CAMBRIDGE
International Education

Cambridge International AS & A Level

INFORMATION TECHNOLOGY **9626/33**

Paper 3 Advanced Theory **May/June 2024**

MARK SCHEME

Maximum Mark: 70

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptions for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Mark scheme abbreviations

/ separates alternative words/phrases within a marking point
// separates alternative answers within a marking point
underline actual word given must be used by candidate (grammatical variants accepted)
max indicates the maximum number of marks that can be awarded
( ) the word / phrase in brackets is not required, but sets the context

Question	Answer	Marks
1(a)	**Two** from: • Repeatedly/repeats/over and over (1st) One from: works through the elements (of an array/block) (1) Operates/performs an operation on every element of an array/block (1) Works on the elements (of an array/block) one at a time (1).	**2**
1(b)	**Two** from: • In a `do…while` loop the condition to be checked is placed at the end of the code block//in a (plain) `while` loop it is at the start of the code block • In a `do…while` loop the condition is tested after the code block is run//in a `while` loop it is tested before the code block is run • The `do…while` loop will always execute the block of code at least once//a `while` loop may not execute the code block at all.	**2**
1(c)	**One** from: • A `while` loop is used when the number of iterations is not known/undetermined // a for loop is used when the number of iterations is known beforehand/already determined • A `while` loop continues as long as a condition is true/until a condition is met // the number of iterations in a for loop is pre-determined by the iteration statement/uses a counter.	**1**

Question	Answer	Marks
2	**Six** from: **Max 5 from:** *Stroke is:* • an outline around the text letters • Can be animated to move around the letters • Can be set to fade in/out around the letters • Can be set to different formats/colours e.g. dotted/dashed/thickness • Can be set to different corner formats e.g. sharp/smooth/rounded **Max 5 from:** *Fill:* • changes the contents of the letter shapes • Change the colour of the letter/shape (content/interior) • Use of (multicolour) colour gradients to gradually change one colour into another • linear gradients change colour along a single axis (horizontal or vertical) • radial gradients change colour in an outward/inward direction starting from/to a central focal point • direction/focal point of gradient can be changed.	**6**

Question	Answer	Marks
3(a)	**Two** from: • The delivery of the system is speeded up • The user engages with the system • The system is more likely to meet the user requirements.	**2**
3(b)	**One** from: • Not knowing when to stop the development/extended development time/takes a long time • Opinions/views/comments come from a biased/small group.	**1**
3(c)	**Two** from: • The advantage of this approach is the speed with which the prototype is put together • To ensure that the (system) requirements are clearly understood/validated • It focuses the user on only one aspect of the system/keeps the feedback precise.	**2**
3(d)	**One** from: • All the man-hours/effort/research/work/resources used to create the throw away prototypes are lost/total cost of project increased. • Developers may be pressurised by the users to deliver the prototype/it as a final product.	**1**

Question	Answer	Marks
4	*Command word: Discuss: write about issue(s) or topic(s) in depth in a structured way.* **One** from: Vision enhancement is designed to provide visually impaired persons with images of their surroundings in order to enable them to work/navigate/enjoy their surroundings **Eight** from, e.g.: • Use of HD camera and smart glasses for vision impaired persons that project images into eyes so that focus/detail are enhanced which means that wearer is independent of others/has increased mobility • Use of smart glasses with augmented reality to overlay details/highlight environmental features/change the colours of signs so that wearer is more informed of dangers/hazards/independent/safe/mobile • Use of devices to improve vision/direct images to centre of retina in sufferers of macular degeneration so that images from peripheral vision/images can be seen/improved • Use in macular degeneration sufferers can improve facial recognition of other people • which improves communication/interactions • Use of remote assistive technology/smart devices linked to certified agents/visual interpreter/support personnel that respond when visually impaired wearer taps/asks with help/assistance • so wearer can avoid hazards/navigate surroundings • Use of retinal implants connected to camera/glasses to directly stimulate nerves with signals to allow brain to interpret environment • so wearer has some direct sense of surroundings • Use of night vision goggles/glasses to enhance vision in low-light/darkness … to enable visually impaired persons to navigate surroundings/use technology/so they can work/drive at night • Use by surgeons/doctors when carrying out surgery so that less invasive techniques/more precise surgery can be carried improves patient recovery rates/speed of recovery. *Max 6 marks if bullets/list of points.*	**8**

Question	Answer	Marks
5(a)	**Three** from: • Wi-Fi transmitters/WAP are restricted to (very) low power • The radio waves/signals degrade/do not travel/propagate over long distances/are attenuated over distance • Do not penetrate solid objects/walls very well/easily/some materials can block Wi-Fi signals • Ensures that Wi-Fi can be used in networks that are close together/in homes/apartments/business sharing buildings • Ensure they do not interfere with each other • Ensure that they are less accessible to eavesdroppers • Because of interference from other transmissions (e.g.: from other devices) • Reduces the/any possibility of (any) (perceived) harmful effects on human health.	**3**
5(b)	**Three** from: • Place WAPs in open environment/high up/unimpeded by objects/walls so that radio waves are not obstructed/signal strength is reduced • Install additional/WAPs/extenders/repeaters/booster/use powerline connections (so that blind-spots are covered) • Increase power output of WAP (1st) so that radio waves travel further (1) • Use 2.4GHz (frequencies) (instead of 5Ghz frequencies) (1st) this has greater range/radio waves at this frequency travel further/can penetrate objects better (1) • Ensure that WAP uses channels that are not used by adjacent/overlapping/neighbours channels • avoid (co-channel) interference which can slow/impede data transmission.	**3**
5(c)	**Four** from: • Transmission media/cables are robust/resistant to electrical noise/interference/resistant to data degradation • Can achieve very high rates of data transfer/high bandwidths compared to other methods of connection/data transfer. • More secure than wireless/high security • Ethernet uses a connectionless mode of communication/no acknowledgment of frames (1st) so less network traffic (1) • All nodes/devices (on Ethernet) have the same privileges/no client-server issues/negotiation needed • No routing required/possible/no need for hubs or switches.	**4**

Question	Answer	Marks
6	**Five** from: • A graphical/diagram/drawing representation of a system • Inputs/outputs in/of a system • Processes in/of a system • Lines/arrows used to show route(s) through the system • Symbols to represent/show the inputs/outputs and processes in/of a system • Sequence of events/processes that occur in a system • Steps/tasks/events within a process in a system • Relationships/links between the elements/stages in a system and external elements • Different routes control events • Start/end/stop of the flowchart Shown by terminators	**5**

Question	Answer	Marks
7	**Eight** from: **Max 1 mark** for naming at least 3 stages: business understanding, data understanding, data preparation, data modelling, evaluating, deployment. *Business understanding:* • which determines what is required from the data mining process • Deciding if the data mining is worth the cost/risk of being carried out • Deciding the success criteria of the data mining process *Data understanding:* • which collects/identifies the data sets to be used • Ensuring that there is enough data available to carry out the mining process • Ensuring that there is enough time/computer resources available to carry out the data mining • Creating a description/report on the data sets to be used *Data preparation:* • selects the data to be used according to e.g. its relevance to the company's requirements • 'Cleaning' the data to remove redundant/inaccurate/irrelevant data • Creating combinations of data by merging data with common characteristics/features/customer uses *Data modelling:* • out the mining to discover relationships/links/patterns in the data • Creating new relationships/links/patterns to analyse the patterns • Document the mining to allow repetition/testing/evaluation of the results *Evaluating:* • the process against the success criteria • If the success criteria are not met the model is amended and rerun • If the success criteria are met the company is shown the results to assess *Deployment:* • of the data mining model for use by company/the data mining model is passed to the bank for use/run for the bank • Full documentation is created so the process can be repeated/monitored/maintained.	**8**

Question	Answer	Marks
8	*Command word: Justify: support a case with evidence/argument.* **Six** from: • New clients/web browsers can be added/join/connect to the server as and when required without the need for changes in configurations • New/more servers can be added as and when demand/traffic increases without users/browsers being disrupted • Control is centralised because all requests are to the server/no client can control the system so security is enhanced/increased • Server resources/new technology can be updated without reference/need to change/update clients/browsers websites can be centrally updated/managed • Centralised control of backup means that clients/web browsers/users do not need to take action/can be automated • Servers can be accessed/used by/from many different platforms/applications/users.	**6**

Question	Answer	Marks
9(a)	**Four** from: • Shows/stores/holds the milestones/tasks/activities/deliverables • Has tools to put milestones/tasks/activities into sequence/order shows dependencies between tasks • Estimation of the duration of activities/tasks to enable calculation of costs to enable allocation of resources • Tracking of team members during tasks/activities enables monitoring/reporting of work progress collaboration between team members • Automatic updating when tasks/activities are changed/completed enable automatic reporting to managers • Visual representation.	**4**
9(b)	**Four** from: • PMS is expensive to purchase/install/use • cost may be more than the project cost/uneconomical • PMS can be complex to use/set up/needs training • PMS may take too long to set up/use • May take too much training/learning for a small project • May not be worth the effort to set up for a small project.	**4**

Question	Answer	Marks
10	*Command word: Discuss: write about issue(s) or topic(s) in depth in a structured way.* **Eight** from: **Max 6 from:** *Benefits e.g.:* • Can use chat rooms anonymously so identity is protected • Can meet new people with different views to expand knowledge/experiences • Can get/research/find out about perspectives from around the world which expands/enhances ideas/opinions • Can (easily) discover people based on user's characteristics/age/gender identity/interests/goals to communicate with people of similar background • Can be free/cheap to use after internet access is paid for so little additional cost/outlay required to communicate over long distances • Can carry out other tasks while 'chatting' so increases work rate compared to e.g. telephone conversations • Can offer unbiased/unfiltered opinions as users do not know each other/act as 'safety valves' for strong emotions/opinions that would not be expressed in real life • Can be restricted to specific topics to provide in-depth discussions • Can pretend to be someone else to avoid bias/discrimination **Max 6 from:** *Drawbacks e.g.* • Cannot be certain that other users are being honest/that they are who they say they are/catfishing • (Often) text-based so emotions/facial expressions are not possible resulting in confusions/ misunderstandings between users • Other online users exploit vulnerable users/coerce/persuade them into illegal/inappropriate activities/behaviour/meetings • Chat rooms can result in 'flame wars' where two or more users enter exchange insults/abuse sparked by a minor disagreement • Trolling/cyber-bullying can be more frequent • Building relationships online can result in less time spent with friends and family. *Max 6 marks if bullets/list of points.*	**8**