Guidance on Marking Information and Communications Technology Projects

The project should be awarded marks according to its stages:

(a) Definition and Analysis **[25 marks]**

(b) Design   **[21 marks]**

(c) Development, Testing and Implementation   **[35 marks]**

(d) Documentation   **[24 marks]**

(e) Evaluation   **[15 marks]**

(a) Definition, Investigation and Analysis   [25 marks]

(i) Definition - nature of the problem solved   [5 marks]

A candidate should not expect the examiner to be familiar with the theory and practice in the area of the chosen system. There should be a brief description of the organisation (e.g. firm or business) involved and the current methods used in the chosen areas that may form the basis of the project. A clear statement of the origins and form of data should be given. At this stage the exact scope of the project may not be known and it may lead to an interview with the user.

1   A vague description of the organisation.

2   Some description of both the stages of study and organisation involved.

3   A good description of either the area or organisation with some description of the other.

4   A clear description with one element missing (for example, origins of data).

5   An excellent description with all elements present.

(ii) Investigation and Analysis   [20 marks]

This section is the 'systems analysis'. The question is not how a system performs detailed tasks, but rather how the project progresses from the original data to the results. The candidate should describe how the user requirements were ascertained (possibly by long discussions with the users; question and answer sessions should be recorded and outcomes agreed). A clear requirements specification should be defined. Alternative outline solutions should be discussed and evaluated against one another.

1 - 5   Some elements have been discussed but little or no user involvement.

6 - 10   Some evidence that an attempt has been made to interview the user and some recording of it has been made. Attempts at some of the other items have been made. An attempt has been made to develop a requirements specification.

11 - 15   Good user involvement and recording of the interview(s). Most of the necessary items have been covered including a detailed discussion of alternative approaches. However, one or two items have been omitted. A requirements specification is present but with some omissions.

16 - 20   Excellent user involvement with detailed recording of the user's requirements. Alternative approaches have been discussed in depth. All other items must be present, showing a thorough analysis of the system to be computerised. A detailed requirements specification has been produced.

(b) Design   [21 marks]

(i) Nature of the solution   [13 marks]

A detailed systems design (including diagrams as appropriate) should be produced and agreed with the users. Proposed data structures should be described and design limitations should be included. Design of the user interface is of paramount importance and should be documented in detail in the form of data capture forms, input formats (with examples of screen layouts if necessary) and output formats should be included here where relevant. A detailed summary of the aims and objectives should also be included. These items are the design specifications which should be agreed with the user.

1 - 2   Some vague discussion of what the system will do with a brief diagrammatic representation of the new system.

3 - 6   The major objectives of the new system have been adequately summarised, but omissions have been made. There is a brief outline of a design specification, including mock ups of inputs and outputs, task model described (including any diagrams). However there is a lack of completeness with omissions from the task model, inputs and outputs. Data structures have been identified but there may be inadequate detail.

7 - 10   A clear set of objectives have been defined and a full design specification is included but there may be some errors or logical inconsistencies, for example validation specified may be inadequate or field lengths incorrect.

11-13   A clear set of objectives with a detailed and complete design specification, which is logically correct. The are also detailed written descriptions of any processes/modules and a clear, complete definition of any data structures. The specification is sufficient for someone to pick up and develop an end result using the software and hardware specified in the requirements specification.

(ii) Intended benefits   [3 marks]

There should be some discussion of the relative merits of the intended system and of the previous mode of operation. This may include any degree of generality beyond the original scope of the system.

One mark should be awarded for each valid benefit up to a maximum of three marks.

(iii) Limits of the scope of the solution   [5 marks]

This may include volume (sizing limitations), limitations imposed by the interface and/or limitations of the facilities used. For full marks there must be some estimate of the size of the storage space required for the implemented system.

1   A vague discussion of what the system limitations are.

2 - 3   The major limitations of the system have been adequately summarised, but omissions have been made.

4 - 5   A detailed description of the system limitations has been given, including the estimate of the size of the files required for the implemented system.

(c) Software Development, Testing and Implementation   [35 marks]

(i) Software Development and Testing   [18 marks]

A technical description of how the solution relates to the design specification produced and agreed with the user should be included. It is the responsibility of the candidates to produce evidence of their development work and for producing a test plan for the system. It is vital to produce test cases and to show that they work. To do this, it is necessary not only to have test data, but to know what the expected results are with that data.

An attempt should be made to show that all parts of the system have been tested, including those sections dealing with unexpected or invalid data as well as extreme cases. Showing that many other cases of test data are likely to work - by including the outputs that they produce - is another important feature. Evidence of testing is essential. Comments by teachers and others are of value, but the test plan must be supported by evidence in the report of a properly designed testing process. The examiner must be left in no doubt the system actually works in the target environment. This evidence may be in the form of hardcopy output (possibly including screen dumps), photographs or VHS video.

1 - 4   Evidence of tailoring of a software package or integration of interface software is tailored into a system and is provided in the form of printouts but with no annotation or relationship to a test plan or test run. The developed solution does not fulfil the design specification. A collection of hardcopy test run outputs with no test plan, or a test plan with no hardcopy evidence may also be present. A teacher may award up to 2 marks if they have been shown the system working satisfactorily and there is no hard evidence in the project report.

5 – 8   Evidence of tailored software packages/tailored interface software/tailored client software etc are provided in the form of printouts. Data structures are illustrated as part of the listings where appropriate, detailing their purpose. There is some annotation evident to illustrate how the package was tailored for a particular purpose or to indicate the purpose of sections of code in a program listing. The developed solution has logical flaws and does not fulfil the design specification. There is little evidence of testing with a badly developed test plan with clear omissions. There is no description of the relationship between the structure of the development work and the testing in evidence.

9 - 13   Evidence of tailored software packages/tailored interface software/ tailored client software are provided in the form of printouts. Data structures are illustrated as part of the listings where appropriate, detailing their purpose. There is some annotation evident to illustrate how the package was tailored for a particular purpose or to indicate the purpose of sections of code in a program listing. The developed solution partially fulfils the design specification. There should be at least eight test runs together with a test plan and hardcopy evidence. However, the test plan has omissions in it and/or not all cases have been tested (i.e. have no evidence of testing).

14 - 18   Technical evidence is provided in the form of printouts. Data structures are illustrated as part of the listings where appropriate, detailing their purpose. There is a full set of printouts showing input and output as well as data structures. All hardcopy is fully annotated and cross-referenced. The developed solution completely fulfils the design specification. A full test plan, with evidence of each test run is present in the report, together with the expected output. The test plan should cover as many different paths

through the system as is feasible, including valid, invalid and extreme cases. Marks may be lost for lack of evidence of a particular test run or lack of expected results.

(ii) Implementation [10 marks]

It is recognised that the user organisation (preferably 'third party') may not fully implement the system, although this is the ultimate aim. However, to score any marks in this section there must be some evidence that the person for whom the system was written has seen the system in operation. This can be done in a number of ways: such as by inviting the user to see the product and allowing the candidate to demonstrate the system, or by taking the system to the user involved. There should be an implementation plan written, including details of system changeover, training required and details of user testing.

0   No evidence that the third party user has used the system. No written implementation plan

1 - 4   Details of system changeover have been documented with some recognition that the user(s) will require training. Some evidence of user testing is given, usually by questionnaire or written comments by fellow students or others who were not directly involved in the development of the system.

5 - 7   A good implementation plan with details of training required. There is written evidence available from the third party user indicating that they have seen the system in operation.

8 -10   A clear and detailed implementation plan, including detailed stages of user testing. All aspects of user testing, user acceptance, implementation and system changeover have been documented. There is written evidence available from the user that the system has been fully tested.

(iii) Appropriateness of structure and exploitation of available facilities [7 marks]

Some discussion of the suitability of methods and any product (e.g. hardware or software) used for the particular system should be included. Some recognition and discussion of the problems encountered and actions taken when appropriate should also be included. A log of such problems could be kept. Suitability for subsequent maintainability and extendibility.

1 - 3   Some attempt at discussing either the suitability of the hardware and software, or the problems encountered.

4 - 7   A complete discussion of the hardware and software available and how they were suitable in solving the given problem, together with a good, informative explanation of the problems encountered and how they were overcome.

(d) Documentation [24 marks]

(i) Technical [10 marks]

Much of the documentation will have been produced as a by product of design and development work and also as part of writing up the report to date. However a technical guide is a standalone document produced to facilitate easy maintenance and upgrade of a system. The contents of the guide should, where relevant, include the following: data structures used and/or database modelling

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and organisation including relationships, screens, reports and menus; data dictionary, where appropriate; data flow (or navigation paths through the interface); annotated software details in the form of printouts; detailed flowcharts/transition diagrams as necessary; details of any functions, procedures, macros etc and any formulae used. All parts of the guide should be fully annotated since this is very important for subsequent development of the system. The specifications of the hardware and software on which the system can be implemented should be included.

Since the system in the technical guide will differ from one project to another, professional judgement as to what would be necessary for another analyst to maintain and develop the system has to be made.

1 - 2   Some items are present but little annotation.

3 - 6   One or two major omissions, but the rest is fully annotated.

7 - 10   No major omissions, with all parts fully annotated. Marks will be lost for inadequate items of documentation for example, non-specification of hardware on which the system can be implemented. For full marks the guide should be well presented rather than just a collection of items.

(ii) User   **[14 marks]**

Clear guidance, as friendly as possible, should be given to the user for all operations that they would be required to perform. These would include input format with screens displays, print options, back-ups (file integrity routines), security of access to data and a guide to common errors that may occur. (Note the candidate would not be required to copy out large volumes of any underlying software's user guide, but to produce a non-technical and easy to follow guide for someone with little computer knowledge.) Some mention here of the relationship between items of software and the data they deal with may be relevant. The user guide should be well-presented with an index and, where necessary, a glossary of the terms used. Alternatively, an electronic guide could be based around hypertext links (screen dumps will be required).

1 - 2   An incomplete, badly produced guide. No screens displays/interface mock ups. Some options briefly described but difficult for the user to follow.

3 - 4   A standalone guide has been produced which, though incomplete, contains details of the required input and output and some error conditions. Some screen displays are present in the guide.

5 - 9   All but one or two options fully described (for example, back-up routines not mentioned). In the main the options are easy for the user to follow with screen displays.

10 - 14   A full user guide with all options described, well-presented (possibly as booklet) with an index and a glossary. No omission of any of the options available (including back-up routines, guide to common errors). Marks may be lost for inadequate descriptions of some options. For full marks, good on-screen help should exist.

(e) Evaluation [15 marks]

(i) Discussion of the degree of success in meeting the original objectives. [6 marks]

This discussion should demonstrate the candidate's ability to evaluate the effectiveness of the completed system. The original objectives stated in requirements specification should be matched to the achievements, taking into account the limitations. User evaluation is also essential and should arise from a questionnaire or, preferably, direct user evaluation. For full marks it is important that the user provides sets of data as they are likely to occur in practice, and that the results arising from such data be given. This data is typical data rather than test data and it may show up faults or problems that the candidate's own test data failed to find.

0   No discussion present.

1 - 3   Some discussion about a number objectives, but some omissions or inadequate explanation of success or failure.

4 - 6   A full discussion, taking each objective mentioned in (b) (i) and explaining the degree of success in meeting them, indicating where in the project evidence can be found to support this or reasons why they were not met.

(ii) Evaluate the users' response to the system [5 marks]

It is important that the user is not assumed to be an expert in computer jargon, so some effort must be made to ensure that the system is user-friendly. It will be assumed that the user will have considerable knowledge of the underlying theory of the business being computerised. Clarity of menus, clear on-screen help and easy methods of inputting data are all examples of how the system can be made user-friendly. Here marks are awarded for the degree of satisfaction that the user indicates in the acceptance procedure. Could the system, or its results be used? Was the system specification achieved? Do any system faults still exist? The candidate should evaluate the users' response to the final version of the system.

1   Some effort has been made to make the system user-friendly, but the user still has difficulty using the system.

2-3   The system is, in the main, user-friendly, but there is room for improvement (e.g. no on-screen help has been provided). The user indicates that the system could be used but there are some faults, which need to be rectified.

4-5   A fully user-friendly system has been produced. The user indicates that the system fully meets the specification given in section (a), and there are no known faults in the system.

(iii) Desirable extensions [4 marks]

As a result of completing the system, the candidate should identify the good and bad points of the final system highlighting any limitations and necessary extensions to the system, indicating how the extensions could be carried out.

1   The candidate identifies the obvious good points of the system and possibly some bad points or limitations.

2   The candidate identifies clearly good and bad points and any limitations.

3   The candidate clearly identifies, good and bad points of the system, limitations and possible extensions.

4   The candidate clearly portrays the good and bad points of the system indicating the limitations, possible extensions and how to carry out the extensions.

Appendix C

Overlap with GNVQ ICT Units

The following grid shows modules in these specifications which have some overlap in content with Advanced GNVQ in Information and Communication Technology units.

AS/Advanced GCE	Advanced GNVQ ICT
Module 2512	**Unit(s)**
5.1.1	7317, 7320, 7340
5.1.2	7318
5.1.3	7318
5.1.4	7320
5.1.5	7337
5.1.6	7323
Module 2513	
5.2.1	7317, 7320, or other depending on task
5.2.2	7317, 7320, or other depending on task
5.2.3	7317, 7320, or other depending on task
5.2.4	7317, 7320, or other depending on task
Module 2514	
5.3.1	7315, 7316
5.3.2	7315, 7321, 7333
5.3.3	7317
5.3.4	7319, 7320

AS/Advanced GCE	Advanced GNVQ ICT
Module 2515	Unit(s)
5.4.1	7337, 7338
5.4.2	7337, 7338
5.4.3	7318, 7321, 7337, 7338
5.4.4	7323
Module 2516	
5.5.1	7319, 7328
5.5.2	any depending on project
5.5.3	any depending on project
5.5.4	any depending on project
5.5.5	any depending on project
5.5.6	any depending on project
Module 2517	
5.6.1	7316
5.6.2	7319, 7328, 7337
5.6.3	7337, 7338
5.6.4	7316, 7323