Examination Feedback for EEE218 – Electric Circuits
Autumn Semester 2014-15

Feedback for EEE218 Session: 2014-2015

General Comments:

The exam counts for 80% of the overall module marks, with 2 lab classes making up the remaining 20%.

Most candidates attempted the required 3 questions, but a handful answered a 4th (additional questions were not marked) – ***you should always read the rubric on the front cover of the exam to find out the number of questions that you need to answer.*** About 40% of candidates failed to fill in the numbers of the questions answered on the front cover of the answerbook – this puts the marker in a bad mood and they are less likely to be lenient! Some scripts were extremely untidy and difficult to read and more detailed explanations need to be given.

Question 1:

Attempted by about 70% of candidates. Generally this question was well done with several candidates achieving full marks. In part (a)(i) some candidates used the incorrect 8 that generated! The main problem in part (b) was confusion between kVA, kW and kVArs. This same problem also occurred in part (c). Another mistake was to simply add the 3 kVA values – each must be resolved into its real (kW) and imaginary (kVAr) components first and then these components summed and used to find the total kVA. In part (c)(iii) several candidates omitted to calculate the capacitor current or assumed the same current that was flowing through the load. Part (c)(iv) was successfully answered by most candidates.

Question 2:

Attempted by about 90% of candidates. Most candidates made a very good attempt at this question although part (c) presented more of a challenge. Many candidates lost marks as they failed to fully read what was required and skipped parts. Part (a) did not present too many problems, although in part (iii) several candidates calculated the VA rather than the power, and many did not bother to calculate the power factor. In part (b)(ii) the question requested both the variation of impedance AND current with frequency. Some candidates place both curves on the same set of axes which was fine provide each curve was clearly labeled. Parts (b)(iii) and (iv) were correctly answered by most candidates. Part (c) presented the greatest challenge; One common mistake was in calculating the total impedance – when calculating the magnitude of a complex number of the form $Z = a + jb - jc$ it is necessary to group real and imaginary terms together ie:

$$|Z| = \sqrt{a^2 + (b-c)^2} \quad \text{BUT NOT} \quad |Z| = \sqrt{a^2 + b^2 - c^2}$$

Many candidates did manage to correctly calculate the current but then made mistakes calculating the voltage across the coil – Many calculated just $|V_L| = 352$V or $|V_R| = 280$V but it is actually thephasor sum of these two: $\sqrt{V_R^2 + V_L^2}$ = 450V.

Question 3:

Attempted by about 90% of candidates. Most candidates correctly answered part (a) although some confused the power dissipated within the battery with that of the motor. Part (b)(i) caused much many more problems. The main mistake was to ignore the internal impedance of the battery – the values of current given can be used to calculate the values of initial and final resistance, but both these values include the internal resistance. Some candidates even used the value of 10V from part (a) for the voltage across the load – remember this voltage will change as the load changes. Part (a)(ii) did not present any real problems. In part (c)(i) the main problem was candidates failing to provide an answer for all 3 parts. In part (c)(ii) the majority of candidates correctly calculated the current, but then just used V x I for the power (this is VA) rather than V x I x cos (φ). Most candidates correctly answered the remainder of the question.

Question 4:

Attempted by about 43% of candidates. This question was similar to those on the tutorial sheet, but with slightly different placement of components, which appeared to confuse some candidates. The main problem was differentiating between resisters in series and parallel. Part (a) was reasonably well attempted. When considering the 5V source the 4Ω and 6Ω are in series; these are then placed in parallel with the 5Ω resistor to obtain an equivalent (3.33Ω) which is then in series with the 2Ω and 3Ω giving a total of 8.33Ω. When considering the 20V source the 2Ω and 3Ω are in series; these are then placed in parallel with the 5Ω resistor to obtain an equivalent (2.5Ω) which is then in series with the 4Ω and 6Ω giving a total of 12.5Ω. In part (b) it is first necessary to find the equivalent resistor seen by the current source (same as the Thevenin resistance in part (c)). This time the 2Ω and 3Ω are in series; these are then placed in parallel with the 5Ω resistor to obtain an equivalent (2.5Ω) which is then in series with the 4Ω (6.5Ω); this equivalent resistor is then in parallel with the 6Ω to give a total resistance of 3.12Ω. Candidates who drew a series of equivalent circuits, showing the steps described above, tended to make far fewer errors. In part (c) candidates need to find the voltage across the 6Ω resistor. In both parts (c) and (d) many candidates failed to provide an equivalent circuit which would have gained then some mars even if the values of voltages etc. were incorrect. (The actual potential arrow (Thevenin) and current direction (Norton) is actually downwards in this problem).