Examination Feedback for EEE118– Electronic Devices and Circuits 1
Spring Semester 2012-13

Feedback for EEE118 Session: 2012-2013

Feedback: Please write simple statements about how well students addressed the exam paper in general and each individual question in particular including common problems/mistakes and areas of concern in the boxes provided below. Increase row height if necessary.

General Comments:

The circuit questions were answered quite well by many students. Question 6 saw the heaviest scoring, question 3 proved the most taxing. Many students appear to lack "exam technique" – probably because, for many, this was the first exam at the university. Scoring very highly in exams requires you [the students] to "do" the problem sheets and past exam papers until you can do them in your sleep. All that remains then is to divide up your time in the exam sensibly and ensure that you read the questions carefully. In questions involving equations, algebra should be used throughout - only at the end should numbers be inserted. If some numerical error is made, the majority of the marks can still be obtained. The number of marks available for an answer should guide how much writing/derivation etc. is required.

Question 1:

Question 1 was tackled with ease by several students, but many struggled as well. Parts a and b were answered correctly by a pleasing number of students. Several found good short cuts and simplifications, showing they had done plenty of practice questions. A couple of students managed to include a source transformation and get the answer right, very impressive. Most students who got part a completely correct also got part b. Practically no students who failed to get part a then went on to correctly answer part b.

The circuit in Part c was widely recognized as a voltage clamp. A small minority confused it with a peak detector. The description of operation was broadly well answered. The key thing is to note that it's a clamp and to ensure that the conduction state of the diode and the charging or discharging of the capacitor feature centrally in the discussion. Several students chose to divide their discussion across one cycle of the input waveform (as I did in the lectures) these students usually scored well. But a bulleted list of the salient points is equally effective.

The graphs in parts c ii and d ii were well answered by most students that had provided a sensible explanation. The current waveforms proved trickier than the voltage waveforms. A significant minority believed that the question was about exponentials and scored poorly. Several students who got a perfect set of graphs in part d ii then neglected to write on the time constant. Always read the question!

Question 2:

This was the least popular question and the average score was low. It was centred around the bipolar transistor and clearly few students have grasped how this device works. Some students confused this device with the FET. Few students were able to carry out the calculations even though all the formulae were provided, again highlighting lack of understanding.

Question 3:

Question 3 was mixed for many students. Only one or two students obtained full marks.

Part a i was poorly answered by many, often ignoring the collector – emitter saturation voltage. Part a ii was got by a much higher fraction of candidates. Many of those who neglected Vce(sat) in the prior part managed to include it here! Perhaps the term "load current" instead of "collector current" was confusing for some. Most students got the switch power (part a iii) and many also found the range of base currents (part a iv). The maximum base resistance caught a few people out however. The biggest possible base current must be used. Errors were carried forward - many students got all but the first mark.

Part b was quite well answered by many. b i was answered correctly by most. The inductor current (b ii) was got by somewhat less than half the candidates because Vce(sat) was neglected again. Part iii was correctly answered by most students. Many students failed to realize that two components were needed to obtain full marks in part b iv. Two marks were available one for the diode and one for the resistor.

Part c was answered poorly overall. Some marks were available for writing down the assumptions that are made. Many students did not write their assumptions and then, having failed to execute their mathematics correctly, were unable to obtain much credit. Re was found by almost all. R1 and R2 by many. If sensible assumptions were made Ie = Ic, Ib = 0 and Vb = 2V was obtained along with Re, R1 and R2, 6 marks were awarded. To get the other 3 requires RL to be found correctly too. Interestingly, every student (there were less than a hand-full) who got RL correct, first drew a diagram of the voltages around the transistor to show the maximum signal swing available on the collector node. Many students seemed to think the value of R1 and RL could be easily related somehow – very worrying.

The small signal diagram in part d was drawn correctly by about half of students. By far the commonest mistake was putting R1 between base and collector instead of in parallel with R2. Second was including RE somewhere, it is decoupled and shouldn't feature. A significant minority of students didn't provide any algebraic solution for the small signal gain. A fair number of students tried something numerical involving (e IC)/(k T). Read the question carefully!

Question 4:

A popular question with the highest average score. Most students did well on the descriptive part but a lot did not have the confidence to try the calculation part (e) or were not able to carry it through correctly.

Question 5:

The descriptive part was done well which indicated general good understanding of the pn junction concepts. The calculation part (d) was done reasonably well also.

Question 6:

Question 6 was well answered on the whole.

Many students were confused by part a i. providing non inverting and inverting amplifier circuits when 3 marks were available for drawing only an opamp symbol and labeling the terminals.

Part a ii caused a lot of difficulty. The question asked for "typical" values but almost all students provided "ideal" values. Many of those that did realize what was required seemed to be guessing.

Part a iii was generally well answered.

Part B i was correctly answered by practically all students

Part B ii was answered well by most, but some read "find" as "state". Working must be provided, it's worth 3 marks!

Part B iii was answered well by many but some students got lost in the analysis.

Part C i was answered correctly by about one third of the students who attempted it. Of those who got C i the majority went on to get C ii as well. In part C there were lots of rounding errors. The final result was often skewed by a significant amount due to lack of significant figures in the partial answers. Working at 5 or 6 s. f. (say 4 d. p.) is desirable. Answers should be 3 or 4 s. f. (2 or 3 d. p.)