Examination Feedback for EEE6008 – Reliability and Failure
Spring Semester 2006-07

Feedback for EEE6008 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:

The overall performance is poorer than I expected. A number of students provided answers that were not relevant to the questions. Some of you have provided explanations, taken from the lecture notes, without careful considerations or understanding of whether they are appropriate. However a small number of students did very well and demonstrated very good understanding of the problems presented.

Question 1:

A number of you who attempted this question used the wrong equation to calculate the stress developed in part (a). You did well in describing stress developing in SiN/Si interface and electromigration effects. However some of you failed to emphasize that Blech effect occurs due to force originating from the stress gradient developing in short conductors. This force counters the electron movement due to electromigration and hence can reduce electromigration effect.

Question 2:

Most of you did well in all parts, except in part (b) (iii). In this part, you should calculate the intensity ratio of the x-ray beam I(x)/Io when the beam is focused on the polymer, Au and Si and when the beam is focused on the polymer and Si (i.e missing Au or open circuit). The intensity ratio difference obtained should be detectable and hence can be used to locate an open circuit.

Question 3:

Again most of you did well although there are some students who have provided failure mechanisms related to growth rather than the bonding process. A number of you have also provided secondary electron mode in SEM as the characterization technique for popcorn effect. The x-ray radiography and scanning acoustic microscopy are more suitable as the features under analysis are generally quite large (>1μm).

Question 4:

A large number of students did not label their graphs in this question. The quality of the lines drawn is poor in some cases leading to extremely large value of MTTF and η. A number of students tried to compute the MTTF mathematically when all you need to do is to locate the intersection between your straight line and the 50% line. Similarly you can obtain the percentage of transistors that fail after 3000 hours from your graph at 3000 hours. Finally some of you have not been able to explain that $\beta = 1$ corresponds to exponential distribution and hence constant failure rate while $\beta < 1$ and $\beta > 1$ will tend towards decreasing (infant mortality) and increasing (wearout stage) failure rates, respectively.