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RECOGNISING ACHIEVEMENT

GCE

Computing

Advanced GCE **A2 H447**

Advanced Subsidiary GCE **AS H047**

Examiners' Reports

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HX47/R/11J

Oxford Cambridge and RSA Examinations

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This report on the Examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the Examination.

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EXAMINERS' REPORTS

Chief Examiner Report

This was the second full session of the qualification H447. The standard of work in the projects remains pleasing, with some of the work of a high standard. The standard of work for the examined units is varied and particularly in F451 the higher marks are not being accessed. Centres are reminded that candidates need to cover all areas of the specification.

Comment is made in the reports from the Principal Examiners that many candidates are not able to use terminology correctly and that basic definitions are not being understood properly. Many questions at this level are based around a scenario and the responses will be assessed by referring to the use made by the candidate of the facts given surrounding the scenario.

Candidates should be aware that the relevant facts will be supplied in the question stem and that they should not provide extraneous detail from their own knowledge. This typically occurs when a question is based around a retail environment because many candidates will work in such an environment and consequently be in danger of using knowledge about their own circumstance in answering the question, even when it is contrary to the information given.

F451 Computer Fundamentals

General Comments:

The candidates are to be congratulated on the application that most of them showed and the effort that was put into the scripts. There were very few scripts demonstrating a poor attitude to the paper. Evidence of this was the small proportion of questions that had a nil response. The standard of written English continues to improve with an eradication of text-speak and the examiners are happy that candidates' work was decipherable. There were no indications of candidates suffering from time trouble. There were occasions when scripts contained nil responses for question 9 but that was almost certainly because they were based around difficult concepts rather than the candidate not having time to provide a response.

Many candidates employ the use of bullet points in their answers and this is perfectly acceptable if appropriate to the question, however, there is a move from some candidates to take this too far and to simply provide a list of one-word or two-word bullets without putting them in any context, which may limit the marks they can achieve.

Comments on Individual Questions:

Question 1

a Well answered although some answered 'software' in terms of hardware: 'Hardware is the physical part of the computer while software makes it work.' This would only be worth one mark. There were a few candidates who equated software with the word 'virtual', again this attracted no mark. The acceptable list of responses to this and to all other questions is available in the published mark scheme to which the attention of the reader is drawn.

b Generally well answered. The definition which most candidates find difficult is 'system software' possibly because it is a very abstract concept. Many candidates try to give an example of something that the system software provides, most usually an interface.

c The most important point about back-up is that it is a copy of the user files. Comments like 'The files are stored…' were very common. Almost all candidates were awarded the mark in (i) but (ii) proved to be a good discriminator. There was a significant minority who talked about producing archive files.

Question 2

a Commonly, 3 marks were earned, for the roles of the analyst and client and for the general need for an agreement to be reached on what the problem actually is.

b Method of implementation was common and it was usually expanded by describing at least one of the methods. Other points were less common and were spoiled by candidates seeming to insist that the analyst would do everything: 'The analyst must train the staff how to use the system'.

c This was a very good discriminator question with many candidates mistakenly concentrating on the analyst and ignoring the part of the client(s) in the process. A small proportion described a protocol rather than a prototype.

Question 3

There were few candidates who took into account that if three methods were expected for six marks then two marks were available for each method. This was a very good example of poor exam technique on the part of some candidates. A common error was to confuse methods of connection with the manner of the data transmission. The examiners understood why candidates may have thought this and the mark scheme credited them appropriately. Common when candidates were struggling for a third possibility after stating wires and wireless was to suggest the Internet.

Question 4

a Most candidates scored well on i and ii but were unable to provide any satisfactory response for iii. This was unsurprising as the concepts are difficult and explaining the concepts adds another layer to that difficulty. It was not intended to be an easy question and it proved a very good discriminator at the A/B boundary.

b i This has become a common question on these papers and candidates are answering well and most are showing the carry values in order to score the mark point for showing the working.

ii Very few candidates were able to provide a worked response here. A few turned the values into 2's complement and were able to do the arithmetic to produce the correct answer. The expected version is on the mark scheme but any appropriate way of carrying out the sum is acceptable. Subtraction of binary numbers is clearly on the syllabus.

Question 5

This question was marked as a banded response question. The question asked about the effects on the confidentiality of data kept on computer systems. Almost universally candidates ignored the positive benefits like paper copies of peoples' details being hard to keep track of. In this sort of question there will normally be two sides to the response and in this question there were very few candidates who saw both sides as being important, consequently there were few who could be placed in the higher band of the mark scheme. The majority of responses simply stated that data could be hacked (magically it seems, there being few attempts to explain such a statement) and that passwords and encryption can be used to stop hacking. It was rare to see anything else that would raise the response above that expected from an average GCSE paper. At this level we would expect to see at least a link between the problems and the solutions in order to raise the response into the middle band.

Question 6

a Well answered, although a few candidates struggled to get the second mark simply relying on the physical size of the networks. Many of the candidates thought that a LAN was connected by cables while a WAN is connected by wireless.

b Most gained full marks as this was well understood. A few confused the issue with parity or verification.

c A good discriminator with most candidates able to explain the way that packets are transmitted but only very able candidates scoring full marks. It was refreshing to see that there were so few examples of candidates suggesting time, cost or speed.

Question 7

a Well answered by most candidates. In ii examiners accepted the devices in the mark scheme and any other device where the candidate had justified the choice in respect of their advantage for disabled people.

b i and iii were well answered but few candidates realised that if a medium is described as ROM it cannot be written to. Most candidates thought that a DVDROM is used to make a backup 'because it cannot be rubbed out'.

Question 8

a Most candidates scored one mark but failed to say anything beyond the fact that generic software will probably not exist.

b There are many types of software that are sensible responses for this scenario. Again, examiners were willing to accept any type of software which is not specified on the mark scheme if the justification given was sensible.

c i This was a good discriminator with all but a few candidates understanding the question and able to provide sensible responses but only a few were able to gain full marks.

ii This proved to be a very difficult question for most candidates. The question was expecting that candidates would relate points about the interface to the scenario given but few were able to do so.

d The explanations of what a knowledge based system is were given accurately, but too often this was not related to the question which specified that the answer should be about how the system is set up.

Question 9

a This was intended to be a difficult question and that is what it proved to be. Many candidates failed to score any marks while many others could only make a comment of altering a single layer without disturbing the other layers. A few candidates gave excellent responses and the number of candidates who produced a rote learned version of the layers of the ISOOSI model was thankfully small.

b This question proved to be a good discriminator with most being able to pick up a mark but the full four marks proved challenging.

F452 Programming Techniques and Logical Methods

General Comments:

The paper was generally well understood with most of the candidates finishing the paper and scoring fairly well.

Two main issues arose across the paper. Firstly, candidates' inability to express their answers clearly caused some candidates to lose marks for some concepts, or to only gain these marks after being given the benefit of the doubt by examiners. This was especially the case where a response required candidates to describe a process or an algorithm. Candidates should be careful to select the method of expressing their answers that is most effective. Often, this is better achieved in bullet points or even in a structured algorithm than in prose, and doing this may enable candidates to score better.

In a related point, candidates' understanding and use of technical terms which are clearly spelt out in the specification was weaker than we would have liked.

These points are explained further in the detailed comments on each question below.

Comments on individual questions:

Question 1

a Correctly answered by most candidates.

b Although most candidates were able to identify the correct position of Kingsway from the data given, it was disappointing to see too many candidates, even the strongest candidates, give the return value of the search function as BusStop(6) rather than just 6. This is the answer one would expect from candidates who had not specifically studied serial search algorithms in an array as required by the specification, and who were using question 1a as a template for answering this question. The descriptions of the search algorithm itself in 1bii also suggested that this had not been specifically studied. Very few candidates considered the possibility that the search item may not be in the array. A considerable number of candidates confused a serial search with a serial file. Descriptions were often unclear and unsystematic. This was an example of a question where, as it was asking for the description of an algorithm, structured English, bullet points or pseudocode may have been a more adequate way of communicating the response, and it was pleasing to see that a small number of candidates had done this.

c This was well answered by most candidates. The few candidates who failed to get full marks did so because they did not provide any additional information in their justification of the data type but just repeated themselves, for example "Destination is an INTEGER because the position of the destination in an array is an integer". Centres should also advise candidates that Number is too vague as a data type and they should state whether the number is an integer or a real number.

d Well answered by most candidates, the majority gaining full marks or nearly full marks. Candidates were expected to show how they had worked through their algorithm and although most did this well, the working out shown by some candidates was incomplete. These candidates were given the benefit of the doubt in most cases, if their working demonstrated they were following the algorithm correctly. However, candidates are advised that this is an examination of Computing rather than arithmetic and that in similar questions, working out should demonstrate how their reasoning follows from the algorithm given.

e Fairly well answered. Most candidates could correctly state at least one advantage of using a constant in 1ei. Some candidates gave a definition of a constant instead, which was not answering the question. In 1eii most candidates could identify a literal in the algorithm which can be replaced by a constant, but many did not give a convincingly descriptive identifier for this constant.

f Generally, this was poorly answered, suggesting candidates were not sufficiently familiar with using string manipulation operations. Many candidates were aware of some of these, but could not explain how to use them to achieve the desired results. In question 1fi which was the best answered, some candidates did not clearly identify that "ROUTE" would be a literal string whereas RouteNumber is a variable and lost a mark, but most candidates were able to produce a convincing concatenation. Questions 1fii and 1fiii required a more multistep approach to obtain the required result and, again, using an algorithm or bullet points helped some candidates express their solutions better.

Question 2

a This was better answered than other questions on top down programming in the past. This may be due to the format of the question where candidates were helped by being given the processes to fill the blank boxes. For most candidates, this avoided the error of thinking that the processes below FOLLOW the ones above like a flow diagram. The scripts of the few candidates who did not achieve full marks, suggested that they were indeed interpreting the diagram as a flow diagram.

b Most candidates completely misunderstood the concept of a data capture form being a printed document on which data is recorded for input into a computer later. A majority of candidates designed a computer input screen layout. As there are similarities between the two designs, candidates were given the benefit of the doubt and were able to score the majority of the marks even if they had in effect answered the wrong question. This particularly lenient line was taken given the significant number of marks in the question and the fact that this was the first time that the design of a data capture form was required, where questions in past papers had asked for a screen layout. Centres are strongly advised to instruct candidates in the designs of both documents (as well as on-screen and printed reports) as stated in the specification and warned that in future sessions, candidates may lose all the marks in similar questions if they answer the wrong question. (The same applies for designs of screen layouts in the case of an output and printed reports).

c There was some pleasing evidence that centres have taken on board previous advice about answering banded response questions. Fewer candidates than usual attempted to produce a "structured" essay with an introduction, middle and conclusion and simply answered the question. Centres should continue to remind candidates to ensure that they have answered the question fully. Most candidates fell in the medium band because they mainly discussed what constituted a good design without "discussing the importance" or providing examples in adequate detail as required by the question. Often, this was a result of trying to make too many points at the expense of depth. When a question of this type is open ended, candidates are better advised to make a few points in adequate detail rather than to attempt to cover the full breadth of possible answers. Where candidates scored highly, they were also rewarded for appreciating the relative importance of the points they were making, such as for example appreciating that validation and ease of entry were more important than aesthetics.

Question 3

a Definitions were often weak or vague. The specification clearly states terms that the candidate must be able to define. Definitions can be found in the BCS glossary of Computing and ICT. Most candidates were able to give examples from the algorithm, showing an understanding of the term, but many were disadvantaged by not being able to clearly formulate their understanding into a definition. Simply learning the definitions would obviate this problem.

b There was a range of answers with most candidates showing a sufficient understanding to gain some of the marks. Candidates who noticed that this was a 3 mark question and put in enough detail, referring to the algorithm as required in the question, mainly got full marks. Some candidates who did not score well confused nesting with indentation.

c Generally well answered with the majority of candidates gaining full marks for well described responses.

d This question also suffered from candidates' unfamiliarity with technical terms. While most candidates were able to explain the difference between the use of = as a relational/comparison operator and as an assignment operator, very few candidates actually used the terms for these as asked for in the question. In some cases analogous terms were given the benefit of the doubt.

e Strong candidates showed that they understood the implications to the function of the algorithm if the value of C was not initialised. Weaker candidates merely stated the obvious eg "It sets the value of C to 0". It would have been pleasing to see more candidates use the term "initialise".

f Generally well understood although only about a quarter of candidates obtained full marks. It was pleasing to see that fewer candidates than in previous sessions referred to black box testing as "testing the inputs and the outputs" and made specific reference to comparing actual outputs with expected outputs. Candidates who failed to score full marks were often "nearly there" with their answers but gave descriptions which were too vague for credit.

g This question was generally well done, allowing candidates to score most of the marks. Inevitably, if candidates made an error early in tracing the algorithm, this may have caused them to lose marks later in their work or in their final outcome. Although examiners make every effort to award follow through marks where appropriate, centres are advised to ask candidates to carefully check their answers in questions such as these.

h A good understanding of the algorithm enabled the majority of candidates to achieve both marks.

Question 4

This question was intended to discriminate the strongest candidates and did so successfully with only about 10% of candidates scoring 6 marks or more. It was rather disappointing to see that among these candidates, few had validated the input for the number of rings, although the question gave a strong hint that this was required. It was pleasing, however, to see the variety of approaches and the ingenuity of some of the best responses, which demonstrated the candidates' programming skills well. It was also pleasing to see that centres have taken on board advice in previous reports and that weaker candidates were not omitting this question as has been the case in previous sessions and were, in the main, able to gain marks for the obvious parts of the algorithms such as receiving and validating inputs.

F453 Advanced Computing Theory

General Comments:

Some candidates showed that they had studied and prepared carefully for the examination. They were able to demonstrate good knowledge of a range of topics.

One major problem, still not addressed by Centres, is the quality of the candidates' presentation. If a candidate wants to gain marks, it is vital that the examiner can read what is written. Many scripts did not help the reader to understand the points being made.

Many candidates are using supplementary sheets to continue answers. While this does not cause a problem candidates should normally find that there is plenty of space assigned to each response for even the longest of answers and that perhaps the response is too long and does not stick to relevant points to the question.

Candidates need to learn to read questions carefully and answer what is asked. Many candidates wrote correct facts as answers to questions which were unfortunately irrelevant and so gained no marks. It is disturbing when candidates offer responses which are not only not relevant to the question being asked but are not part of the specification. It appeared that some had attempted to learn mark schemes from previous examinations, including, perhaps, those for Units 2509 and 2511 which preceded this F453 and are no longer offered. This approach should only be used with extreme caution, as both the topics and the questions are different. The mark scheme is used by examiners after considerable discussion: a candidate who quotes phrases from it is unlikely to explain points in sufficient detail unless they have good background knowledge and sufficient understanding to clarify the points. This became evident in question 2(b) where more than one candidate gave an answer that errors or error diagnostics were output "in a spurious list".

Centres should make candidates aware that correct notation and terminology is important. Some new topics, such as some of the UML diagrams, particularly need correct usage or they lose their sense.

Comments on Individual Questions:

Question 1

a Very few candidates were aware the queue held a pointer rather than the actual data to be printed. Many candidates were not able to differentiate between "backing store" and "main memory", and used the terms as if they were interchangeable.

b The question included the phrase "when managing memory". Despite this, a number of candidates tried to gain a mark for "memory management". Some understanding was demonstrated, though the term "partitioning" was only seen infrequently.

Question 2

a Many scored full marks, though "optimisation" was often given instead of "code generation".

b Few candidates gained full marks here. Most had a vague idea that something was checked against some rules, but only the better candidates were able to give any detail. Many wrote, incorrectly, that the process stopped as soon as the first error was found. Some wrote their whole answer about lexical analysis.

c Answers were often limited to a mention of portability or a virtual machine. There was some misunderstanding that intermediate code is free of any errors: of course, this is not true as various run-time errors could remain.

Question 3

a Most candidates gained marks here.

b Only the most able candidates gained full marks here, while weaker candidates wrote about "2 processors" working "twice as fast". A few wrote about Von Neumann architecture at length instead of answering the question.

Question 4

a This question was intended to help candidates and many gained good marks here. However, some calculated 3 different values for P, Q and R and did not correct their mistake. Many candidates failed to state which value was different.

b Most candidates gained marks here.

c Almost all candidates realised this was the maximum possible value, but very few gave a valid reason. Some candidates were able to demonstrate proper understanding here.

d Most gained marks, though some appeared to use an unnecessarily complicated method in their calculations.

Question 5

a This was answered quite well.

b Most gained full marks here.

c Many candidates gained full marks. However, some candidates wrote long essay-style answers, often omitting key points. Candidates should be able to describe a simple algorithm and indicate repetitions correctly, though many used a description followed by "and keep doing this until…".
While candidates could, if they had time, check their algorithm by using an example, it was not acceptable to choose a value and show how to add that specific value to the binary tree.

d This was answered well by the majority, though a few candidates failed to label their pointers.

Question 6

a There were some good answers, but many candidates were unable to describe suitable features, instead they simply gave a definition of a procedural language.

b Some candidates gave excellent answers, but many appeared to guess at least some of their answers. On this occasion, credit was given even if the notation used was inaccurate. For example, in (ii) credit was given for "driver", ":Driver", and "Driver" even though the correct answer was "Driver". However, correct notation is important and it is likely that full credit will only be given in future examinations when terms are written correctly.

c It was rare to see the correct answer to (i). Many candidates gave random guesses, naming any type of diagram such as "flowchart" or "JSP diagram". As discussed above, the diagram in (ii) was marked leniently with some errors in notation ignored on this occasion. Many failed to number the sequence, even though it was stated as part of the diagram provided.

d Many candidates gave adequate answers here, though inheritance symbols were rarely used correctly. Common mistakes were to add a number of incorrect classes such as "Council", or to put attributes such as "qualifications" in both a class and its subclass.

Question 7

a Candidates should ensure they read the question carefully, especially when 8 marks are available. Many wrote about just one of the terms, or failed to distinguish between functions and procedures. A considerable number of candidates were unable to give any correct information about stepwise refinement, and many guessed it was a way to test or improve a program. Some candidates lost marks here by giving repetitive detail about one of the terms while failing to mention others.

b Only the better candidates gained good marks here.

Question 8

a Most candidates were able to answer this reasonably well.

b Many candidates appeared to know something about immediate addressing, though were unable to explain the term adequately. A few answers were excellent.

c Again, most candidates seemed to know the term but their answers were limited by a lack of technical vocabulary.

Question 9

a This was answered well by the majority.

b Although all but the weakest candidates gave a correct definition in (i), very few gave good answers in (ii). The majority saw the words "foreign key" and gave a standard definition instead of answering the question. A few candidates showed both their knowledge and the ability to apply it here, giving a brief explanation and an example from (a).

c Most candidates scored well here. A few lost a mark through careless wording. A common mistake was to state "in descending order" without naming the attribute used for the order.

d Most candidates gained some marks but many guessed that the difference in (i) was in the type of characters instead of fixed/variable length.

e Many correct answers were seen, the acceptable responses to this and all other questions on the paper are available in the published mark scheme.

F454 Computing Project

There were a limited number of entries for the January session largely from centres that had decided to start the project work at the end of the lower sixth form year and to leave the time from January up to the examination to be used exclusively for work on F453.

The standard was, as usual, very good with some interesting and varied projects. The new specification has settled down and the approach to this unit has encouraged students to tackle a much wider range of projects than was possible under the previous specification.

Good project work was typically developed from a thorough investigation of the problem and possible approaches beyond a simple interview. Those candidates who researched around the topic looking at similar problems and more in depth analysis of the requirements tended to go on to produce well focussed and effective solutions.

The design sections require three elements, the traditional screen designs, file formats, validation, as appropriate, as well as a full set of algorithms to describe the solution and a complete test strategy. A test strategy is not just a standard test plan to be applied to the eventual solution but should include details of how the solution will be tested during development and post development acceptance testing by the end user.

The best development sections demonstrated the process including the testing that had taken place during development often using a rapid prototyping approach. Full testing should include this evidence, evidence of post development testing against the success criteria and acceptance testing by the end user. In fact the best projects had evidence of good end user involvement throughout the process.

The documentation section requires the solution to have good on screen support including clear guidance, organisation of input and output, help features and useful error messages as appropriate to the program. These should be identified as part of the evidence for documentation along with the essential extra bits of supporting/technical documentation a user would require to make use of the product.

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