External Assessment Report 2014

Subject(s)	Technological Studies
Level(s)	Higher

The statistics used in this report are prior to the outcome of any Post Results Services requests

This report provides information on the performance of candidates which it is hoped will be useful to teachers/lecturers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding. It would be helpful to read this report in conjunction with the published question papers and marking instructions for the examination.

Comments on candidate performance

General comments

Overall candidate performance was better this year than last.

Candidates found Section A to be generally very accessible, and the three questions of Section B, whilst much more demanding, were of an equal standard. All of the Section B questions appeared to be equally attractive, with similar numbers of responses to each.

In every question of the assessment, there were candidates who scored full marks. Several candidates answered all three of the Section B questions.

Centres should note that there was an error in Figure Q10(c): T3 is shown as an npn transistor, but should be a pnp. Very few candidates were affected by this; most simply assumed that the npn worked, and were marked as correct. In a handful of cases, candidates saw a problem — whether or not they actually pinpointed it — and were marked accordingly, so no candidate was disadvantaged.

Areas in which candidates performed well

Questions 1(a); 10(b); 11(b): most candidates demonstrated a good understanding of PBASIC programming, and produced valid solutions. There were, however, a number who used unacceptable instructions such as 'if....then goto....' or 'if....then....else...'

Question 2: most candidates performed very well in this question, with a large number accruing full marks. Many gave the full, basic Boolean equation in part (a), but used a simplified equation to correctly complete parts (c) and (d).

Question 3: generally well-done, though some candidates gave the complementary angle for the direction of the force.

Question 6(a): most candidates were able to correctly determine Young's modulus. Some, however, treated the specimen as circular in cross-section.

Question 7: most candidates produced a valid flowchart, though some neglected to switch off the arm motor.

Areas which candidates found demanding

Question 1(b): A number of candidates failed to correctly determined the mark:space ratio.

Question 4(b): A number of candidates missed either the 85%, or 0.7V, or both, when calculating I_B. This gave rise to a multitude of follow-through errors.

Question 5 (b) and (c)(i): A number of candidates failed to distinguish clearly between the responses of the two control systems to temperature change.

Question 9(b): Some candidates used Node D to find the force in BD, and seemed to overlook the unknown reaction at D.

Question 9(c): Some candidates failed to identify the purpose of the passive strain gauge as being for temperature compensation.

Question 9(e): A number of candidates struggled to describe the operation of the warning circuit. Some did not identify the critical values of 3V, 6V, 9V, and their descriptions were often poorly expressed and lacking in concise technological terminology.

Question 10(c): As in Q9(e), some candidates who attempted this question struggled to describe in a clear, coherent fashion how the circuit worked. Some chose simply to mention 0V and 5V, neglecting changes as V_{in} increased. Some missed the significance of the push-pull driver operating the warning lamps, and so had the wrong, or both, lamps operating at various points.

Question 10(d): Perhaps because they did not grasp the essence of the circuit in Figure Q10(c), some candidates did not provide a correct response for the modified circuit.

Question 11 (c)(ii): Some candidates found difficulty with the force acting on the bolts, either not halving the 330N, or not adding the 50N tightening force.

Advice to centres for preparation of future candidates

Some candidates used programming commands which are not part of the PBASIC instruction set. Whilst it is appreciated that the advent of Pickaxe and other BASIC variations has complicated the issue somewhat, it is important to ensure that candidates are fully versed in the correct PBASIC instructions, and use only these in examinations.

The selection of ‘sin’ or ‘cos’ when resolving inclined forces continues to confuse many candidates. Centres should devise a standardised method for overcoming this difficulty, and ensure that this is applied consistently throughout the course.

Some used incorrect box shapes when flowcharting — these are given in the data booklet.

Nodal Analysis continues to be challenge for some candidates. The concept that each node must be in equilibrium — but only if *all* the forces acting on it are considered — seems not to be clearly grasped. Centres are encouraged to devote great attention to this area, backed up by regular practice using past-paper questions.

As ever, descriptive questions can be challenging for candidates. A number of candidates did not express themselves clearly, concisely, or with a logical flow, and in general technological terminology was minimal. Clear communication is, however, vital in engineering and technology situations, and so centres are encouraged to make good use of past-paper descriptive questions over the session, in preparation for the external assessment.

At several points through the question paper, candidates ‘rounded’ intermediate answers, resulting in some quite excessive variations in final solutions. Centres should emphasise the need for consistency, and that final answers should be expressed to three significant figures, with intermediate answers being maintained to a minimum of three significant figures. An exception is in the case of force analysis, where two significant figures is acceptable.

Statistical information: update on Courses

Number of resulted entries in 2013	735

Number of resulted entries in 2014	772

Statistical information: Performance of candidates

Distribution of Course awards including grade boundaries

Distribution of Course awards	%	Cum. %	Number of candidates	Lowest mark
Maximum Mark 200				
A	37.7%	37.7%	291	146
B	19.7%	57.4%	152	126
C	14.8%	72.2%	114	106
D	6.2%	78.4%	48	96
No award	21.6%	-	167	-

General commentary on grade boundaries

- While SQA aims to set examinations and create marking instructions which will allow a competent candidate to score a minimum of 50% of the available marks (the notional C boundary) and a well prepared, very competent candidate to score at least 70% of the available marks (the notional A boundary), it is very challenging to get the standard on target every year, in every subject at every level.

- Each year, SQA therefore holds a grade boundary meeting for each subject at each level where it brings together all the information available (statistical and judgemental). The Principal Assessor and SQA Qualifications Manager meet with the relevant SQA Business Manager and Statistician to discuss the evidence and make decisions. The meetings are chaired by members of the management team at SQA.

- The grade boundaries can be adjusted downwards if there is evidence that the exam is more challenging than usual, allowing the pass rate to be unaffected by this circumstance.

- The grade boundaries can be adjusted upwards if there is evidence that the exam is less challenging than usual, allowing the pass rate to be unaffected by this circumstance.

- Where standards are comparable to previous years, similar grade boundaries are maintained.

- An exam paper at a particular level in a subject in one year tends to have a marginally different set of grade boundaries from exam papers in that subject at that level in other years. This is because the particular questions, and the mix of questions, are different. This is also the case for exams set in centres. If SQA has already altered a boundary in a particular year in, say, Higher Chemistry, this does not mean that centres should necessarily alter boundaries in their prelim exam in Higher Chemistry. The two are not that closely related, as they do not contain identical questions.

- SQA's main aim is to be fair to candidates across all subjects and all levels and maintain comparable standards across the years, even as arrangements evolve and change.