Examination Feedback for EEE6008 Reliability & Failure
Autumn Semester 2012-13

Feedback for EEE6008 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:

Questions 1, 3 , and 4 were the most popular questions on the paper this year and there was a very large spread of scores across all questions. Most students attempted Qs. 3 and 4, performing better in Q3. Q2 was least popular and generally the most poorly answered.
Generally, students seemed to struggle with the questions that required a link to be made between lecture topics, or where an evaluation of different methods was required. Questions requiring note recital or mathematics were better addressed.

Coursework was generally of a good standard.

Question 1:

A disappointing number of students misread part (a) and described the degradation process rather than suggest and justify a suitable characterization method for its investigation. Of those that did, many described SEM based techniques, which are not appropriate due to need for removing the plastic encapsulation and the large scale of the features.
A reasonable number of students correctly identified and described EBIC and CL, but failed to adequately evaluate their merits.
Part c), most process flows were out of order, such as opening packaging before X-radiography, and missing out some appropriate steps, but most made a reasonable attempt.

Question 2:

Most were unable to deduce the concentration of vacancies in part (b) (ii) in a question very similar (only numbers had changed) to one we did in class.
c) Most were able to describe how impurities and dopants differed, but few were able to use bandgap diagrams to describe the possible effects of impurities.
d) a large number of students did not know why interstitial impurities are less prevalent that substitutional impurities.
e) A large number of students correctly identified 3 origins of metal impurities, but of these, very few were able to outline how one of these can be introduced, its effects and how to avoid. Poor examples were used.

Question 3:

Most were able to estimate the MTTF, but a large number did not extract the shape parameter to deduce the cause of failure.
In part (c)(i), I asked for the acceleration factor, and then a subsequent demonstration of obtaining the activation energy from this. Very few used my suggested method. A large number correctly predicted that ~50% will still work after 8000hrs. Some calculated the MTTF, but then failed to make the link.
Part (d), reasonable attempts but a number of students had forgotten about exponential distributions.
Part (e), most were able to calculate the reliability of the parallel system, but a large number could not use this study of the comparative gain in reliability to discuss the trade-off with cost appropriately.

Question 4:

There was some confusion over the degradation method at play in the Al-Si system and a number of students discussed stress rather than the dominant interdiffusion process, which is subsequently addressed in the rest of the question. Many did not make the link between the reduction in electromigration from adding small amounts of copper (raises Ea for GB diffusion) and the formation of precipitates and galvanic cells.
Some students missed the electrolyte and described electromigration, although a large number correctly identified humidity at reduced temperatures in part f.