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**APPLIED INFORMATION & COMMUNICATION TECHNOLOGY**

**9713/31**

Paper 3 Written B

**May/June 2016**

MARK SCHEME

Maximum Mark: 80

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**Published**

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**1 (i) Two from:** [2]

Original source is only available in hardcopy  
 ...may need to use software to edit the digital copy of the source  
 ...may contain text that may be imported into article using OCR

**(ii) Two from:** [2]

...dictate article for future typing  
 ...record a voice memo/audio log about the article  
 ...use of speech-to-text/speech recognition  
 ...to record interviews for use in the article

**2 Four limitations of laptops from:** [4]

Difficulties when viewing/creating the article on laptops which generally have smaller screens and keyboards presenting  
 Image processing can be slower on laptops which usually have lower specification/ slower processors / less memory (RAM)/ smaller hard drive with slower access times for the same cost as e.g. desktop computer  
 Laptops are inherently more vulnerable to damage and theft so more risk of loss of article  
 Power management issues e.g. limited battery life so more difficult to manage when away from office  
 Connecting to outside networks may require configuration skills/more technical skill to connect when away from office  
 Repairs are more difficult than when away from office/traveling

**3 Four from:** [4]

Ensure resources are all electronic  
 Gather assets/resources into common/shared area  
 Convert assets/resources into suitable format for inclusion into final document  
 Create master document/template  
 Use of copy/paste of resources into master document  
 Use of hyperlinks embedded in the master document/template  
 Use of embedded object linking to include remotely stored assets/resources

**4 Four from:** [4]

Text and images/assets are brought together  
 Media/plate held in precise position  
 Plate wrapped around drum rotating on its axis/plate is put in cylinder and head move long axis/  
 plate on flat bed and laser is deflected by mirrors line by line  
 Computer data used to control the laser/ultraviolet to produce image on plate/drum  
 Separate plates are created for different colours  
 Plate/drum uses to print onto paper

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5 Four from: [4]

Benefits:

Reduction in time taken from conception to publication  
Storage space for the product/assets is virtually unlimited  
Fewer overheads e.g. distribution costs means lower cost of production  
Distribution of electronic publications is faster than printed/hardcopy  
Can include links/multimedia to illustrate/enhance the content

Drawbacks:

Different formats exist so magazine has to be made available in several formats  
Content is not secure compared to printed format/content can be copied more easily  
Perceived lack of 'quality' in electronic publications

6 (a) Six from: [6]

Benefits:

There is no significant time delay between question and answer  
Interviewer can more easily ask extension questions based on answers  
...that can add to the verbal answer from the interviewee/scientist  
People from all over the globe can be interviewed  
Enables interviewers/reporters to contact people in restricted areas e.g. laboratories for medical research  
No need to travel/no travel costs for reporter  
No time wasted by reporter in travelling to interview  
Interview can easily be recorded for later transcription/reference

Drawbacks:

The reduction of social cues/cannot see interviewee so e.g. body language/eye contact cannot be used as a source of extra information  
The interviewer has no knowledge of the situation in which the interviewee is situated  
...so less able to create a good interview ambience  
Telephone line quality can affect responses  
Easier for interviewee/scientist to find excuse/make up excuse/find reasons to terminate the interview

**Max 4** for all benefits or all drawbacks

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(b) Six from: [6]

Advantages:

Can interview scientists that are not easy to access e.g. in restricted areas  
 Easier to ask lengthy questions that require a detailed response  
 Can use emoticons  
 The lack of nonverbal and social cues can reduce miscommunication due to cultural diversity  
 Reporter/scientist has some degree of anonymity so reporter may get more information from scientist  
 Reporter has time to formulate questions/scientist has time to construct reply  
 No need to travel/no travel costs for reporter  
 No time wasted by reporter in travelling to interview  
 Interview dialogue/exchange/emails easily kept for reference  
 Can use translating tools to interview in different/foreign languages

Disadvantages:

The reduction of social cues/cannot see interviewee so e.g. body language/eye contact cannot be used as a source of extra information  
 The interviewer has no knowledge of the situation in which the interviewee is situated ...so less able to create a good interview ambience  
 Reporter has to adapt to email style of scientist  
 Reporter has to wait for reply which might be a long time  
 Scientist may never reply/may terminate the contact without notice  
 Reporter may have to send reminders

**Max 4** for all benefits or all drawbacks.

7 (a) Two from: [2]

Very large number of processors/multi-core processors running in parallel  
 Processors close together in a 'computer cluster'  
 Processors can be distributed across a network/the 'cloud'  
 Can process trillions of operations per second  
 Can run different operating systems on different nodes/processors in cluster

(b) Four from: [4]

Computer can be used to scan/search through databases of molecules/chemicals/drugs to find chemical compounds that could be used as basis for new drugs  
 Computer can be used to scan/search through databases of human genome for possible new drug treatments for e.g. cancer  
 Computer used to cross-match results of previous research with results of new drug under development  
 Computer can be used to create/run a model of the effects of the drugs/chemicals on subject/human body  
 Computer can be used to predict the effects/possible side effects of the new drug  
 Computer can be used to monitor amount of chemicals/ingredients being used

8 (a) (i) **One** from: [1]

Needed to take photograph of employee/technician for use on ID card/to store in employee/staff database

(ii) **One** from: [1]

Needed to type/enter characters to input details of new technician into the database

(b) (i) **Two** from: [2]

...not practical to have the computer spend time processing the data to determine how best to store it  
 Allows validation rules to be easily applied to the data  
 ...determines/places constraints on the values that are possible in a field  
 ...to ensure the integrity of the data  
 Makes it easier to determine other properties of the field  
 ...e.g. format of data within the field/maximum size of a field value/use of the field data in expressions/ whether or not the field can be indexed/size of the database  
 Allows use of storage space to be optimised

(ii) **Two** from (one mark for a matching data type and a valid reason): [2]

Details stored in the field in the database	Most appropriate data type used for that field	Reason for using the chosen type
Technician's last name	Text/character/ alphanumeric/ string	Name can contain almost any printable character
Technician's gender	Boolean	Only two choices

(iii) **One** explanation from (max 2 marks per explanation): [2]

Telephone numbers may contain spaces; spaces are not numbers so could not be entered  
 Telephone numbers may contain letters, letters are not numbers so could not be entered  
 There is no need/requirement for mathematical calculations on telephone numbers  
 Some telephone numbers have a leading zero which makes it text  
 Some telephone numbers have a leading plus/+ which makes it text

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**9 (a) Four from:** [4]

Data is stored only once/one record per technician/avoids data duplication so less storage space is needed  
 Data is stored only once/one record per technician no need to update multiple records/deletion or modification of data is simpler/quicker  
 ...changes are cascaded to other tables  
 Complex queries can be carried out by extracting data from multiple tables  
 Enhanced security access to tables can be restricted on individual table basis  
 Database can be expanded easier than a flat file database by adding new tables and creating new links  
 Ensures referential data integrity

**(b) One-to-many because each technician has more than job role** [1]

**(c) one-to-one each job role has only one title** [1]

**(d) Six from:** [6]

Data may be invalid although it has been copied correctly e.g. wrong number of characters in post\_code  
 Data may not have been copied correctly but may be valid e.g. telephone number/area code copied incorrectly  
 The stored data on the technician has to be accurate so that decisions based on the data are appropriate/use of the data is appropriate.

Verification (max 4):

To try and ensure that the data has been copied correctly  
 ...appropriate example: e.g. contact telephone number has been copied correctly  
 Ensures that data being entered matches/is the same as that obtained from technician  
 Ensures that the data stored about the technician is more reliable

Validation (max 4):

Carried out by computer so  
 ...only checks that the data is sensible/reasonable/meets pre-set rules  
 ...appropriate example: e.g. gender is either male or female  
 Does not check that the data is actually correct

**10 Six from:** [6]

Determine/decide the data to be input into model  
 ...input selected data into model  
 Decide the parameters that will be used  
 ...input selected parameters into model  
 Production costs/staffing costs output from model  
 Prediction of profits output from model  
 Adjust/amend values for 'what if'  
 Use of goal seek/break-even point  
 Calculate the total costs  
 Use results to help make decision based on his knowledge of the market  
 Produce graphical representation of results/data/profits/growth

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**11 Eight** from: **[8]**

Sensors collect analogue data about the temperature and pH in the vessel/vat  
 Data from sensors is converted from analogue to digital using ADC  
 Microprocessor continuously monitors data from sensors/process is repeated/continues until fertiliser is made  
 Microprocessor compares data from temperature sensor with pre-set value  
 ...if temperature in vessel/vat is lower than pre-set value microprocessor sends signal to turn on heater  
 ...if temperature in vessel/vat is higher than pre-set value microprocessor sends signal to turn off heater  
 Microprocessor uses actuators to turn heater on/off  
 Microprocessor uses actuators to open/close valve  
 Data from sensors is converted to analogue from digital using DAC  
 Microprocessor compares data from pH sensor with pre-set value  
 ...if pH in vessel/vat is lower than pre-set value microprocessor sends signal to motor to open valve to allow in more alkali  
 ...if pH in vat is higher than pre-set value microprocessor sends signal to motor to close valve to stop flow of alkali

**12 (a) Two** from: **[2]**

Primary research is gathering new data that has not been collected before.  
 Secondary research is the use of existing data that has already been produced.

**(b) Six** from: **[6]**

Computer-assisted web-based interviewing (CAWI)  
 ...use on online questionnaires  
 ...automated analysis

Computer-assisted personal interviewing (CAPI)  
 Either the interviewee or an interviewer sits at a computer terminal  
 ...answers a questionnaire using the keyboard/mouse

Computer-assisted telephone interviewing (CATI)  
 ...telephone survey technique  
 ...the interviewer follows a script provided by software application  
 ...software can choose next question based on previous answer

Automated Computer Telephone Interviewing (ACTI)  
 ...a computer with voice recognition capabilities asks interviewees a series of questions  
 ...recognises and stores the answers  
 ...software follows scripted logic and can branch  
 ...the flow of the questionnaire based on the answers from interviewee  
 ...as well as information known about the interviewee

**[Total: 80]**