28-12-2018

MECE 347 Midterm Make-Up

Name:

Surname:

Number:

Signature:

Q1) For the amplifier circuit below find the transfer function in Laplace domain**.** Select suitable values for R1, Rf, Rx and C to obtain a maximum gain of 10 and a cut of angular frequency of 10000 rad/sec. **(33 points).**



Q2) We have 2 inputs which are named as V1(t) and V2(t). Design a circuit diagram that generates the output function In your design you can use any number of amplifier units given in the figures below. However each unit should either demonstrate an inverting differentiator or an inverting-summing amplifier characteristics or a simple inverting amplifier characteristics. Indicate gain value of each unit **(33 points).**

**Inverting Amplifier unit Inverting Differentiator Amplifier unit**

    
**Inverting Summing Amplifier unit**



Q3)A FET amplifier structure in small signal AC analysis is given below. This circuit is examined for low frequency range and it should have 3 cut of frequencies due to the capacitors Cg, Cd and Cs. Find approximately the cut-off frequency (fcut\_of\_Cd) due to capacitor Cd. In the calculations take r0=RL=RD=RS=RM=1000 Ω, Cd= 1 μFarad, gm=10-3 Siemens. **(34 points).** The procedure for findingfcut\_of\_Cd is given below.

Procedure:

* Kill all sources
* Short the capacitors (Except for Cd)
* Put source instead of Cd (VTest)
* Calculate the current originating from the source (ITest)
* VTest/ITest=RCd
* fcut\_of\_Cd=

