Examination Feedback for EEE201 – Signals and systems
Autumn Semester 2006-07

Feedback for EEE201 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:

Many of you have shown that you understand the different signal analysis techniques taught in this module. You were able to complement your understanding with the required mathematical skills to solve more challenging problems. I was particularly pleased that a number of you who were able to use various properties of Fourier Transform to solve Q4 and your ability to obtain the expressions for the current and capacitance voltage in Q3 using Laplace Transform.

However, I was also very disappointed with the performance of some of you who were not able to write down any meaningful solutions. The answer booklets have many blank pages with only one or two lines. This group of students appears to be ill-prepared for the examination, have very little understanding of the subject and have very poor basic mathematical skills. Some of you presented very messy work that was almost impossible to read. It is important that you demonstrate that you know what is required to solve the problem even if you are not able to perform the maths. Usually short sentences to explain what you are trying to do will help to demonstrate your understanding.

See below for more detailed comments.

Question 1:

I expected most of you to be able to obtain the Fourier Series coefficients for a simple square wave presented. While many of you were able to do the first part some of you could not perform the integration required and attempted to force your working solutions to agree with the expression provided. I have stressed in the lectures that it is very important that you practice your integration skills to enable you to obtain Fourier Series coefficients.

I was very surprised and disappointed that most of you do not understand that **amplitude spectrum** refers to the plot of amplitudes of the harmonics as a function of harmonic frequencies. Some of you sketched an approximation of a squarewave using a number of harmonics while others sketched what looks like a sinusoidal signal with different peak values given by the amplitudes of the harmonics. A number of you also sketched trigonometric FS coefficients with negative frequencies (a_{-n}). This is clearly wrong.

Only a small group of you were able to use Parseval's theorem correctly to obtain the average power in the last part of this question.

Question 2:

A large number of you lost some marks because of failure to write down correct convolution equation to obtain the unit step response. Most of you have chosen to flip the impulse response $h(\tau)$ and shift it by t to obtained $h(t-\tau)$. However when writing the performing the convolution you have integrated $h(\tau)$, which indicates that you have not fully understood the convolution process. Some of you made silly mistakes such as sketching $h(\tau) > 1$ or equal to a and sketching the $u(\tau)$ with a fixed duration.

A number of you have also failed to note that the signals have been sampled at 0.5s in part c.

Question 3:

In this question, there are more than one ways of to obtain the expression for i(t) and I was pleased to see the different ways used by some of you showing that you understand the circuit analysis. For example you can obtain the voltage across the capacitor by using the transform impedance approach or by equating the input voltage to the sum of voltage across the capacitor and resistor. Some of you have also solved part (c) by solving the integral equation or to use Laplace Transform to solve for the expression for the capacitance voltage.

Question 4:

Most of you have no problem with questions in part (a) and part (b). A large number of you do have problem with part (c) in which you were asked to obtain the time domain expression for a low pass filter. Here you can either make use of the Inverse Fourier Transform or make use of frequency shift and duality property. Once you have obtained the expression in time domain $h(t)= (A\omega_c/2\pi)\exp(j\omega_c t/2)\sin(\omega_c t/2)/(\omega_c t/2)$ you will be able to work out the peak amplitude of h(t) since the magnitude of $\exp(j\omega_c t/2)$ is 1 and the maximum value of $[\sin(\omega_c t/2)/(\omega_c t/2)]$ is 1.