

Paper C5 2006

21 candidates, mean mark 65, SD 11.8

Overall quite a good performance by most candidates. The level of the paper seems to have been reasonably well matched to the ability of most candidates, though some questions (mostly on the more predictable topics) proved more popular than others.

Q1. 18 attempts, mean mark 16.0, S.D. 5.4

A very standard question on spectral line shapes and line widths. Those that could remember the solutions of similar previous questions tackled things satisfactorily, while those that had prepared less well did more poorly, leading to a wide range in scores.

Q2. Radiative transfer. 7 attempts, mean mark 17.4, S.D. 4.4.

The first part of this question was standard bookwork and was well answered by most candidates. The second part of the question then applied the standard equations derived to the real case of Venus' atmosphere. A few candidates had difficulty here, but most were able to use the equations correctly. Finally, the third part of the question then relied on the candidates being able to work out what happens at altitudes where radiative equilibrium breaks down and convective overturning takes over, in order to work out the actual surface temperature in Venus' atmosphere. This part of the question was the most challenging and least well done by the candidates.

Q3. 13 attempts, mean mark 18.6, S.D. 3.8.

This was a very standard bookwork/descriptive question on the formation of solar systems, circumstellar discs and finally planets. Most candidates tackled this well and there was not very much variation in the marks. Quite a few candidates were confused about the difference between core-accretion and gravitation instability theories of planet formation, but otherwise most candidates did well.

Q4. 1 attempt, mark 7.

This question was based on previous questions concerning the measurement of sea-surface temperature, but also used principles outlined in the 3rd year atmospheric physics practical course to work out how to correct for atmospheric absorption. Unfortunately, the question must have looked much harder than it actually was as there was only one candidate who attempted it! In fact, the same candidate chose to do all 4 of the radiative transfer questions and so had clearly decided to avoid the dynamics questions altogether. Unfortunately, the candidate's grasp of radiative transfer was not strong either, and so this question proved too difficult.

Q5. 18 attempts, mean mark 16.1, SD 2.9.

A question on elementary Rossby wave propagation in the oceans. It was somewhat surprising that few candidates realised that the 4th equation of the first part represented heat energy conservation. In other respects, however, the rest of the question was tackled competently by most candidates. Some silly errors by some in deducing the group (NB not the phase) velocity in the last part, with a consequently incorrect conclusion concerning ENSO.

Q6. 3 attempts, mean mark 15.3, SD 7.0.

The least popular of the GFD questions attempted by only 3 candidates, even though this concerned the (now mainstream topics of the) physics of baroclinic instability and application of the Eady model. Two of the three candidates made a respectable attempt of most parts, though the third case was presumably tackling this question in desperation!

Q7. 9 attempts, mean mark 13.8, SD 1.8.

A variant on a somewhat standard question on western boundary currents in the oceans - the main innovation being to include consideration of an eastern, as well as a western, boundary with friction. The main difficulties arose in seeking to justify the approximations in the third section, which did require a careful consideration of both complementary function solutions of the main ODE in the problem.

Q8. 15 attempts, mean mark 16.5, SD 3.5.

A question on balanced flow with emphasis on cyclostrophic balance in the context of Venus's atmosphere. Much of this question was attempted competently by most candidates, though disappointingly only a few demonstrated any understanding of the application of barotropic instability.