INFORMATION TECHNOLOGY **9626/33**

Paper 3 Advanced Theory **October/November 2019**

MARK SCHEME

Maximum Mark: 90

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[Turn over

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(a)	Accumulates goods ready for purchase Calculates total cost of purchases for user to approve/check.	**2**
1(b)	***Eight*** *from:* Web server software to host the store Database to store information about items being sold Interface for staff to update database of items Search engine to enable customers to search for items Software to enable customers to create accounts Security software to check log in details Security software to authenticate bank details Firewalls to help prevent hacking Backup software to make backups of the database and website Store front view to show customers details of items/products Administration section to allow merchant to manage the online shop ... by editing/adding products ... by editing/amending prices ... by managing discounts ... by managing shipping costs Allow appearance/skin to be changed to match shop web site Allow a guest account so customer does not need to create a personal account Allow customer to ship to multiple addresses Provide suggestions for further purchases Allow products to be saved for future use/re-ordering/provide 'wish lists' Provide for return of goods Provide system for customer loyalty reward Database of customer records/details System for online chat/help System for FAQs to be shown.	**8**

Question	Answer	Marks
2(a)	*Three protocols from e.g.:* FTP/file transfer protocol for uploading data/files/pages to server HTTP/hypertext transfer protocol for accessing web pages HTTPS/hypertext transfer protocol secure for secure data transfer SMTP/IMAP/POP to send/receive emails TCP/IP for packet transmission SSH for secure access to a server/another workstation SFTP for secure method of uploading data to a server SMB for transferring files to a file server TELNET to connect computers to a switch/router.	**3**

Question	Answer	Marks
2(b)	*Four from:* Uses radio waves in 2.4 GHz/5 Ghz frequency ranges/(900 MHz and 3.6/60 GHz frequency bands) Data frames are modulated onto carrier wave Spread spectrum used for higher power levels Two channels used for full duplex exchange of data/most WiFi is half-duplex WiFi network uses SSID to identify itself Access point and device must be connected to same WiFi network/SSID to be able to exchange data Data is encrypted for security during transmission Devices must use IEEE 802.11 protocols/standards IEEE 802.11 has a number of variants a/b/g/n/ac(/ad/ah/aj/ax/ay/az) (must have 3 to gain this extra mark) 14 channels on 2.4 GHz which are 5 MHz spaced/device uses channels spaced apart to reduce channel interference.	4
2(c)	*Candidates may refer to e.g.:* **Two** *similarities from:* They are both communication systems Both use wireless technology Both have more limited range than cabled networks Both have limited bandwidth compared to cable networks **Four** *differences from:* Bluetooth has a shorter range than WiFi Bluetooth is restricted by solid objects/barriers/walls whereas WiFi can penetrate most barriers to some extent Bluetooth has a lower bandwidth than WiFi Bluetooth requires 'pairing' of devices whereas WiFi (often/usually) requires a full log in procedure Bluetooth data transfer is 'one to one' whereas WiFi facilitates communication between several devices.	6

Question	Answer	Marks
3	***Three from:*** ***Max One*** *from:* Alpha testing is carried out by the developers whereas beta testing is carried out by users Alpha testing includes both black box testing and white box testing Alpha Testing is carried out before the launch of software product into the market Beta testing is always a black box testing or a functional testing Beta Testing is done at the time of software product marketing ***Max Three*** *from:* Beta testing reduces product failure risks Beta testing audiences give a more objective view than employees carrying out alpha testing Beta testing is carried out on a nearly complete system whereas alpha testing will encounter far more bugs. Alpha testers will provide a more technical analysis of the faults of the system.	3

Question	Answer	Marks
4	*Command word: Evaluate: discuss the importance of, weigh up, the advantages and disadvantages, judge the overall effectiveness, weigh up your opinions.* **Eight** *from:* *Advantages:* Large amounts of information may be gathered from many responders in a shorter time than interviewing Unlike with questionnaires, interviewees might try and provide answers which they think the interviewer wants to hear Can be carried out by any number of researchers with little effect on the reliability and validity of the data Easier to analyse quantitatively than interviews *Disadvantages:* Cannot see the process as a whole as you would with observation Cannot move away from their 'script' and ask a more in-depth question as they could with interviews Cannot interpret body language as would be possible with observation/interviews Do not have to arrange a set time as would be required for interviews Questionnaires can lead to people not telling the truth as they are anonymous, which is less likely with interviews Questions cannot be changed once they are typed up unlike interviews Follow up questions cannot be asked unlike interviews More difficult to interpret emotions/feelings on a subject Cannot determine how much thought/consideration has been given to the answers by respondents Cannot have questions explained as to their purpose/meaning unlike interviews.	8

Question	Answer	Marks
5(a)	*Ten from:*	10

Activity code	Week 1					Week 2					Week 3					Week 4				
	Day					Day					Day					Day				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
A																				
B																				
C																				
D																				
E																				
F																				
G																				
H																				

(Critical path is white ⟶ and shown for part **(b)**)

Marks allocated as follows:

Correct positioning of activities A and B on Week 1 Day 1
Correct length of activity B at Week 1 Day 1 to Week 2 Day 1 (6 working days)
Correct positioning of activity C after activity A
Correct length of activity C at Week 1 day 5 to Week 2 day 4 (5 working days)
Correct positioning of activity D after activity B
Correct length of activity D at Week 2 day 2 to Week 3 day 1 (5 working days)
Correct positioning of activity E after activity D
Correct length of activity E at 3 days (Week 3 day 2 to Week 3 day 4)
Correct positioning of activity F after activity C
Correct length of activity F at 3 days
Correct positioning of activity G after activity F (D has already ended)
Correct length of activity G at 3 days
Correct positioning of activity H after activity F
Correct length of activity H at 7 days (Week 3 day 3 to week 4 day 4).

Question	Answer	Marks
5(b)	Activities A, C, F and H – 1 mark Length is 19 days – 1 mark	2

Question	Answer	Marks
6	*Command word: Discuss: give important arguments for and against. Often requires a conclusion.* This question to be marked as a Level of Response. **Level 3 (7–8 marks)** Candidates will evaluate in detail the benefits and drawbacks of the use of copper cables The information will be relevant, clear, organised and presented in a structured and coherent format. There may be a reasoned conclusion/opinion. Subject specific terminology will be used accurately and appropriately. **Level 2 (4–6 marks)** Candidates will explain the benefits and drawbacks of the use of copper cables For the most part, the information will be relevant and presented in a structured and coherent format. There may be a reasoned conclusion/opinion. Subject specific terminology will be used appropriately and for the most part correctly. **Level 1 (1–3 marks)** Candidates will describe at least one benefit and at least one drawback of the use of copper cables Answers may be in the form of a list. There will be little or no use of specialist terms. **Level 0 (0 marks):** Response with no valid content. *Answers may include reference to:* *Benefits:* Flexible so can be installed almost anywhere/can use 'tight' bends Can run electrical power along copper cable/Ethernet cable Can supply power to remote devices e.g. cameras high on buildings do not need separate power supply Costs of installation are less than for fibre optic cables NICs that use copper connections are cheaper to buy than those that use e.g. fibre optic Can provide higher bandwidths than wireless/WiFi Harder to hack into compared to WiFi *Drawbacks:* Can be subject to electrical interference Must not be run next to mains power cables Costs of installation are more than for wireless/WiFi Cannot provide as high bandwidths as fibre optic	8

Question	Answer	Marks
6	Break/lose contact/connection more frequently than fibre optic cables Easier to connect into by unauthorised users More of a safety/tripping hazard than WiFi.	

Question	Answer	Marks
7(a)	***Three*** *from:* Rapid access to (lost/removed) data/files Protection of data/files against power loss/failure of main system Protects against failure of storage system/hard disk Protects against loss of data from viruses/malware Protects against failure of OS.	**3**
7(b)	***Three*** *from:* Backups will store malware as well as safe data Backups will not remove malware Backups will restore data to time before malware infection but latest data will be lost Backups may not store up to date data if run during office/use hours Backups take snapshot of data which may change soon after backup is run so some data may not be backed up Backups can be stolen in their entirety If not encrypted all data can be stolen/accessed Backup windows should use system downtime which may be limited to out of hours' time System performance is reduced when backups are being carried out Restoration of data after malware infection can be laborious and time consuming Cost of extra hardware/storage may be excessive.	**3**

Question	Answer	Marks
8	**Six** from: Acts as gateway between LAN and WAN/internet Allows use of multiple (internal) IP addresses through one (external) IP address on internet Many computing devices/computers can be used through one internet connection Presents single IP address to exterior networks/internet (as number of external IP addresses is limited) Acts as a central device/node for logging/monitoring of internet access/activity Acts as a central device/node for filtering of internet access/activity Controls/requires username and password for internet access/activity Prevents access to inappropriate material/activities Acts as a cache for frequently used remote resources Reduces access times/network traffic over internet connection.	**6**

Question	Answer	Marks
9(a)	*Eight from:* Anti-malware/virus/spyware software to protect against viruses and spyware. Firewall (software or hardware) to help to prevent unauthorised access to company network Firewall to help to prevent unauthorised access to files stored by cloud storage provider Only allow access to company devices/laptops/smartphones Firewall to enforce company security polices Firewall to interrogate data packets entering/leaving company networks/cloud storage providers Firewall works by comparing contents of packets with predetermined/user defined rules Router to direct data packets to/from internet from/to company network/Cloud storage provider Router maintains database/list/table of IP addresses to forward packets Router updates list from other routers as addresses become known to it Router ranks entries in table according to probability of being correct address for packet to take on its route to destination Router maintains list/table of other routers to send packet if route is unknown. X should use encryption to secure the data for transmission Passwords and user IDs should be required by the access/firewall software before allowing devices to connect/access. *For 8 marks, must have at least 1 mark from each of firewall, router and encryption.*	8
9(b)	*Four from:* Locations B and C are open to the public/any device can connect so there is no secure connection at these locations Data may not be encrypted Location B could be used by hackers using Man in Middle (MIM) to route data through hacker computer Location B may be susceptible to fake/spoof/unauthorised wireless access points/connections Location B may be susceptible to intercepting wireless signals from company devices as there is no check on users of cafes/can sit anywhere without reason/identification.	4

Question	Answer	Marks
10	*Six from:* Photographs opened in image editor Person image cut out from photograph 1/Fig. 10.1 Mask around person is created to cover background Selection to be cut is highlighted/drawn Selection is modified around edges to ensure accuracy Using of adjustable nib for drawing tool Cut unwanted parts of image of woman Background of cut image changed to transparent Copy cut out (to clipboard) Create new layer for image of woman Import/paste cut out into image of office/photograph of office/Fig. 10.2 Place new image in correct position Resize image of woman (as required to fit in image of office) Bring to front/back as necessary Flatten/merge layers (if required) Correct new image for overlap/misplaced parts/pixels of imported image Crop area of new image/photograph 2 as required.	**6**

Question	Answer	Marks
11	*Six from:* Line 4 declares the variable/var length to hold one side of rectangle Line 5 declares the variable/var width to hold other side of rectangle parseFloat (prompt("")); used to display message parseFloat (prompt("")); used to collect values for both sides of rectangle parseFloat (prompt("")); used to create a (text) box for the user to enter the values Variable/var calc_area is declared to calculate the area Holds result of calculation document.write() is used to display the messages on screen about the values/area of the rectangle Displays the results of the calculation/contents of var calc_area.	**6**