

General comments on EE2-21 Feedback Systems paper 2013

1. The students have done very well on this question, scoring approximately 77%.
 - (a) This is an electric circuit modeling question and is a somewhat typical study group question.
 - i. Typical study group question.
 - ii. Typical study group question.
 - iii. Typical study group question, asks for a physical interpretation.
 - iv. A bit tricky since it uses all the results above.
 - (b) This is a Nyquist diagram/Routh-Hurwitz question and is mostly typical of study group questions.
 - i. Typical study group question.
 - ii. Typical study group question.
 - iii. Typical study group question.
 - iv. Typical study group question.
2. This question combines knowledge about Nyquist analysis and the Routh-Hurwitz criterion in a slightly non-standard way for compensator design. The students did less well on this question, scoring an average mark of 55%.
 - (a) Standard study group question, although part (iii) needs a little thought to deduce the phase margin.
 - (b) This uses the extended Nyquist stability criterion in that it requires the determination of closed-loop stability for all possible gains. The students tend to make elementary mistakes in signs, inversions and inequalities.
 - (c) Standard study group question.
 - (d) Standard study group question, although they haven't done PD controllers in that context.
3. This is a PD control design question that uses basic concepts of stability from a system's characteristic equation. The students did relatively well scoring approximately 61%.
 - (a) Most students got the characteristic equation right, but some did not give the correct comment on the closed-loop stability.
 - (b) Most students got the location of closed-loop poles right.
 - (c) Most students seem to have understood the concept of PD compensator design.
 - (d) Some students found the implementation of a controller using opamps a little difficult.