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**APPLIED INFORMATION AND COMMUNICATION TECHNOLOGY**

**9713/33**

Paper 3 Written B

**May/June 2017**

MARK SCHEME

Maximum Mark: 80

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**Published**

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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)	<b>Two from:</b>  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)	<b>Two from:</b>  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)	<p><b>Eight from e.g.:</b></p> <ul style="list-style-type: none"> <li>Has WAN and LAN ports for connection of (W)LAN to internet</li> <li>USB ports to allow sharing of (multimedia) files</li> <li>Has multiple NICs, for connection to different networks/internet</li> <li>...support 10/100/1000 Mbit<sup>s</sup> networks</li> <li>Act as gateway between networks</li> <li>...provides ADSL/cable connection to WAN</li> <li>...provides routing tables/'default' gateway</li> <li>Combines function of router and WAP</li> <li>Has wireless NIC</li> <li>...to allow/provide use of Wi-Fi</li> <li>...to provide use of 2.4/5Ghz wireless bands</li> <li>Provides security facilities for network</li> <li>...Wi-Fi security facilities</li> <li>...one touch connection for wireless peripherals e.g. Printer</li> <li>Provides DHCP functions</li> <li>...to allow automatic provision of addressing for connected devices</li> <li>Has web-based administration interface</li> <li>...allows user to configure the router</li> <li>Uses open-source/Linux operating system for ease of update/customisation</li> <li>Wi-Fi clone facility to add WAPs</li> <li>Provides USB interface for use of flash memory devices/external storage devices as NAS.</li> </ul>	<b>8</b>
2(b)	<p><b>Six from:</b></p> <ul style="list-style-type: none"> <li>Traffic sent as IP packets from device</li> <li>...packet contains destination in header</li> <li>Device looks up destination IP in its DNS table</li> <li>...if IP address not known sends packet to 'default' gateway/router address</li> <li>...if known sends packet to IP address</li> <li>Router examines packet header</li> <li>...to determine destination IP address</li> <li>...looks up IP address from DNS server</li> <li>...if IP address not known sends packet to another router</li> <li>...if IP address known sends packet to IP address of server.</li> </ul>	<b>6</b>

Question	Answer	Marks
3(a)	<p><b>Four from e.g.:</b></p> <p>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.</p>	<b>4</b>
3(b)	<p><b>Six from:</b></p> <p>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.</p>	<b>6</b>
3(c)	<p><b>One from:</b></p> <p>Bluetooth            GPS.</p>	<b>1</b>
4	<p><b>Six from:</b></p> <p>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.</p>	<b>6</b>

Question	Answer	Marks
5	<p><b>Six from:</b></p> <p>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.</p>	6
6	<p><b>Eight from:</b></p> <p><i>Advantages of e.g.:</i>  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</p> <p><i>Disadvantages of e.g.:</i>  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.</p> <p><i>Max 6 marks for all advantages or all disadvantages.  One mark available for a reasoned conclusion.</i></p>	8

Question	Answer	Marks
7	<p><b>Six from:</b></p> <p>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.</p>	6
8	<p><b>Six from:</b></p> <p>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.</p>	6

Question	Answer	Marks
9(a)	<p><b>Four from:</b></p> <p>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.</p>	<b>4</b>
9(b)	<p><b>Four from:</b></p> <p>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.</p>	<b>4</b>
10	<p><b>Four from:</b></p> <p>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.</p>	<b>4</b>

Question	Answer	Marks
11	<p><b>Six from:</b></p> <p><i>Benefits include e.g.</i>            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</p> <p><i>Drawbacks include e.g.</i>            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.</p> <p><i>Max 5 marks for all benefits or all drawbacks.            One mark available for a reasoned conclusion.</i></p>	<b>6</b>
	<b>Total:</b>	<b>80</b>