APPLIED INFORMATION AND COMMUNICATION TECHNOLOGY   **9713/31**

Paper 3 Written B   **May/June 2017**

MARK SCHEME

Maximum Mark: 80

Published

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

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This document consists of **8** printed pages.

Question	Answer	Marks
1(a)	Signal is switched on/off/in pulses to represent the code being sent.	**1**
1(b)	*Two* from: Line of sight only so will not affect other devices in home/building Short distance so will not interfere with other devices Short distance so uses very little (electrical) power.	**2**
1(c)	*Two* from: Games controller/joystick to navigate/play using buttons/paddles Use of touchscreen with 'app' on smartphone to replicate navigation features Microphone for entering voice commands Keyboard/pad for entering alphanumeric characters/user names/id/password.	**2**

Question	Answer	Marks
2(a)	***Eight*** *from e.g.:* Has WAN and LAN ports for connection of (W)LAN to internet USB ports to allow sharing of (multimedia) files Has multiple NICs, for connection to different networks/internet ...support 10/100/1000 $Mbit^{-s}$ networks Act as gateway between networks ...provides ADSL/cable connection to WAN ...provides routing tables/'default' gateway Combines function of router and WAP Has wireless NIC ...to allow/provide use of Wi-Fi ...to provide use of 2.4/5Ghz wireless bands Provides security facilities for network ...Wi-Fi security facilities ...one touch connection for wireless peripherals e.g. Printer Provides DHCP functions ...to allow automatic provision of addressing for connected devices Has web-based administration interface ...allows user to configure the router Uses open-source/Linux operating system for ease of update/customisation Wi-Fi clone facility to add WAPs Provides USB interface for use of flash memory devices/external storage devices as NAS.	8
2(b)	***Six*** *from:* Traffic sent as IP packets from device ...packet contains destination in header Device looks up destination IP in its DNS table ...if IP address not known sends packet to 'default' gateway/router address ...if known sends packet to IP address Router examines packet header ...to determine destination IP address ...looks up IP address from DNS server ...if IP address not known sends packet to another router ...if IP address known sends packet to IP address of server.	6

Question	Answer	Marks
3(a)	**Four** *from e.g.:* Signal is spread over a number of frequencies within the band ...frequency hopping is where carrier frequency is rapidly switched ...using a code known to both transmitter and receiver Uses a pseudorandom number generator to produce the codes ...direct spread where signal is spread over a range of frequencies ...centred on the main/nominal frequency Can be a mixture of frequency hopping and direct spread.	4
3(b)	**Six** *from:* Increased resistance to interference Increased resistance from 'jamming' Increased bandwidth Increased resistance to eavesdropping/interception Increased resistance to multi-path reflections/fading Allows multiple users/access by multiple devices Can transmit on same frequency as others by using different code Limits power density so safer to use.	6
3(c)	**One** *from:* Bluetooth GPS.	1
4	**Six** *from:* Knowledge base has many individual items of information/facts that need updating so each item interacts with many other items during reasoning ...difficult to check all/every interaction Knowledge base objects are inter-dependent so modifying/updating one will affect another ...creating a need for more modifying Inferences/reasoning carried out during processing is not easily observed ...system makes inferences as processing occurs and changes/adds facts ...so changes may affect reasoning in unknown ways Changes may cause other changes to be made which may create need for more changes.	6

Question	Answer	Marks
5	*Six* from: Examine patient to determine symptoms/collect data Enter symptoms/data into expert system via user interface Collect symptoms via sensors attached to patient Doctor/patient enters answers to questions into user interface Expert system searches knowledge base for match with symptoms/data Inference engine uses rules base ...to add data to working memory ...to use rules/conditions to find match for symptoms/data ...to add data that could trigger use of more rules ...use of forward/backward chaining to match conditions/data ...to produce list of probable/possible/suggested diagnoses/illnesses Results presented via user interface to doctor/patient as hardcopy/on screen Doctor uses results and own knowledge to make diagnosis.	6
6	*Eight* from: *Advantages of e.g.:* Email has an audit trail for record keeping Email can be answered/replied to at different times/at doctor's convenience Email can have files attached for others to consult Chat rooms are in real time/discussions are in real time Chat rooms mean doctors do not have to travel to talk to others Instant messaging is in (almost) in real time/discussions are in (almost) real time Instant messaging allows doctors to do other tasks Video chat/conferencing can reduce costs of visits to other doctors/meetings Video chat/conferencing can be used to replace meetings where doctors have to travel *Disadvantages of e.g.:* Email is not secure Emails may not be delivered Emails can be ignored Chat rooms can hide/do not necessarily show doctors identity Instant messaging does not allow time to consider the message before it is sent Instant messaging can easily be misused Video chat/conferencing reduces personal interaction Video chat/conferencing can be affected by technical issues/different time zones. *Max 6 marks for all advantages or all disadvantages.* *One mark available for a reasoned conclusion.*	8

Question	Answer	Marks
7	***Six** from:* Attach sensors/named sensors to patient ...connect sensors to computer system ...via ADC/convert analogue signals to digital Computer continually reads/stores data from sensors ...processes data for display ...compares data to pre-set values Data output/displayed on screen for doctors/nurses to watch ...accompanying sounds to reassure monitoring staff that all is well ...hardcopy produced ...stored data used for analysis/comparison over time ...alerts/alarms sounded if pre-set parameters exceeded.	**6**
8	***Six** from:* Web browser uses HTTPS Website operator/owner acquires/has a certificate from a certificate provider ...using a certificate signing request Digital identity certificate provides a public key ...holds website owner name/information ...website owner email address Certificate provider has checked that the website owner has authority to use website address/domain Certificate provider signs certificate and provides a public document Web browser is sent digital certificate when it accesses website Web browser reads certificate information ...uses public key to decrypt certificate ...checks against built-in list of trusted/root certificates ...if certificate is valid then web site is authenticated ...if certificate is not valid user is given popup warning that site has not been authenticated.	**6**

Question	Answer	Marks
9(a)	***Four*** *from:* At least 8 characters long Contains characters mixture of uppercase/lowercase/numbers ...keyboard characters/symbols not defined as numbers or letters Does not contain a complete word or phrase Is different from previous passwords Does not relate to the user/contain the user name Does not repeat characters too often.	**4**
9(b)	***Four*** *from:* Users may write down passwords in accessible places if... ...passwords are excessively complex ...required to be changed too frequently Users may have too many passwords to manage ...so may use same password for all accounts Users may choose weak passwords if not allowed to write down password Special characters may prove difficult to use if travelling in different countries/keyboards Identity management systems may require one password to access all others ....the master password may be easily found by hackers/social engineering techniques.	**4**
10	***Four*** *from:* Basic requirements are identified ...input and outputs determined Initial/first prototype developed ...only includes user interfaces Customers/end-users examine the prototype ...provide feedback on additions or changes Prototype is revised/enhanced ...based on user feedback Prototype build and end user examination may be repeated.	**4**

Question	Answer	Marks
11	***Six* from:** *Benefits include e.g.* Reduced costs of development Reduced time of development ...as any changes are made during development Increased user involvement ...fewer misunderstandings/interpretations of design ...final product more likely to satisfy the end-user Can experiment with prototype before building final product *Drawbacks include e.g.* Analysis of requirements can be inadequate ...complete project may not be analysed ...better solutions may be overlooked Confusion of end user over what is actually wanted/required ...developer and end user may have different ideas of what end product should be Excessive time spent on developing prototype ...prototype may become too complex ...not meet end user requirements *Max 5 marks for all benefits or all drawbacks.* *One mark available for a reasoned conclusion.*	6
	Total:	**80**