**188212 Analog Electronics Lab.**

**Final Examination (3 hours)**

**Instructions:**

1. Do all problems to the best of your knowledge without any approximation unless otherwise stated in the problem.
2. Use at least 3 significant digits in your calculation.
   1. For a voltage amplifier circuit model as shown in Figure 1.1 (10 points)



Figure 1.1

Find 

1.2 The spec sheet for the 3N171 lists the following minimum values:  
*IDS*(on) = 10 mA at *VGS* = 10 V and *VGS*(th) = 1.5 V.Using these ratings, determine the value of *ID* for the circuit shown in Figure 1.2. (10 points)



Figure 1.2

1. Refer to the amplifier circuit shown in Figure 2. Determine **, ** and ** (20 points)



Figure 2.

1. Refer to the BJT amplifier circuit in Figure 3.
   1. Draw the ac equivalent circuit.(5 points)
   2. Determine the value of the input impedance (*Zin*) and output impedance (*Zout*)  
      (10 points)
   3. Calculate the voltage gain (*Av*) (5 points)



Figure 3

1. The Figure 4 shows a common-source FET amplifier.
   1. Calculate *VGSQ* and *IDQ*, given the *IDSS* = 10 mA and *VGS(off)* = -4 V (5 points)
   2. Draw the ac equivalent circuit. (5 points)
   3. Calculate the input impedance (*Zin*)and output impedance (*Zout*) (5 points)
   4. Calculate the voltage gain (*Av*) (5 points)



Figure 4