

UG Exam Performance Feedback

Second Year

2016/2017 Semester 2

COMP28512 Mobile Systems

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Comments Please see the attached report.

COMP28512: Exam June 2017 Feedback

Q1: Overall marks for this compulsory question were mostly good. The question tests broad understanding of the overall subject matter through multiple short sub-questions. The answers showed that most students have a broad understanding of the course material. There were some poor marks (<9) in Question 1 and these mostly occurred with poor marks on questions 2, 3 and 4, indicating that the student had paid inadequate attention to the course material overall.

a) This was supposed to be easy. Surprisingly, students seemed to find it hard and many wrong answers were given.

b) Mostly reasonable answers on aliasing distortion though inevitably one or two answers quoted the Sampling Theorem incorrectly – ($F_s < \text{twice bandwidth}$ instead of half).

c) Mostly satisfactory answers on frequency-domain processing, though direct answers were best and took little time.

d) Very few students remembered that a line spectrum is used for Fourier series.

e) Have to mention that the variable length codes are 'self terminating'.. Sorry to disappoint those who expected the algorithm to come up again this year

f) This question can be answered succinctly, but many answers were over-elaborate and not quite to the point. Those who decided to sketch a graph were wise to do so, except that many students did not label the axes (voltage against time).

g) Most answers here were OK, but some students confused CSMA with CDMA. Must specify that randomised back-off after collisions is an essential aspect of both mechanisms (CSMA and ALoHa).

h) Almost everybody answered this question on 'event driven' systems quite well.

i) Most answers got somewhere on this part, though many lacked clarity.

j) Many quite authoritative answers to this question – as may be expected from expert Computer Scientists..

Q2: About 80% of the students attempted this question. About 15 % of students got rather low marks and this reduced the average. But there was a significant number of authoritative answers.

a) Cellular v WiFi: Generally acceptable answers from most attempts, but few mentioned the use of licensed/unlicensed spectra. Remember to mention 'seamless handover' – it is important.

b) Explaining the issues clearly was the challenge, thought some attempts just made it clear that there were fundamental misunderstandings about circuit/packet switching in

mobile telephony. There were many good answers. The status of 2G, 3G, 4G were well understood (generally)

c) Apart from the very poor attempts, most people had some idea about CDMA and its use in 3G mobile telephony. CDMA was not always well explained, especially the 'spectral spreading' aspect. Many students understood the advantages.

Q3: About 60 % of the class chose to answer this question. The distribution of marks was similar to that for other questions. For those that had prepared adequately for the exam, the main challenge was putting the words together to explain the answers.

- (a) The power requirement formula is one generic formula that you have to remember if you wish to convince anyone that you understand the issues. A few students got this wrong
- (b) It was pleasing that most students who attempted this question understood why reducing the clock frequency does not directly improve power efficiency in terms of energy per instruction. People must have listened carefully to Steve Furber's lecture.
- (c) There are many issues concerning power efficiency that Steve's lecture covered. Few students gave clear details of all of them. You have to explain how to achieve the efficiency; e.g. how overall capacitance or switching activity may be reduced.
- (d) There were some very authoritative answers to this question about the ARM processor. But many answers were rather vague and unconvincing.
- (e) We discussed this point about FEC and spatial multiplexing so often in the lectures that the challenge was just explaining the point clearly for 2 marks.

Q4: This question about bit-error error control for mobile phones was quite well done on the whole. About 60 % of the class chose to answer it.

- (a) Have to mention that interleaving caters for 'bursty' error. Most did, and understood interleaving reasonably well.
- (b) The Hamming codes were generally well remembered and/or understood. Many correct answers were different from the instance given in the lecture notes which meant that they had to be worked out from scratch and based on a clear understanding. Some explanation of the methodology was needed to get full marks. It is so much easier to use a syndrome table to explain the methodology. Many did not, and had to write quite a few words of explanation.
- (c) The main aspects were understood, but some calculations failed because student did not or were unable to convert the value of E_b/N_0 to deciBels. Did all students bring along their calculators I wondered? It occurred to me while marking this question that students may no longer have calculators since they rely on their mobile phones, as I do. I presume mobile phones were banned in the exams. I must think about this for next year.
- (d) With the correct value of E_b/N_0 in (dB) this is straightforward. Otherwise, it is difficult to answer.
- (e) There were some pretty good answers to this part which is the hardest part.