**INFORMATION TECHNOLOGY** **9626/33**

Paper 3 Advanced Theory **May/June 2018**

MARK SCHEME

Maximum Mark: 90

**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 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **10** printed pages.

## 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 descriptors 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).
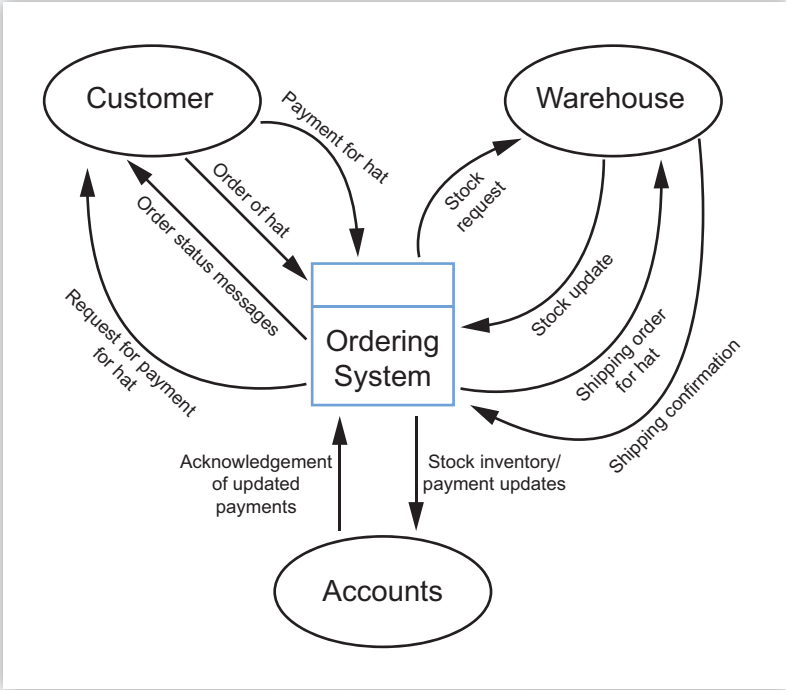
---

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.

| Question | Answer | Marks |
|---|---|---|
| 1 | **Eight** *from:*<br><br>The more available bandwidth on the connection the higher quality of video that can be streamed<br>Use of a 3G connection to the internet limits video/streaming to low bit rate of 400 Kb/s<br>Buffers not filled completely so video pauses/stops/jerky if frames not received fast enough<br>Provides video of 320 × 240 pixels without apparent stuttering/buffering/stop-start issues<br>This will be a poor video/low definition video as seen on the 1024 × 576 screen<br>Use of a 4G connection with higher bandwidth of c. 15Mbit/s allows video with higher bitrates to be viewed properly<br>This is 1024 × 576 is possible and this is HD quality<br>Highest bit rates of 19 / 30 Mbit/s allowing resolutions of up to 1920 × 1080 pixels<br>Available/can be streamed over Wi-Fi (IEEE 802.1 g) wireless connections....<br>Which have a maximum of 54 Mbit/s<br>1920 × 1080 pixels will have to be downscaled for viewing on the smartphone screen<br>Which may lead to artefacts and loss of quality. | 8 |

| Question | Answer | Marks |
|---|---|---|
| 2 | *A suitable line of code would be:*<br><br>document.getElementById("button1").addEventListener("click", checkreadpagefunction);<br><br>**Six** *from:*<br>*1 mark for each of:*<br><br>*Capturing the element:*<br>　　document.getElementById<br>*Identifying the button by name:*<br>　　"button1"<br>*Checking for the event:*<br>　　addEventListener<br>*Correct reference to click by mouse:*<br>　　"click",<br>*Calling the correct function by name:*<br>　　checkreadpagefunction);<br>*All correct delimiters and all correct brackets:*<br>　　. between key words, , after click AND ; after function<br>　　() around button1<br>　　() around parameter ("click", checkreadpagefunction); | 6 |

| Question | Answer | Marks |
|---|---|---|
| 3(a) | **Eight** *from:*<br><br>S1 to S6 have their own storage devices for storing whole messages<br>Message sent in its entirety from source to switch S1<br>...S1 stores whole message on its storage device<br>S1 connects to S3 and forwards whole message to S3<br>...S3 stores whole message on its storage device<br>...message is deleted from S1<br>S3 connects to S5 and forwards whole message to S5<br>...S1 stores whole message on its storage device<br>...message is deleted from S3<br>Process repeated between S5 and S6 where message is stored before forwarding to destination<br>The source and destination of the message are not directly connected<br>Message can be multiplexed with other messages on network Switches<br>Method is called 'message switching'. | 8 |
| 3(b) | **Two** *from:*<br><br>Improves/makes more efficient use of bandwidth because the data channels are shared among communication devices<br>Network congestion can be reduced as messages can be stored temporarily at message switches<br>Priorities may be used to manage network traffic<br>Use of broadcast messaging/messages are delivered to multiple destinations makes more efficient use of network bandwidth<br>Message can be stored until recipient decides to pick it up<br>Process is transparent to applications the use it. | 2 |

| Question | Answer | Marks |
|---|---|---|
| 4 | **Six** *from:*<br><br>Animator drew frames 1 and 5 and 8<br>Frame 8 created by flipping/reflecting of frame 1<br>These are used as key frames<br>Frame 1 was duplicated/copied (by computer) to create frames 2, 3 and 4<br>Frame 5 was duplicated/copied (by computer) to create frames 6 and 7<br>Key frames define the start and end point of transitions that can be used by a computer-based animation application<br>Tweening was used to create frames in between. | 6 |

| Question | Answer | Marks |
|---|---|---|
| 5 | A simple context DFD would be e.g.: <br><br>  <br><br> **Eight** *from:* <br><br> Identify all three entities: customer, warehouse, accounts <br> Order from customer to ordering system <br> Payment from customer to ordering system <br> Request for payment to customer from ordering system <br> Messages re order status payment to customer from ordering system <br><br> Stock (check) request from ordering system to warehouse <br> Shipping order from ordering system to warehouse <br> Stock update from warehouse to ordering system <br> Shipping confirmation from warehouse to ordering system <br> Stock inventory update from ordering system to accounts <br> Acknowledgements from accounts to ordering system. | 8 |

| Question | Answer | Marks |
|---|---|---|
| 6(a) | **Four** *from:*<br><br>Made up of pixels<br>Each pixel is represented by bits<br>1 to 64 bits per pixel<br>Number of pixels depending on colour depth<br>Bits representing pixels packed in rows for bmp<br>Rows rounded to 32 bit words<br>Padding needed for loading into memory locations<br>Usually stored from bottom left up to top right of image. | **4** |
| 6(b) | **Four** *from:*<br><br>Vector images are stored as co-ordinates/geometric descriptions of shapes and colours<br>Digital monitors cannot display co-ordinate-based graphics<br>Because all digital monitors are pixel-based<br>Graphics card/computer must convert the co-ordinates/ descriptions into pixels before sending to digital monitor...<br>Uses an ADC-type action<br>Resizes the image to suit the requirements of the user/monitor. | **4** |

| Question | Answer | Marks |
|---|---|---|
| 7 | **Six** *from:*<br><br>Green and red lasers used<br>Light from both is sent in parallel stream/collimated<br>There is minimal divergence<br>Output about 1 watt<br>Green laser reads the data from top layer of disc<br>Data stored as holographic laser interference patterns<br>Red laser reads reference data stored on aluminium layer at/near bottom of disc layers<br>This is the servo information for accurately aligning the read head position over the disc<br>A (dichroic) mirror allows the red laser light to pass while reflecting the green layer<br>Stores c. 60 000 bits per pulse in densely packed tracks<br>Compared to a single/one bit per pulse for current optical storage<br>Can store 100 GB to 1 TB<br>Phase storage systems can store more data. | **6** |

| Question | Answer | Marks |
|---|---|---|
| 8 | **Six** *from:*<br><br>Greater flexibility in scheduling work/tasks around other activities<br>Greater focus on work activities in comfort of own home/surroundings<br>Reduced stress due to commuting/other workers<br>Greater flexibility/chances in employment opportunities as have experience of self-motivation/use of remote technologies<br>Reduced time off sick as workers can schedule their own time around minor illnesses<br>Possible tax benefits from use of home as office<br>Reduced costs/time spent on travelling to/from work<br>Employees can choose to live/can reside in a cheaper area/do not have to live close to/in expensive city centre offices<br>No need to travel in extreme weather conditions to get to work. | **6** |

| Question | Answer | Marks |
|---|---|---|
| 9(a) | **Six** *from:*<br><br>Enhance shape outlines for objects to make them more apparent<br>Enlarge signs to make the words more readable<br>Change colours of objects to make them more visible<br>Detect signs/objects in visual range and produce warning sounds to accompany the images<br>User learns sounds and associates with object for future reference<br>Infra-red light amplified to enhanced vision in poor light dark conditions. | **6** |
| 9(b) | **Two** *from e.g.:*<br><br>Military operations at night to spot the enemy<br>Enhance vision when night driving e.g. taxi, truck drivers<br>Improving age-related vision problems<br>Detecting chemicals for forensic purposes<br>Detecting heat loss from e.g. buildings/people. | **2** |

| Question | Answer | Marks |
|---|---|---|
| 10 | This question to be marked as a Level of Response. | **8** |
| | **Level 3 (7–8 marks)** | |
| | Candidates will discuss in detail advantage(s) and disadvantage(s) of a range of types of project management software.<br>The information will be relevant, clear, organised and presented in a structured and coherent format.<br>There will be a reasoned conclusion/opinion.<br>Subject specific terminology will be used accurately and appropriately. | |
| | **Level 2 (4–6 marks)**<br>Candidates will explain advantage(s) and disadvantage(s) of various types of project management software.<br>For the most part, the information will be relevant and presented in a structured and coherent format.<br>There may be a reasoned conclusion/opinion.<br>Subject specific terminology will be used appropriately and for the most part correctly. | |
| | **Level 1 (1–3 marks)**<br>Candidates will describe the advantage(s) or disadvantage(s) of types of project management software.<br>Answers may be in the form of a list.<br>There will be little or no use of specialist terms. | |
| | **Level 0 (0 marks):** Response with no valid content**.** | |
| | *Answers may make reference to e.g.:*<br>the various types of PMS with advantages/disadvantages of those mentioned: | |
| | *Desktop/single-user/personal:*<br>Suitable for smaller projects<br>Only one person can use the PMS at any one time | |
| | Can be used on mobile devices/smartphones/tablets<br>May lack all the features of full software | |
| | *Collaborative:*<br>Allows multiple uses to edit sections of the project<br>Changes reflected to other users<br>Some areas may be read-only/unavailable when others are working on them | |
| | *Visual:*<br>Allows information to be filtered and presented in easier to understand manner to avoid information overload<br>Used for fluctuating data<br>Details not instantly available. | |

| Question | Answer | Marks |
|---|---|---|
| 11 | **Eight** *from:* <br><br> Geographical area that can be covered is much greater than other broadcasting methods <br> Costs are less over greater distances/areas... <br> No need for terrestrial transmitters to homes <br> Can cover difficult terrain more cheaply <br> Allows greater bandwidth for data transmission... <br> Higher definition for TV/bit rate for radio for higher quality broadcasts <br> More TV/radio channels are possible due to greater capacity <br> Requires users/viewers/listeners to have (suitable) receiving equipment <br> ...broadcasters may have a limited audience if few people have satellite receivers <br> ...need line of sight view to satellite to be able to receive <br> ...need to be professionally installed which takes time and can be costly <br> Satellite technology has a huge setup cost <br> Satellites do not have an unlimited lifespan <br> ...may become space junk when lifespan is over <br> Repair of orbiting satellites is almost impossible <br> Signals to ground can be subject to interference/blockage due to weather/other signals <br> Significant delays in signal propagation/travel time of signals/distance from uplink to receiver can cause anomalies e.g. time differences of several seconds in transmissions. <br><br> *Max six for all positives or all negatives.* <br> *1 mark available for a reasoned conclusion/opinion.* | 8 |

| Question | Answer | Marks |
|---|---|---|
| 12 | **Eight** *from:*<br><br>E-business can be more convenient for shoppers<br>No need to travel/saves cost/time of going to shopping malls<br>Reduction traffic congestion/environmental effects of traffic<br>Less time used for ordering/buying goods than visiting a range of shops<br>Greater availability/choice of goods to buy<br>Information about goods is more available/price comparisons can be made more easily<br>Online business can start up cheaper/quicker than conventional businesses so increasing the global economy<br>E-business has created a range of new jobs/employment opportunities/skill sets<br>E-business can operate all the time/24–7 with no shutdown time/shoppers can buy/trade at any time<br>A global marketplace has been set up by e-businesses<br>New marketing models have developed e.g. review forums/online advertising companies<br>Loss of jobs around the world due to closure of conventional business/shops<br>Increase in fraud due to online transactions not being secure<br>Loss of personal contact with supplies leading to loss of confidence in business transactions.<br><br>*Max six for all positives or all negatives.*<br>*1 mark available for a reasoned conclusion/opinion.* | 8 |