UNIVERSITY OF CAMBRIDGE COMPUTER LABORATORY

Computer Science Tripos
Marking Scheme and Classing Convention

This document is concerned with Part IA, Part IB, Part II and Part III Computer Science Tripos examinations, administered by the Computer Laboratory. Paper 1 of Part IA is also taken by candidates offering subject Computer Science of Part IA of the Natural Sciences Tripos and by those taking the Introduction to Computer Science option in Part I of the Psychological and Behavioural Sciences Tripos.

1 Overview of the Examinations

The following table shows the components of the different Parts of the Computer Science Tripos (CST) and indicates the maximum mark available for each:

Examination	Papers	Assessed practical	Maximum mark
Part IA	1, 2 (+ 2 others)	Assessed Exercises	400
Part IB	3 or 7, 4, 5, 6	Assessed Exercises	400
Part II	7, 8, 9	Project/Dissertation	400
Part III	5 *modules*	Project/Dissertation	900

Each written paper and the Part II Project/Dissertation is marked out of 100. Part III modules are marked out of 100 and the Part III Project/Dissertation is equivalent to four modules. Details of the way credit is awarded for Assessed Exercises are given below.

Note that Paper 1 is an option for candidates taking Part IA of the Natural Sciences Tripos (NST) or Part I of the Psychological and Behavioural Sciences Tripos (PBST).

Note also that there will be two different variants of Paper 7 in June 2018. Paper 7 (New Regulations) will be taken by candidates sitting the new option in Part IB, and Paper 7 (Old Regulations) will be taken by candidates sitting Part II.

1.1 Notes on Part IA

Six categories of candidates may be distinguished:

1. CST: Computer Science candidates who offer Papers 1, 2 and 3 (New Regulations) of the CST and subject Mathematics of the NST.

2. CST+NST: Computer Science candidates who offer Papers 1 and 2 of the CST and subject Mathematics and a bench subject of the NST.

3. CST+Mathematics: Computer Science candidates who offer Papers 1 and 2 of the CST and Papers 1 and 2 of the Mathematical Tripos.

4. CST+PBST: Computer Science candidates who offer Papers 1 and 2 of the CST and subject Mathematics of the NST and Paper 3 of the PBST.

5. NST+CST: Natural Science candidates who offer Paper 1 of the CST as one of their four NST options, the other options being subject Mathematics and two bench subjects.

6. PBST+CST: Psychological and Behavioural Sciences candidates who offer Paper 1 of the CST as one of their options (PBST Paper 1), the other options being regular PBST papers. Such candidates are examined exactly as for any other candidate offering CST Paper 1. The PBST examiners are supplied with the raw marks of each such candidate together with any requested summary information.

The raw totals for each of 1, 2 and 3 (New Regulations) are post-processed by a procedure known as *norm-referencing* to ensure uniformity across subjects. For the relevant candidates, the raw marks of Papers 1 and 2 of the Mathematical Tripos and of Paper 3 of the Politics, Psychology and Sociology Tripos are also norm-referenced to ensure uniformity. NST Papers are norm-referenced using the same procedure.

The marks from Papers 1 and 2 of the Mathematical Tripos are used without incorporating any additional quality marks for individual questions.

Every candidate is required to submit a portfolio of assessed exercises. A satisfactory exercise is awarded a tick. Details of the required ticks for each paper are specified by an announcement by the Head of Department. A rejected exercise may be resubmitted, in principle any number of times, but it is rare to require more than one resubmission. All submissions and resubmissions of assessed exercises are subject to the deadlines specified each year by an announcement by the Head of Department.

There is an expectation that every student will pass all their ticks. Not doing so is rare. The number and duration of ticks associated with a course is determined by the course lecturer(s) subject to oversight by the Teaching Management Committee. The guiding principle in deciding whether to use a tick should be whether it teaches a specific concept or reinforces important lecture material.

For both Part IA and Part IB of the Tripos, mark penalties will be applied to act as a deterrent to missing a tick. The Part IA and Part IB Examiners are supplied with a final tick list. Each missing tick will receive a penalty of 10 marks (10% of a paper). The maximum penalty is 100 marks (one full paper).

1.2   Notes on Part IB

A Part IB candidate is required to submit a portfolio of practical work which is marked by the 'tick' system: i.e., assessed as either satisfactory or unsatisfactory.

Every candidate is expected to gain a full set of ticks: any shortfall from the required number of ticks incurs a penalty of 10 marks per missing tick. Details of the required ticks for each paper are specified by an announcement by the Head of Department and any penalty is subtracted from a candidate's overall total for the four written papers. The maximum penalty is 100 marks (one full paper). Such penalties are rare.

2   Marking Scheme for Parts IA, IB and II Written Papers

The 9 papers of the CST each contain between 8 and 16 questions and candidates are always asked to attempt 5 questions with 20 marks available per question.

Every question is based principally on material presented in a particular course of lectures and is normally set and marked by the lecturer who gave the relevant course.

Each question is heralded by the title of the most relevant course and the breakdown of the 20 available marks is clearly indicated. Each question is vetted by at least two internal examiners and, for Parts IB and II, the External Examiner. As a means of moderating the marking process, the External Examiner scrutinises a number of marked scripts selected at random.

3 Marking Scheme for Part IA and Part IB Assessed Exercises

Satisfactory solutions to the individual exercises are awarded ticks by those who are responsible for the associated practical classes. A submission has to pass a threshold of acceptability *and* the candidate may have to satisfy an assessor at a short interview (5 to 10 minutes). Unsatisfactory individual exercises which fail to obtain a tick may be resubmitted, subject to the specified deadlines.

Each Part IB candidate also takes part in a group project. Each member of each group must attend *all* the formal meetings and write a personal report. Each such report includes summary assessments of the contributions made by the other members of the group. The proprietors of the group projects take these assessments into account when awarding ticks. No resubmission is possible for group projects.

4 Marking Scheme for Part II Dissertations

Every dissertation is read by at least two of the internal examiners, who each independently assign provisional marks. They are also asked whether a *viva voce* examination or additional assessment by an expert should be considered.

When all the dissertations have been read and marked, the raw marks are processed to produce a provisional mark. An order-of-merit table is drawn up and the readers (perhaps in the presence of the External Examiner who will also have read some of the dissertations) then discuss every dissertation in turn. When there is disagreement, one or more experts may be consulted. Experts are asked for comments but not for marks (since they typically read an insufficient number of dissertations for self-calibration). These comments and the views of the External Examiner may lead to the provisional mark being adjusted.

Candidates may be invited to a *viva voce* examination, at which additional expert assessors may participate. It is expected that in any year, around 5–10% of candidates will be examined by viva.

5 Classing: CST Parts IA, IB and II

There are three principal stages in classing Parts I and II of the CST:

1. For each candidate, determine an overall total mark.
2. Order the candidates by their overall marks, thereby deriving an order-of-merit table.
3. Partition the order-of-merit table into classes.

Further details are given in the following sections.

5.1 Marks

In every written paper in the CST, candidates are asked to attempt five questions where each question is marked out of 20.

There is no scaling of total marks in Part IB or in Part II and there is typically no scaling of marks for individual questions in any part of the CST. However, the examiners may scale marks for individual questions in exceptional circumstances.

For Part IA and Part IB penalties are applied for any missing assessed exercises.

5.2 Part IA – Norm-Referencing

The procedure for deriving the overall mark for each candidate in Part IA of the CST follows that used by examiners for the NST. A full description of this procedure is given in the documentation supplied to examiners. The purpose of norm-referencing is to scale the marks so there is comparability between the different papers and candidates who offer different combinations of subjects are treated fairly. The Mathematical Tripos examiners and the PBST examiners do not use norm-referencing, so the CST examiners also have to norm-reference the marks of CST candidates who offer Papers 1 and 2 of the Mathematical Tripos and the marks of CST candidates who offer Paper 1 of the PBST. The result is that all papers are out of a maximum possible 100 marks.

5.3 Part IA – Classing

When all four norm-referenced marks are available for every CST candidate, one can order the candidates by their overall totals, which will be out of a maximum possible 400 marks.

Class boundaries are drawn to achieve a given Tompkins score and to show steady progression through the three years of the Tripos.

The aggregate mark for each candidate is used to determine an order-of-merit table. The class boundaries are then set by the Examiners in order to achieve a partition of 25/55/12.5/7.5 for First/Upper Second/Lower Second/Third and Unclassed respectively. In common with the NST practice, a total mark below 40% will be unclassed.

Note that, in common with the NST practice, the norm-referenced marks are published. For NST only, these are split into a mark for a written paper and a mark for the practical work. Because of norm referencing, it is possible for candidates who have obtained the same number of ticks to have different marks for their practical work.

5.4 Classing convention: Part IB and Part II

The aggregate mark for each candidate is used to determine an order-of-merit table. The class boundaries are then set by the Examiners (after discounting students who fail to be classed) in order to achieve at Part IB a partition of 32.5/52.5/10/5, and at Part II a partition of 40/50/7.5/2.5, for First/Upper Second/Lower Second/Third respectively.

The final class boundaries are arrived at by careful consideration of those candidates who fall close to borderlines. This procedure is overseen by the External Examiner.

It is not the practice to scale the marks on individual questions. However, the Examiners reserve the right to apply such scaling if they see fit. The Examiners may additionally ask for questions to be remarked if they are not content with the mark distribution presented.

In Part II distinctions will be awarded to any candidates who are placed in the top 10% of the classed candidates for both their dissertations and the aggregate mark for the three written papers.

6 Classing Convention: Part III

Part III students obtain an overall percentage score for the year, with 60% being the passing grade, 67% being "pass with merit" and 75% corresponding to "pass with distinction".

These scores are calculated by combining raw scores from individual modules with the score attained for the research project. Each of the five taught modules contributes 1/9th of the overall grade, while the project accounts for 4/9ths. In addition to attaining a passing grade overall, students are also expected to attain a passing grade for their research project.

In the process of Research Project selection, Part III students fix a *Project Supervisor* in conjunction with their Director of Studies. Because the Project Supervisor is an Assessor for the purposes of examining (i.e. provides a project mark), he or she must be a University Teaching Officer at the Computer Laboratory or otherwise approved by Head of Department.

The project dissertation is marked by one of the Part III Examiners and by the Project Supervisor. Each assessor produces a percentage score, and these are averaged to provide a provisional mark. Should the individual scores be widely discrepant, a third assessor may be used. In addition, students may be called for a viva voce examination, which may lead to adjustment of the provisional mark.

7 Additional documents

Guidance on deadlines, late submission and penalties
http://www.cl.cam.ac.uk/teaching/exams/deadlines.html

Form and Conduct Notice
http://www.cl.cam.ac.uk/teaching/exams/formcond.pdf

Structure of Papers
http://www.cl.cam.ac.uk/teaching/exams/exam-structure.pdf

Head of Department Announcements
http://www.cl.cam.ac.uk/teaching/exams/headofdeptnotices.pdf
http://www.cl.cam.ac.uk/teaching/exams/headofdeptnotice-p3.pdf

Group Projects
http://www.cl.cam.ac.uk/teaching/group-projects

Part II Project Briefing Document
http://www.cl.cam.ac.uk/teaching/projects/pinkbook/

Guidelines for Assessors – Part II Project Dissertations
http://www.cl.cam.ac.uk/teaching/projects/pinkbook/node18.html

Examination Questions from Previous Years
http://www.cl.cam.ac.uk/teaching/exams/pastpapers/

Examiners' Reports (including Comments and Summaries)
http://www.cl.cam.ac.uk/teaching/exams/reports/

November 2017