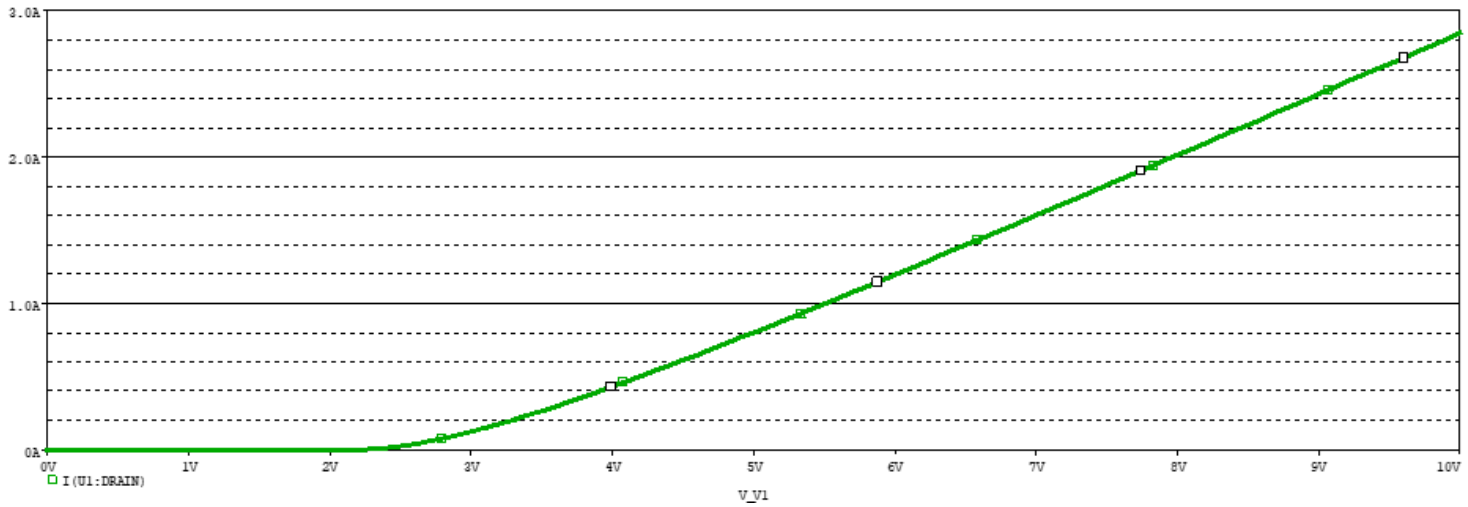
Task 1:

Discrete circuit design is constructed using the circuit components which are manufactured separately and then are connected together afterwards using different methods such as vero-boards, connecting wires and Printed Circuit Boards (PCBs). In case of MOSFETs, the MOSFET is manufactured separately and the components such as the resistors and capacitors are then connected to it afterwards. The demand of discrete circuits if MOSFET will be less as compared to the integrated circuits but there are some application that requires the discrete circuit design; Analog switches, because of the theoretically zero offset voltage. High-frequency amplification, where noise is low and the square-law characteristic is desirable. Certain isolated cases, such as the interfacing between MOS-bipolar circuits or where the unique property of the device (i.e., the extremely high input resistance) can be used to advantage. There are also disadvantages of this circuit design i.e.there will be virtually no demand for packaged singlegate functions-the reason being that the performance would be so poor and the cost so close to the cost of present bipolar circuits that no advantage for using MOS would exist. Integrated Circuit Design: In the Integrated Circuit Design, the whole circuit is manufactured together which is fitted in an integrated circuit (IC). There is a microscopic array of electronic circuits and electronic components. In case of MOSFETs, large, complex ICs operating at slow-to-medium speeds are manufactured. Some of the advantages of this design are; Integration of a complete function on a chip allows all interconnections to be made on that chip. Only the signal and power leads need to be brought out of the package. As the number of leads decreases, the package cost decreases. The cost of testing complex ICs, which can make up a very substantial portion of the total cost, is largely dependent upon the number of signal pins in the package. The small number of signal pins makes it cost efficient. Here the signal is fed into the circuit, operated upon in some complex manner, modified, and then presented at the output. The serial shift register (SR) is the classical-and most illustrated-example.

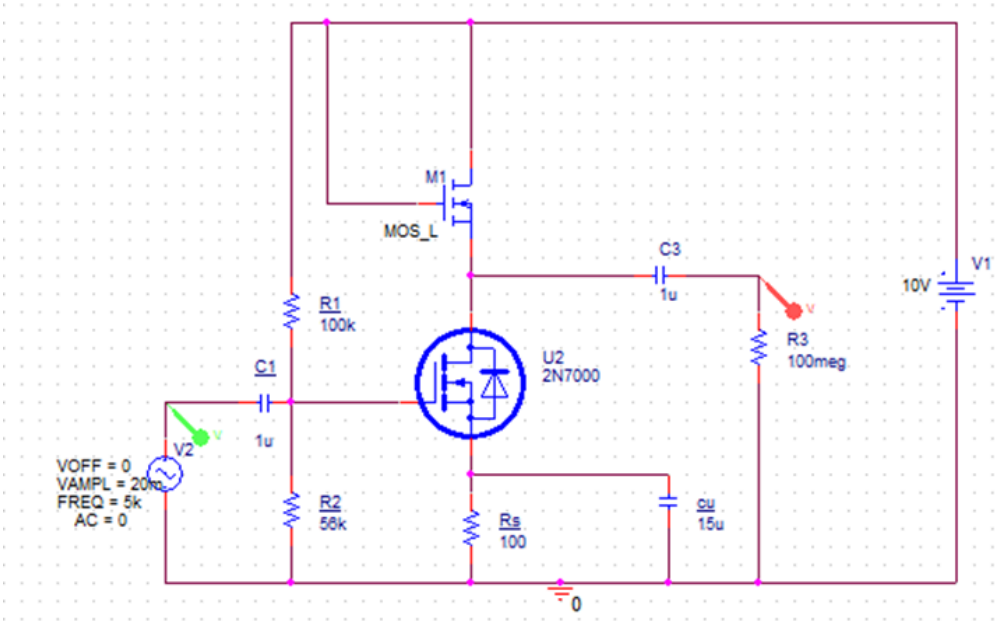
Task2:

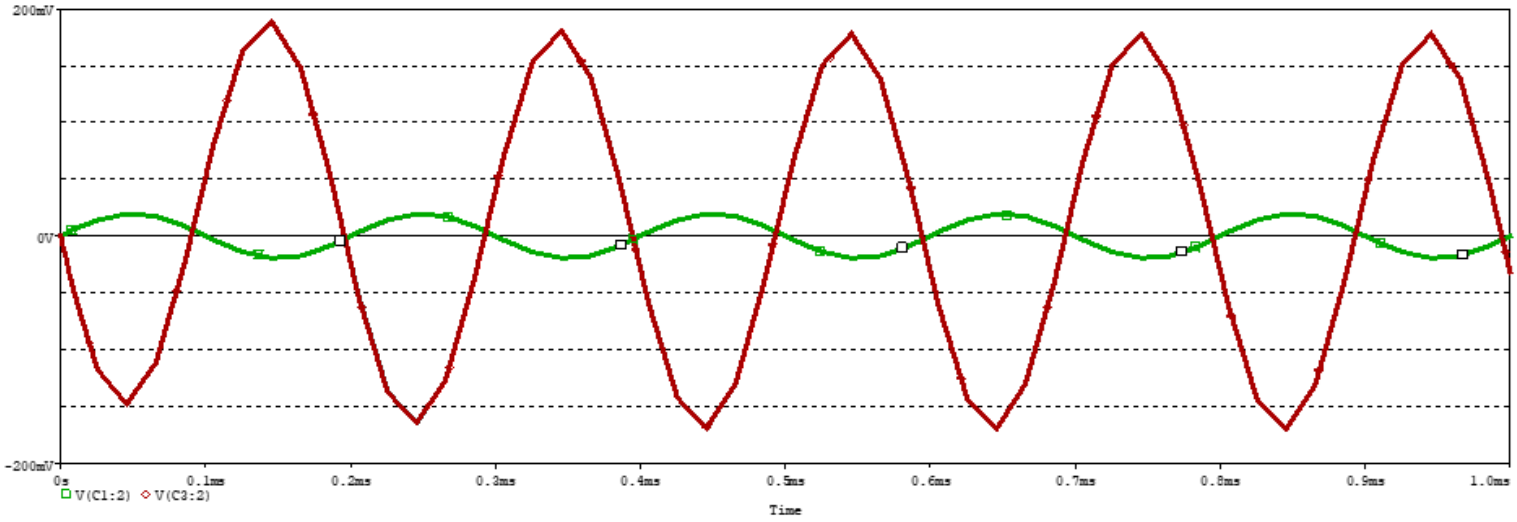




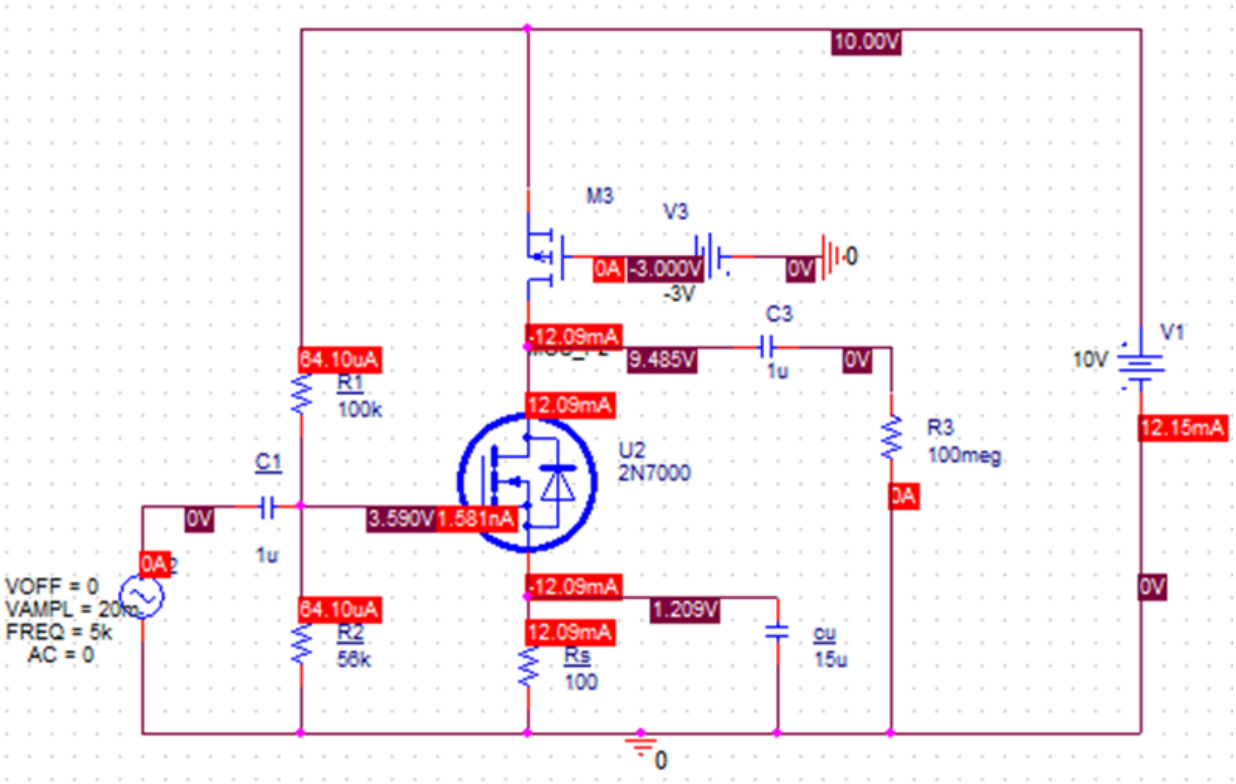
Trace Color	Trace Name	Y1	Y2	Y1 - Y2
	X Values	2.8973	0.000	2.8973
CURSOR 1,2	I(U1:DRAIN)	100.719m	-1.446E-30	100.719m

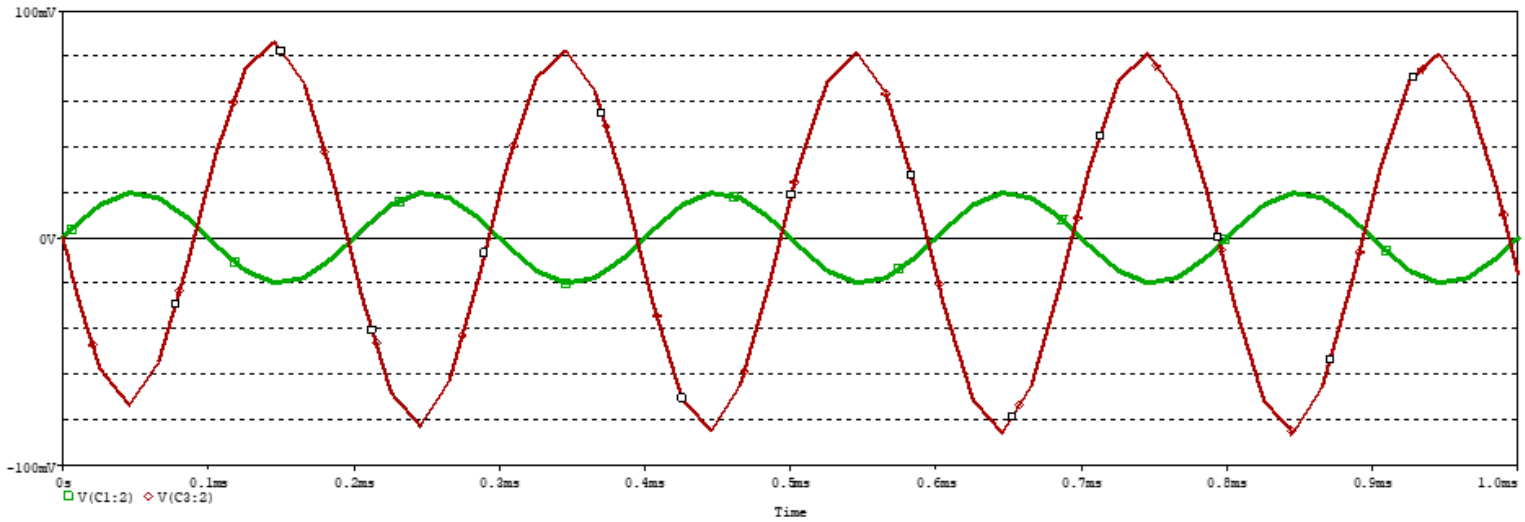
Task 3:



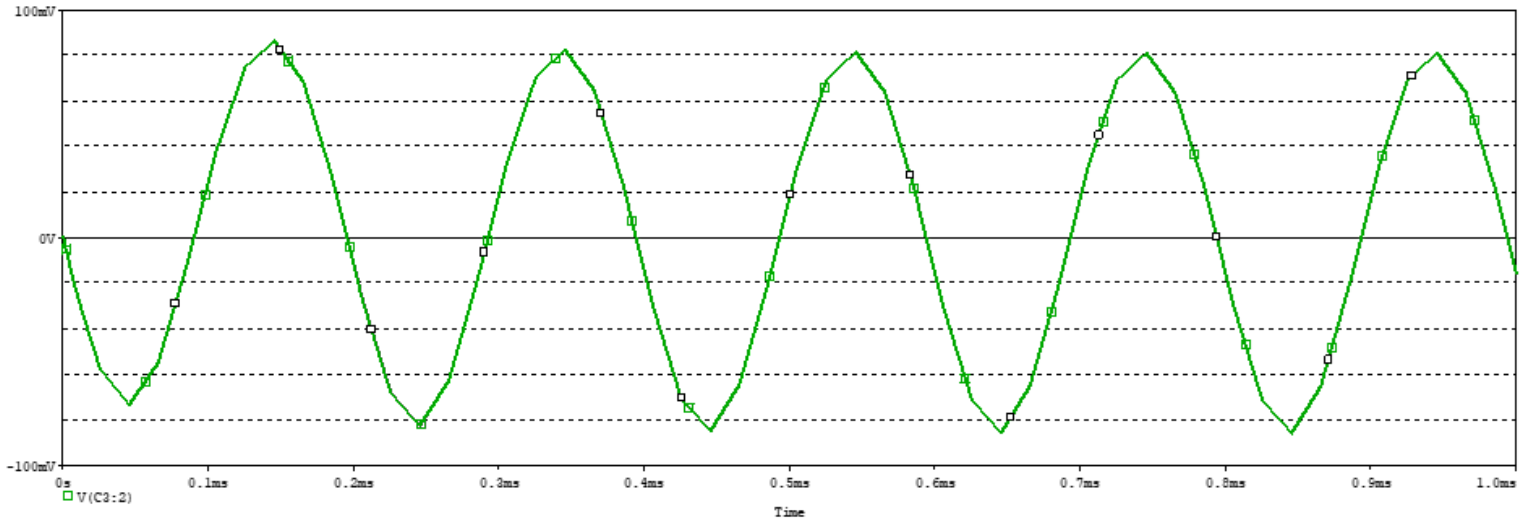

200mV
0V
-200mV
0s
0.1ms
0.2ms
0.3ms
0.4ms
0.5ms
0.6ms
0.7ms
0.8ms
0.9ms
1.0ms
V(C1:2)
V(C3:2)
Time

Task 4:


10.00V
M3
V3
0A
-3.000V
-3V
0V
0
-12.09mA
9.485V
C3
1u
0V
64.10uA
R1
100k
12.09mA
U2
2N7000
C1
R3
100meg
0V
3.590V
1.581nA
1u
0A
VOFF = 0
VAMPL = 20m
FREQ = 5k
AC = 0
-12.09mA
1.209V
64.10uA
R2
56k
12.09mA
Rs
100
cu
15u
0
V1
10V
12.15mA
0V



Output:



Trace Color	Trace Name	Y1	Y2	Y1 - Y2
	X Values	145.517u	245.447u	-99.930u
CURSOR 1,2	V(C3:2)	86.250m	-82.819m	169.070m