Rewarding Learning

ADVANCED
General Certificate of Education
2015

Applied Information and Communication Technology

Assessment Unit A2 7

assessing

Unit 7: Investigating Systems

[A6J11]

FRIDAY 22 MAY, MORNING

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

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Area	Problem
Bookings	Tables not fully utilised/Poor table management: customers were sometimes left standing for quite a while and left dissatisfied. Timing was not estimated correctly especially for special occasions. Poor information in booking diary – uncontrolled access/changes by many members of staff: less experienced staff gave away large table for two or three people. No note when customers have arrived: unnecessary phone calls/embarrassing.
Stock	Danny made poor records on whiteboard – it may not be ordered or Maureen need to guess the quantity. Confusion when deliveries were made. Too little too much ordered and food may go off. No written record of deliveries checked against orders. No discrepancies followed up. No easy way to combine supplier orders other than by telephone. No stock records to check/track levels. Deliveries made to wrong sites. No way of predicting stock requirements.
Staff	No analysis of absences or rotas. Difficult to manage rotas at multiple sites. Maureen working outside her role taking orders and serving and clearing.
Finance	Danny behind on payments to suppliers, reminders and refusal to supply. No information on most popular meals/recipes. Difficult to get information for Tax returns/VAT inspectors. Difficult to combine financial information in multiple sites.

[2] × 4 [8]

Other valid reasons will be accepted.

AVAILABLE MARKS

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2 THE KEY MEMBERS OF THE TEAM ARE LISTED IN THE FOLLOWING TABLE.

AVAILABLE MARKS

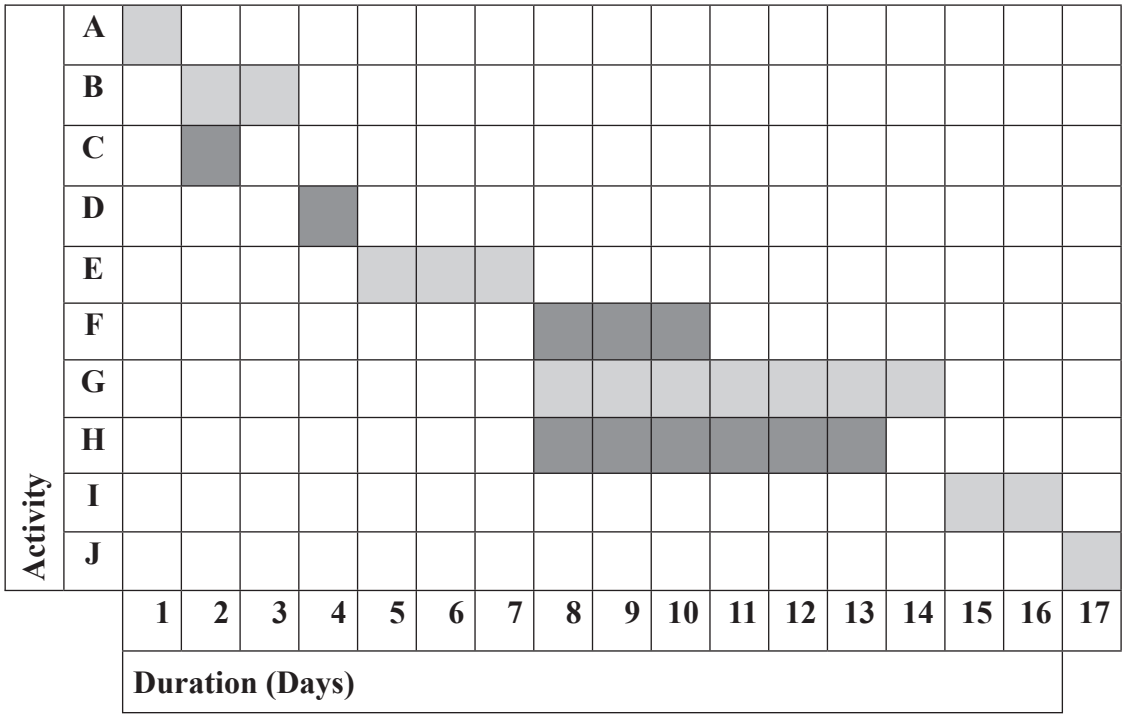
Members of Team	Example Activities
Project Manager	Planning activities, allocating tasks, estimation of time and budget, monitoring progress and quality, ensuring adherence to procedures and standards, team selection, motivation and review, risk management and taking corrective action to ensure project on time and to budget.
Analyst	Investigation of current system, fact finding, DFDs, ER diagrams, design of new system to meet user requirements, test planning, system testing.
Programmer	Coding new system and unit testing.

Each team member = 3 × [2] activities [6] 6

Other valid activities will be accepted.

3 (a)

AVAILABLE MARKS



[1] × 4 [4]

(b) (i) It would delay it by 1 day. [1]

(ii)
- By adding extra staff/overtime
- To complete a task on the critical path more quickly/Task I complete in 1 day rather than 2.

Other valid answers will be accepted.
([1] × 2) [2]

(c)
- Easier to identify critical path/float and the effect of delays.
- Dependencies explicitly shown.
- Easier to analyse complex projects.
- EST, LST, EFT, LFT mentioned

Other valid answers will be accepted.
([1] × 2) [2] 9

4 THE STUDENT MAY PROVIDE SOME OF THE FOLLOWING INFORMATION.

AVAILABLE MARKS

SSADM	DSDM
Sequential Phases	Iterative – continual improvement and change
Release at end	Incremental releases/delivery
Limited user involvement – beginning and end	High user involvement throughout
Likely to go over budget and time	Fixed Time and Budget/Timeboxing
Requirements fixed at beginning	Changing/Prioritised requirements
Emphasis on documentation	Emphasis on face to face communication
Large/Government Agencies	Small Projects
Well defined projects	Complex and novel projects
Data Flow Modelling	Prototyping
Authoritative Project Management	Testing throughout
Covers most of the life cycle from feasibility study to system design	Collaborative/Empowered team
Waterfall Approach	DSDM Phases: There are 5 phases (Feasibility, Business Study, Functional Model Iteration, Design and Build Iteration, Implementation). DSDM Atern: 7 phases/stages (Pre-project, Feasibility, Foundations, Exploration, Engineering, Deployment, Post-Project).

Students should make some mention of Danny's Diners (smaller business, cash flow limited, needs as soon as possible, unaware of requirements and with expansion requirements likely to change).

Level 1 ([1]–[2])
Overall Impression: Basic
Candidate provides a basic answer demonstrating simple knowledge of both methodologies.
Candidates describe, using simple terminology, the characteristics of either SSADM or DSDM.
The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

Level 2 ([3]–[4])
Overall Impression:
Candidate provides a good answer showing a reasonable understanding of both methodologies.
Candidates provide good descriptions of both SSADM and DSDM making an appropriate recommendation.
The candidate makes a reasonable selection and use of an appropriate form and style of writing.
Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning clear.

Level 3 ([5]–[6])
Overall Impression: Excellent
Candidate provides an excellent answer showing thorough understanding of both methodologies.
Candidates compare and contrast SSADM and DSDM using a good selection of characteristics and making an appropriate recommendation with justification.
The candidate successfully selects and uses the most appropriate form and style of writing.
Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a sufficiently high standard to make meaning clear.

All other valid answers will be given credit. [0] awarded for a response not worthy of credit. [6]

AVAILABLE MARKS

6

5 A SELECTION OF THE FOLLOWING DOCUMENTATION MAY BE INCLUDED.

AVAILABLE MARKS

Document	Purpose	Example of Content
Project Plan	Planning, Estimation, Monitoring and Control. Communication with Danny and Software Development Team.	Scope/Schedule/Gantt/ Network diagram Resources/Costs/Staff Equipment/Hardware/ Software SW Development Approach Standards and Procedures
Feasibility Study	Help managers decide if project will go ahead/ be of benefit to users; compare alternatives, make recommendations. Cost/Benefit Analysis.	Operational; Technical; Economic; Legal; Schedule.
Terms of Reference	Agreement/contract between client and consultancy. Establishing boundaries/scope of system.	Overall budget and time. Objectives and scopes/vision. Constraints.
User Requirements Specification	Document user's requirements/communication with users – in language they can understand/ identifies what system must deliver to users. Use to develop system spec. Map to acceptance testing and approval of final product: performance, accuracy and completeness.	List of user requirements.
System Specification	Given to programmers who can then write the code. Design system that delivers user's requirements as outlined in the user requirements spec…blueprint. Logical model of new system.	Algorithms Data Models/ER Diagrams/ DFDs Screen Designs/Storyboards Data Dictionary Hardware Specification Data Communications Test Plan Output Requirements

Test Plan	To develop high quality product/increase user satisfaction. Set aside resources for testing and schedule – communication with team. Prevent errors as early as possible. Improve software development process.	Resources – test environment Schedule Levels of testing How errors are reported/ logged Staff involved Standards and procedures to be followed
Technical Guide	For a technician who needs to maintain and repair the system.	Troubleshooting Hardware Installation Backup Routines Security Maintenance HW and SW upgrades
User Guide	Simple guide for those without technical knowledge in their own language and at correct level on how to use the system.	Logging On/Insert /Delete/Update Log Off Reports

AVAILABLE MARKS

Level 1 ([1]–[2])
Overall Impression: Basic
Candidate provides a basic answer demonstrating simple knowledge of documentation used in the software development process.
Candidates poorly describe the purpose and content of a limited range of documentation.
The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence.
There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

Level 2 ([3]–[4])
Overall Impression:
Candidate provides a good answer showing a reasonable understanding of documentation used in the software development process.
Candidates provide descriptions of the purpose and content of a range of documentation.
The candidate makes a reasonable selection and use of an appropriate form and style of writing.
Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning clear.

Level 3 ([5]–[6])
Overall Impression: Excellent
Candidate provides an excellent answer showing thorough understanding of documentation used in the software development process.
Candidates provide detailed descriptions of the purpose and content of a good selection of documentation.
The candidate successfully selects and uses the most appropriate form and style of writing.
Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a sufficiently high standard to make meaning clear.

All other valid answers will be given credit. [0] awarded for a response not worthy of credit. [6]

AVAILABLE MARKS

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6 GANTT CHARTS, NETWORK DIAGRAMS and PRECEDENCE CHARTS

AVAILABLE MARKS

(a)

Information	Interview	Observation	Documentation	Questionnaire
When customers are celebrating a special occasion they often run over the allocated time.		✓		
How Maureen feels about her job role and duties.	✓			
The information required by Government for VAT and TAX returns.			✓	
Evidence that deliveries are being checked against the supplier orders.			✓	
The high priority business areas to be included in the new system.	✓			
Customer satisfaction with the current ordering system.				✓
The workload that staff experience in a typical day.		✓		
Larger tables are usually not fully occupied yet large groups are often turned away.		✓		

[1] for each correct row × 8 [8]

(b)
- Face to face
- Open-ended questions/elaboration/opinions
- Clarification of questions can be sought
- Don't allow "poor response rate only . . . in context . . . yes"

[1] for any point × 2 [2] 10

7 CANDIDATES MAY PROVIDE SOME OF THE FOLLOWING INFORMATION:

AVAILABLE MARKS

User	Feature
Maureen	Table management: Display of layout of restaurant tables showing occupancy and highlighting those due to leave. Booking system: List of bookings with time and date – add/insert/ delete and validation rules/automatic addition of extra time for celebrations/optimisation of table use/access restricted to certain staff members. Staff rotas and attendance monitoring across all sites.
Waitress Staff	Taking Customer Orders: use hand-held devices; click on table, menu and menu items to automatically add to orders and to show the menus that are currently available with the correct prices. Production of Bills: Click on table in layout to automatically total bill using menu prices. Able to view rotas for forthcoming week.
Kitchen Staff	Stock management system: staff can click on items on screen that are running low to replace the whiteboard. They could have a system which shows the deliveries expected and can simply check them off on the system as they come in.
Danny	Management reports – finance and marketing. Report on menus – which dishes are most popular. Revenue/Costs/Profit and Loss/TAX and VAT returns – combine all sites – centralised database. Stock Ordering: List of items that need to be reordered/automatic reordering of common ingredients/list of items that were not delivered/checked off. Discrepancies highlighted.

Level 1 ([1]–[2])
Overall Impression: Basic
Candidate provides a basic answer demonstrating simple understanding of features that could be implemented for users of the system.
Candidates may identify at least one potential user and briefly describe a limited range of non-specific features.
The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence.
There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

Level 2 ([3]–[4])
Overall Impression:
Candidate provides a good answer showing a reasonable understanding of features that could be implemented for users of the system.
Candidates identify at least one potential user and describe some features which would benefit some users.
The candidate makes a reasonable selection and use of an appropriate form and style of writing.
Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning clear.

Level 3 ([5]–[6])
Overall Impression: Excellent
Candidate provides an excellent answer showing thorough understanding of features that could be implemented for users of the system.
Candidates identify two potential users and clearly describe good features which would specifically benefit these users.
The candidate successfully selects and uses the most appropriate form and style of writing.
Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a sufficiently high standard to make meaning clear.

All other valid answers will be given credit. [0] awarded for a response not worthy of credit. [6]

AVAILABLE MARKS

6

AVAILABLE MARKS

8 (a) (i) customer

_____

(ii) booking (details)

_____

(iii) (customer) payment

_____

(iv) (customer) receipt – not invoice

_____

(v) daily orders

_____

(vi) discrepancy (queries)

_____

(vii) final reminder

_____

(viii) supplier

_____

- ( ) implies optional word
- **(ii)** and **(iii)** can be swapped
- **(v)** and **(vi)** can be swapped.
- plurals are acceptable

([1] × 8) [8]

(b) STUDENTS MAY PROVIDE SOME OF THE FOLLOWING INFORMATION.

AVAILABLE MARKS

Overall	Illustrate way data is passed around the system of Danny's Diners and how it is transformed and how it is stored within the system. Processes shown as boxes – underlying logic/ processing hidden – shows function without unnecessary detail/clutter. Model of system/match user's perception. Powerful communication tool – use different levels for different users to reflect their knowledge and responsibility. Hierarchical: Start with Context then decompose into Level-1 and then each process in Level-1 decomposed/ exploded/partitioned showing further detail into a Level-2 revealing inner workings; can break down processes further if they are complex but usually not more than Level-3…. until elementary processes. Series of increasingly detailed pictures…called levelling. Top Down Approach: understand overall system of Danny's Diners before lower levels of detail. Aid to understanding system that will be refined and amended as understanding increases.
Context Diagram	Shows entire system as a single process/top level view. Fixes boundary of system/area under investigation/scope. All external data flows between it and outside world/external entities are shown around perimeter. No data stores are shown as they are internal to the system.
Level-1	This Level-1 diagram shows the system as a whole, at a summary level. The large process in the context diagram is broken down/ decomposed into smaller processes. Internal data flows within the system are added. All data stores are shown. The entities and external data flows in the context diagram are retained: input and output data flows of parent are maintained on the child…called balancing.

Students should provide examples relating to Danny's Diners. They should give an example, say, of an entity (Supplier) or a process (Manage Bookings).

Level 1 ([1]–[2])
Overall Impression: Basic
Candidate provides a basic answer demonstrating simple understanding of dataflow diagrams.
Candidates provide simple descriptions of the role of DFDs with poor descriptions, if any, of the components within the context and Level-1 diagram.
The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence.
There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

Level 2 ([3]–[4])
Overall Impression:
Candidate provides a good answer showing a reasonable understanding of dataflow diagrams within the context of Danny's Diners.
Candidates provide good descriptions of the role of DFDs with descriptions of some of the components within the context and Level-1 diagram highlighting some differences.
The candidate makes a reasonable selection and use of an appropriate form and style of writing.
Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning clear.

Level 3 ([5]–[6])
Overall Impression: Excellent
Candidate provides an excellent answer showing thorough understanding of dataflow diagrams within the context of Danny's Diners.
Candidates provide good descriptions of the role of DFDs with descriptions of most of the components within the context and Level-1 diagrams, with contrast and comparison, and indicating some knowledge of their hierarchical nature or how they are interconnected.
The candidate successfully selects and uses the most appropriate form and style of writing.
Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a sufficiently high standard to make meaning clear.

All other valid answers will be given credit. [0] awarded for a response not worthy of credit. [6]

AVAILABLE MARKS

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AVAILABLE MARKS

9 **(a)**

Customer:Booking	1:M
Booking:Table	M:1
Table: Order	1:M
Order: Order Items	1:M
Order Items: Menu Items	M:1
Menu Items: Menu	M:1

[1] × 6 [6]

(b) Using the information provided, identify with a tick (✓) which table(s) in the database will contain the following data items. Note that a data item may be present in more than one table.

Data Item	CUSTOMER	BOOKING	TABLE	ORDER	ORDER ITEM	MENU ITEM	MENU
Customer number	✓	✓					
Customer phone number	✓						
Quantity ordered of each menu item					✓		
Time period when the lunchtime menu is offered							✓
Waitress name				✓			
Date and time of order				✓			
Price of lentil soup						✓	
No of customers in the group		✓					
Maximum number of seats			✓				
Special Occasion?		✓					

Each correct row [1] × 10 [10]

(c) Because booking time or date are not unique. [1]

(d) Suggest one validation rule that could be applied to each of the following fields in the Booking table.

Booking Date: Not more than 7 days in advance/Not less than current date.

Total Number of People in Party: Must be greater than zero/must be less than or equal to maximum at table.

[1] for one validation rule for each field × 2 [2]

19

10

This project will use four levels of testing including **program** testing which tests individual units of code to check how they work **independently**. The tests will be designed and executed by the **programmer**. They will check that the **algorithms** are correctly implemented, according to the detailed design specification, by choosing test data that is correct, invalid and extreme and at the boundaries of any conditions and loop counters in the code itself.

When the entire code for a large subsystem is ready, such as the booking system, the analyst will perform **integration** testing. This tests how the individual components of code work **together** as a group.

Once all the subsystems have been developed and tested the system can be tested as a whole. This is called **system** testing and will be carried out by the **analyst**. This will ensure that all the functional and non-functional requirements have been met according to the requirements specification.

The **users** of the system will then be invited into Super Solutions to perform **acceptance** testing to ensure that it meets their business needs and is fit for purpose. If the system is approved the client will be asked to sign-off the new system.

([1] × 10) [10]

AVAILABLE MARKS

10

			AVAILABLE MARKS
11	**(a)**	• Phased: This is a large system and would benefit from being split into distinct independent phases such as finance, ordering, booking, stock/The staff will be able to gradually familiarise themselves with each part of the system which is quite large in size. • Pilot: There are two restaurants and it may be good to trial in one; less risk involved as only one involved. [1] × 2 Reasons. Other valid alternatives will be accepted. [2]	
	(b)	• Technician in house: for ensuring that the system runs smoothly and is regularly updated and troubleshooting. Will be useful for Danny's Diners as computerised booking and stock management is crucial to the success of the business. • Online Help: for simple regular/non-critical maintenance they can easily be performed by users with little technical experience, e.g. help when changing the prices of menu items. • Call Centre/Help Line: Trouble shooting when there is an issue that requires expert guidance and help such as when part of the system will not work, such as printing out the bill. Remote help may be available. [2] Method and example. User guide – no. Technical guide – no. [2]	
	(c)	• Correcting errors/bugs. • Improving performance and efficiency/security and backups. • Adapting to a new environment: new operating systems/database/ hardware/legal issues. • Adding new functionality. [1] × 2 Reasons. Other valid alternatives will be accepted. [2]	6
		Total	**100**