**188211 Analog Electronics**

**Solution to Exam 2 (2 hours)**

* 1. Write voltage polarities of the capacitors  and . (6 points)



* 1. Assume that  is 10 mA. Find . (4 points)

.

* 1. Calculate the voltage gain . (8 points)







.

* 1. Find  and . (8 points)





* 1. Determine the current gain . (14 points)

Let , , , , and .

Use a current divider formula to find a relation between  and  which, in turn, relates to .



Apply a current divider formula to find a relation between  and .



Then .

* 1. Find the power gain . (5 points)

.



Figure P.2.

* 1. Find  and . (20 points)

From Shockley’s equation and , we obtain

.

Rearrange the terms and get

.



A

The valid  is 9.891 mA.

Thus V.

Another way is to substitute  in Shockley’s equation. We then have

.

Rearrange the terms and get





V

The valid  is -1.484 V.

Thus A.

* 1. Find . (5 points)

V.