Examination Feedback for EEE6008 – Reliability and Failure
Autumn Semester 2007-08

Feedback for EEE6008 Session:2007-2008

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:

Most of you did better in questions 1 and 4. However your performance in questions 2 and 3 was poor. A number of you struggled when asked to discuss reliability issues that are not "bookwork" but rely on your understanding of the module.

Question 1:

Most of you did very well in the bookwork sections (a), (b)(i) and (b)(ii). However in b(iii) you should be calculating the average power using $\frac{1}{T}\int_0^T i(t)^2 R dt$ but most of you failed to do this. In part (c) I was disappointed with a number of you who failed to calculate the current density which is given by current/area. From the value of current density you should be able to discuss whether it will cause a large electric field across the gate dielectric and consequent reliability issues associated with the electric field.

Question 2:

The performance in this question was poorer than I expected. Parts (a) and (b) are bookwork and I was expecting you to do well. You should be able to identify that depositing Al directly onto Si is not acceptable because of interdiffusion that could short the junction and lead to conducting filament growth that could cause local breakdown. A number of you were not able to provide satisfactory answers for parts (b)(ii) and (c)(ii). In (b)(ii) I expected you to discuss reliability issues related to galvanic corrosion and formation of Al-doped island while in part(c)(ii) a description of failure related to thermal mismatch should be provided. Most of you did well in part (d).

Question 3:

Very few of you attempted this question although most of the questions were derived from bookwork. (a)(i) is bookwork while (a)(ii) has been discussed during one of the lectures. If you have made notes during the lectures you would have found that this question is not too difficult. In part (b) you were expected to relate your knowledge of radiation damage to semiconductor and oxide to MOSFETs, GaAs FETs and laser diodes. Most of you did well for MOSFETs and GaAs FETs. In the laser you should also note that radiation can damage the built in photodiode required to monitor the laser performance.

Question 4:

Most of you did reasonable in this question. However, most of you were not able to recognize that only 7 out of 60 diodes tested failed and all of them failed before 1000 hours. This would have suggested that the failure rate is very high initially but approaching constant after 1000 hours. Therefore the reason for the failures is most likely defects in the laser diodes. You should be able to sketch the failure rate as well but some of you failed to do so.

Question_6:

Question_7:

Question_8: