**30-12-2017**

**MECE 347 Make-up for Midterm**

**NAME:**

**SURNAME:**

**NUMBER:**

**Q1)** 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 due to capacitor CS. In the calculations take r0=RL=RD=RS=1000 Ω, Rin=RG=500 Ω CS= 1 μFarad, gm=10-3 Siemens. **(35 points)**



**Q2)** The circuit below is a band-pass filter designed using two OPAMPs (Say two LM741 IC is used for this purpose.



1. Find the transfer function $H\left(s\right)=\frac{V\_{out}(s)}{V\_{in}(s)}$ in Laplace domain. **(35 points)**
2. Show that when CA = CB = C, RA = RB = R, R1 = 0 Ohm, R2 = $\infty $ Ohm the transfer function becomes

$H\left(s\right)=\frac{1}{C^{2}R^{2}s^{2}+2CRs+1}$. **(5 points)**

1. Draw the approximate magnitude response of H(s) in logarithmic scale as bode plot in DB (decibel). **(15 points)**
2. What is the exact cut of frequency of this low pass filter. **(10 points)**