Examination Feedback for EEE6001 – Electronic Engineering Principles
Autumn Semester 2006-07

Feedback for EEE6001 Session:2006-2007

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:

Question 1:

Attempted by about 70% of candidates. In **(a)** and **(c)** many candidates correctly wrote down Gauss/Amperes law but failed to give explanation of how they are applied and simply quoted result.
Part **(b)** was reasonably well attempted. Part **(d)** was taken directly from a tutorial sheet but only a very few candidates obtained the correct answer or applied the correct method.

Question 2:

Attempted by just under half the candidates. Part **(a)** was similar to an example given on handouts, with parts **(i)** to **(iii)** well attempted although some candidates confused flux and flux density in part **(ii)**. Part **(a)(iv)** proved a little more challenging with only a handful of candidates obtaining the correct result.
Part **(b)** was bookwork but only a few candidates correctly drew the equivalent circuit and sketched the torque-speed characteristics. Part **(c)** was taken directly from a tutorial sheet but was not attempted by many candidates and some failed to include the effect of the back emf in the calculations.

Question 3:

(a) Modest Scoring. In general students remembered the basic equations. A few very good derivations, whilst others made (over) simplifications which led to estimates which were close. There were a number of poor responses, with the following issues: Basic misunderstanding of the problem, including misunderstanding of the terms 'majority' and 'minority' carrier. Failure to remember the basic equations, or wrong assumptions. Errors in the calculation. Errors in the units.

(b) High Scoring. The majority of students drew accurate p-n junction diode band alignments. The question asked for a number of parameters to be marked on the drawing and marks were deducted when these were absent. There were one or two spectacular failures, which is very concerning.

(c) High Scoring. The question is a simple matter of remembering the diode equation, which the majority did, and then making a simple calculation. There were a few with errors in the calculation.

(d) Low Scoring. Only a few students remembered the equation for the photocurrent. A few tried to derive it, with mixed results. All failed to realise that when the photon energy is less than the band gap the photocurrent is zero and I> Io.

Question 4:

(i) Modest-High Scoring. The majority recognised Schottky behavoir and many students reproduced the band alignment accurately. There were a few spectacular failures.

(ii) High Scoring. The majority applied the equation accurately, although there were a surprising number of miscalculations.

(iii) High Scoring. The majority of students were able to remember the gm equation and very few derived it. I had hoped for derivations (as he question asks for). A good number of high quality responses, plus a few miscalculations.

(iv) Low Scoring. Very few students understood that quantum mechanical tunnelling was the problem in thin gates, despite this being in lectures. Very few references to it in responses. Instead, there were many derivations of gate oxide properties such as capacitance which were well off the mark.

Question 5:

This question was was attempted by approximately 70% of candidates.
Part **(a)** was bookwork and offered a lot of marks for being able to differentiate the given equation and for knowing how it relates to the small signal parameters of a bipolar transistor. A large number of candidates struggled with part **(a)** and more success had with part **(b)**. The largest single reason for lost marks in part **(b)** was failure to fully read the question. A number of candidates completed the analysis of the given circuit successfully and could have gained full marks but then didn't provide all of the values that were requested.

Question 6:

Part **(a)** was completed quite successfully by those who attempted question **6**. As with question **5**, marks were lost by candidates who didn't fully read the question. Part **(a)** specified that the resistors in the given circuit were contributing noise but many candidates treated them as noiseless. Very few candidates managed to complete part **(b)**, a question that was very similar to questions in the tutorial sheets and past papers in the undergraduate course EEE103.

Question 7:

(a) Most students stated differences between the two types of state machine, but far fewer mentioned the latency and number of states as asked for in the question.

(b) Completed quite poorly in general, one or two correct solutions. Some completed the design correctly but for the sequence in the reverse order, which I only deducted a single mark for.

(c) Most students drew the adder as requested. Many recognised the critical path through the full adder block, but gave me the delay to the carry output not the sum output, which I specifically asked for. Most knew why the adder has its name, and also the disadvantage. Only one student knew that there is dedicated support for this architecture on FPGA devices.

(d) Answered very poorly. If attempted, most students drew the parallel multiplier from last year’s exam.

Question 8:

(a) Students were asked to draw and label the transmitter side of the communications model given on page 3 of the first topic and page 1 of every subsequent topic. In general, answers were mediocre at best. Half marks for the correct blocks in the correct order with no output labels; extra marks deducted if the blocks were in the wrong order.

(b) This section was answered quite well. Half marks if the correct method was used but the wrong answer given. However, very few recognised that I was asking for “lossy” coding, which is disappointing as I spent a lot of time discussing the concept of entropy and its relevance to coding schemes.

(c) Most students could draw ASK and PSK. I needed to see three periods of the carrier for each transmitted bit, which many students missed. Almost all could draw a constellation diagram for QPSK, and some many knew how many bits QPSK can encode. Far fewer recognised the theoretical increase, and very few could suggest an improvement for 8-PSK and an application.