**188211 Analog Electronics**

**Exam 2 (2 hours)**

**(Closed Book)**

**Instructions:**

1. Do all problems to the best of your knowledge without any approximation unless otherwise stated in the problem.

**Scores**

1a

1b

1c

1d

1e

1f

2a

2b

3a

3b

3c

3d

1. Use at least 3 significant digits in your calculation.
2. A BJT amplifier is shown in Fig. P.1 with its *ac* equivalent circuit on the right. Assume that  of the transistor is 170.



Figure P.1.

* 1. Write voltage polarities of the capacitors  and . (6 points)
  2. Assume that  is 10 mA. Find . (4 points)
  3. Calculate the voltage gain . (8 points)
  4. Find  and . (10 points)
  5. Determine the current gain . (12 points)
  6. Find the power gain . (5 points)

1. A self-biased JFET amplifier circuit is shown in Fig. P.2. The saturation drain current   
   () the JFET is 20 mA and the pinch-off voltage () is -5 V.



Figure P.2. A self-biased JFET amplifier circuit for Prob. 3.

* 1. Find  and . (20 points)

Hint Shockley’s equation is given below:



* 1. Find . (5 points)

1. Briefly describe the following terms.
   1. Voltage buffer. (5 points)
   2. Threshold voltage of a MOSFET. (5 points)
   3. Drain-feedback bias. (5 points)
   4. CMOS. (5 points)