Cambridge International AS & A Level

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

Paper 3 Written B **October/November 2016**

MARK SCHEME

Maximum Mark: 80

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.

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1 (a) ***Four*** *from:*

Computer Aided Design
....to create, modify, analyse designs

Computer Aided Manufacture
Use of (computer) software to control manufacturing machinery/tools
....to assist in all stages of the manufacturing process e.g. planning. **[4]**

(b) ***Two*** *from e.g.:*

Light pen for drawing directly on screen/when desk space is limited/might only have CRT monitors
Trackerball for drawing when desk space is limited/less chance of picking up dust/reduced risk of health issues/more accurate than a mouse/selecting options
Graphics tablet/use of stylus for inputting freehand drawings
Scanner for inputting hardcopy drawings/photographs/notes. **[2]**

(c) ***Two*** *from e.g.:*

CRT monitors/curved screens for several designers to see the design simultaneously
Plotter to produce large hardcopy of design drawings/blueprints
Laser printer to produce hardcopy of designs
3D-printer to produce model/prototype. **[2]**

(d) ***Six*** *from:*

Benefits:

Using CAD can be more accurate with measurements than traditional drawing methods
Using CAD can reduce human error in use of/placing components from library for the drawings
Using CAD allows drawings to be saved/edited/modified at various stages in the process
Using CAD allows drawings to be saved/edited/modified by several designers
Using CAD allows drawings to be sent electronically to designers/email
Using CAD enables analysis of interaction of components
Using CAD enables analysis of component costs
Using CAD allows rotation/zoom of views

Drawbacks:

Using CAD requires a computer system which can be expensive/initial costs are high
Using CAD can be slower than traditional methods for one-off/low-volume production
Increased costs as workers need to be trained how to use the software and machinery.

Max 4 for all benefits or all drawbacks.
1 mark is available for a reasoned conclusion. **[6]**

(e) ***Four*** *from e.g.:*

The results of manufacturing using CAM are consistent (always the same)
Using CAM enables very high accuracy levels in large-scale production
CAM can produce/machine very intricate/difficult shapes
Using CAM can speed up production of low-volume products
CAM can be run for very long periods e.g. 24 hours a day, 7 days a week
Can be linked to CAD, so that designs are electronically input to machinery. **[4]**

2 (a) ***Two*** *from:*

Data about speed/from engine rotation/flywheel revolutions collected by using a light sensor
Temperature data from oil/water/exhaust systems collected by using temperature sensor
Data about pressure of coolant/oil systems collected by using a pressure sensor
Data about air/fuel ratio from exhaust gases/manifold/before and after catalytic converter collected by using oxygen/lambda sensor
Data from the engine management system. **[2]**

(b) ***Two*** *from:*

Printer to output hardcopy of results/data/possible diagnoses
Screen/monitor to show possible diagnoses/current readings/warnings/data summaries. **[2]**

(c) ***Six*** *from:*

Consists of database of facts/car engine faults/solutions and the rules base
Holds database of knowledge from experts
...for use by inference engine
Stores unstructured and structured information
Is updated by inference engine
Using forward chaining
Existing facts are used to create new facts
Is updated by additional input of facts/knowledge from experts
New rules can be generated
User can enter new parameters/variables
Can import parameters/data from other systems. **[6]**

(d) ***Six*** *from:*

Receives data from user interface from mechanic/from car engine sensors
Checks knowledgebase for matches to data input
Checks the rules to find relevant rules that match knowledgebase facts
....using forward/backward chaining
Chooses/selects relevant rules
...prioritises rules found in knowledgebase
Executes rules in order of priority
Repeats the steps from check knowledgebase to execute rules
.....until no more matches for condition/data input
Use of if-then-else logic/action
Applies logical rules
Interprets facts in knowledgebase to provide possible diagnoses/probabilities
Suggests possible faults. **[6]**

3 *One description for each:*

Motor: to move whole simulator/parts of simulator/open,close valves in hydraulic rams for moving the simulator

Buzzer: output sound/audible alert as warning/information

Large screen: display car track/ scenes/ views of road ahead

Loudspeaker: output sounds of car noises/ambient sounds/instructions from instructor. **[4]**

4 ***Eight*** *from:*

Benefits:

Drivers are not put in physical danger/can be safer/less risk of being hurt/no risk to life
Different/extreme conditions can be simulated so no need to wait for natural occurrence
Different conditions/scenarios can be repeated
Running costs/fuel consumption lower than real cars
Simulation can be recorded for later playback/analysis
...feedback can be visual overlays as well as verbal comments
...computer can objectively assess performance c.f. observations by instructor
Manoeuvres/actions can be demonstrated by the simulator
Crashed/damage to virtual cars does not cost money to repair

Drawbacks:

Can be difficult to simulate all conditions found on race tracks
Can be expensive to create a realistic simulation
Not all variables can be included in a simulation
Drivers may be more reckless in simulations because of lack of real danger
Lack of a realistic experience for drivers
...skills may not transfer from simulator to real driving
...lack of retention of skills/knowledge learned in simulator
Occurrence of 'simulator sickness' due to
...motion sickness where movement of body does not match what is shown on screen
...lack of smooth movement on screen during rapid changes of position
...latency between moving the steering wheel and simulator responding

Max 6 for all benefits or all drawbacks.
1 mark is available for a reasoned conclusion. **[8]**

5 (a) Six *from e.g.:*

Name for identity purposes
Address for billing purposes
Email address for confirmation of booking
Telephone number for (emergency) contact
Credit/debit/bank card details for payment
Number of passengers for accommodation/safety purposes
Ages of passengers for allocation of amenities/facilities
Number of rooms/cabins required for passenger manifest/accommodation allocation
Departure/arrival ports for itinerary
Dates of travel/cruise for logistical/booking purposes. **[6]**

(b) ***Six*** *from:*

No need to waste time on travel to company offices
Saves cost of travel to company offices
Can more easily compare prices of cruises/options available
Prices can be cheaper when booked online since company
Less pressure from sales people to buy extras/upgrade
Can browse with no pressure to actually book/purchase
Employs fewer staff and has lower costs
Can check availability immediately
Can get immediate confirmation of booking
Do not need to wait for tickets/details to arrive as these are sent by email. **[6]**

(c) (i) ***One*** *from e.g.:*

Barcode/matrix code with details of booking/booking reference
The official ticket number/ticket identification number
...with a check digit
Baggage allowance. **[1]**

(ii) ***One*** *from e.g.:*

MUST *be different from response given in* ***(i)****:*
Barcode/matrix code with details of booking/booking reference
The official ticket number/ticket identification number
...with a check digit
Carriage terms and conditions
..fare and tax details/codes indicating costs
Indication of form of payment
Baggage allowance. **[1]**

6 (a) (i) ***Two*** *from:*

Upload firmware upgrades
Link via cable to other devices
Access music/video files on USB storage devices/mp3 player. **[2]**

(ii) ***Two*** *from:*

Store music/video files for playback
Record music/video files from entertainment system/use as PVR storage
Store firmware upgrades
Transfer files to/from entertainment centre. **[2]**

(b) ***Four*** *from:*

Files are compressed to save storage space/bandwidth when transferred
...loss in quality is acceptable
...can be up to 90% reduction in file-size
Standard format for music/audio files
...can be played by most devices
...entertainment system may not be able to play other audio file types/may be only audio file type entertainment system can play
Data can be added to file
....to describe contents of file e.g. song, artist etc. **[4]**

7 (a) ***Six*** *from:*

Video and audio encoded into digital format (by camera/at studio/in outside broadcast truck)
Video/audio edited for transmission/may have short time delay introduced
Sent by cable/satellite link to studio
Sent by cable to uplink station/dish
Received by receiving dish on (geostationary) satellite
Frequency altered and sent to transponder on (geostationary) satellite
Transmitted to ground/downlinked to dish on ship
LNB on dish on ship receives signal from satellite
Signal sent to receiver via cable
Signal distributed to entertainment systems around the ship/in cabins
Receiver converts signal into viewable audio/video. **[6]**

(b) ***Six*** *from:*

Movies/video stored on servers accessed via (local) network
Kumar has direct access to files stored on server
Movie compressed to save storage space/transmission bandwidth to achieve smooth playback/reduce lag/buffering
Kumar has a PIN required to view movie
Each cabin has set-top box/receiver required
Menu/list of movies shown on screen
...can be sorted by e.g. Genre/artist
...can be searched on criteria e.g. Genre
Chosen movie is streamed/downloaded to local entertainment device
Can be paused/rewound/fast forward. **[6]**