ADVANCED
General Certificate of Education
2011

Information and Communication Technology

Assessment Unit A2 1

assessing

Module 3: Information Systems

[AW211]

FRIDAY 27 MAY, MORNING

MARK SCHEME

1 (a) (i) Video camera/webcam
Microphone
Speakers
Monitor/data projector
Broadband connection
Modem
[1] for each of four resources [4]

(ii) Travelling is reduced (cost/time)
Trainees can participate from their normal work places
Trainees throughout the country can be trained
Reduction in costs/time/environmental impact
[1] for each of two points

It supports multimedia
Trainees can observe what the tutor/trainer is doing
[1] for each of two

It is interactive
Trainees can communicate directly with a tutor/trainer
Trainees can be observed using the system
[1] for each of two points

The training session can be recorded
… and repeated later
[1] for each of two points

[2] for each of three benefits [6]

(b) A help desk [1]
A dedicated telephone number/email address/electronic link
The user can communicate directly with a person trained in support
… who may be able to control the user's computer remotely
… who may have access to a database of problems and solutions
… who will talk the user through the system
[1] for each of two points

A user group [1]
A formal/dedicated body of enthusiasts/end users of a particular system/software package
… who communicate via an electronic forum/bulletin board/series of meetings
The user can post their problem/query
… or start a thread
… and get a response from users with the same problems
[1] for each of two points

[3] for each of two methods [6]

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2 (a) (i) Exercising the eyes by focusing on objects at varying distances
Blinking regularly
Keeping the air moist
Adjusting the screen height/seating
Adjusting the brightness/contrast/refresh rate on the monitor
Positioning the monitors to avoid glare
Keeping your monitor screen clean
Regular eye testing
Adequate lighting conditions
Using larger monitors
[1] for each of four precautions   [4]

(ii) RSI [1]
This occurs in the upper back/neck/shoulder regions/arms/elbows/
wrists/hands/fingers
Symptoms range from numbness/restricted movement to chronic
pain
[1] for one point

Remedy
Take regular breaks every half hour from working at your
computer
Regularly stretch to relax the body
Use footrests, wrist rests and document holders
Use an ergonomically-designed workstation/keyboard/chair
[1] for one point

Carpal tunnel syndrome [1]
This occurs when a nerve is pinched/compressed in the wrist
The symptoms are pain, numbness, tingling/weakness in the wrist
[1] for one point

Remedy
Take regular breaks every half hour from working at your
computer
Wear a wrist brace/splint
Have a cortisone injection/surgery
[1] for one point

Ulnar neuritis [1]
This affects the back of the inside of the elbow
The symptoms are tingling/pain in the fingers/elbow/funny bone
[1] for one point

Remedy
Use an adjustable seat
Avoid putting the elbows on the desktop
Use a wrist support
[1] for one point

Backache [1]
This affects the muscles in the back
The symptoms are mild/severe pain in the back
[1] for one point

Remedy
Maintain a natural posture while using the computer
Have adequate lower back support/footrests
Avoid sitting in the same position for extended periods
An ergonomically designed workstation
[1] for each of two points

Radiation damage
… from rays from the screen
… which can affect the whole body
[1] for each of two points

Remedy
Use an anti-radiation screen [1]

[3] for each of two problems [6]

(b) Membership of the world's largest educational and scientific society
… specifically for computing professionals
[1] for each of two points

Access to a wide range of resources
… publications/on-line books/searchable digital library/newsletters
[1] for each of two points

Access to special interest groups
… attending conferences/accessing specialist publications/activities
[1] for each of two points

Access to professional development courses
… and career advice
[1] for each of two points

Contact with online forum groups
… communicating with fellow professionals throughout the world
[1] for each of two points

[2] for each of four benefits [8]   18

3   **(a)**   The software could be purchased ready made
…   "off the shelf"
…   from a computer store/specialist software shop
[1] for each of two points

This is a suitable method as payroll is a common/standard application
and there are many payroll packages already available
The software will be relatively cheap as the cost will be shared among
many users
[1] for one point about suitability

The software could be developed "in-house"
…   by specialists within the business
[1] for each of two points

This would be an inefficient method as it would be expensive and take
a long time as the system would have to be developed from scratch
Most companies do not have the expertise to develop their own
software
The full cost of the software will fall on the business
[1] for one point about suitability

The software could be "out-sourced"
…   to specialist software developers
[1] for each of two points

This would be an inefficient method as it would be expensive and take
a long time as the system would have to be developed from scratch
The full cost of the software will fall on the business
[1] for one point about suitability

[3] for each of three methods   [9]

(b)   (i)   <u>Benefit</u>   Reduced development time [1]
The PM CASE tool automatically performs tasks such as critical
path analysis
…   performs tasks such as critical path analysis faster than a
human
Standard templates/previous PM data can be re-used
[1] for one point

<u>Benefit</u>   Improved quality/increased accuracy [1]
The PM CASE tool automatically validates/checks processes e.g.
Gantt chart production
…   does this consistently/eliminates human error
The PM CASE tool provides the PM with better quality information
…   and enables the PM to make better decisions such as
responding to risks/bottlenecks
[1] for one point

[2] for each of two benefits   [4]

(ii) Graphics tool [1]
Assists/automates the modelling of the system
… by creating and maintaining DFDs, ERDs
Automatic validation of DFD levels/ERD relationships
Automatic population of the data dictionary
[1] for each of two points

Code generating tool [1]
Assists/automates the production of program code/interface code
… from formal program specifications
Code is optimised
[1] for each of two points

Interface generating tool [1]
Assists/automates the production of code for the user interface
… from design of IO objects (buttons/text boxes etc.)
[1] for each of two points

Data dictionary generator [1]
Automatically populates the DD
… with processes/entities/attributes
Automatically validates the DD
The developer can add documentation/annotation

[3] for each of two CASE tools
[6]

4 (a) NLI

Allows user to interact using written

… or spoken language

… instead of computer language and commands

Verbs or phrases used

… to instigate functionality

… such as creating, selecting, modifying data

Sounds are stored in a database

… and the user input compared with these

Speech recognition software is used

[1] for each of four points

CLI

There is a finite list of commands

Each command is a short word

… e.g. PRINT

Each command is typed at a prompt

Some commands have parameters or switches

[1] for each of four points [8]

(b) An experienced user will have memorised all the commands

… so a CLI is a very direct method/requires minimal keyboard entry

Input to a NLI is relatively slow and can be verbose

… and prone to error due to mispronunciations/extraneous noise

[1] for each of three points [3]

(c) This interface does not require keyboard skills/

… and so can be used by "members of the public"

[1] for each of two points

This interface is intuitive

Actions/menu options are chosen by pressing the appropriate icon/

part of the screen

[1] for each of two points

This interface is durable

It has no moving parts e.g. keys on a keyboard

It can be kept clean/is hygienic

[1] for each of two points

The options in a tourist information centre lend themselves to images

… which can be used as icons

These icons can be changed dynamically

… to accommodate visitors not speaking the local language

[1] for each of two points

[2] for each of two benefits [4]

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5 (a) There is no risk of "double booking"
… as record locking can be used to prevent the same record being updated by two users at the same time
[1] for each of two points

There is instant/immediate feedback
… informing the user that the reservation has been made
[1] for each of two points

[2] for each of two benefits   [4]

(b) Some workers have been made redundant
… because robots can work more efficiently than humans
[1] for each of two points

The work of many employees has been made safer
… as robots can operate in hazardous conditions (e.g. in paint spraying booths)
[1] for each of two points

The work of many employees has been made less physical
… as robots can be used to manoeuvre heavy car components
[1] for each of two points

Some workers may be de-skilled/re-deployed
… as ICT systems can do their jobs more effectively
[1] for each of two points
[2] for each of two ways   [4]   8

6 (a) <u>Data inconsistency</u>
An attribute/field stored more than once does not have the same value throughout
Example: the departure time of flight XYZ123 is shown as both 09.15 and 09.25
[1] for each of two points

<u>Data redundancy</u>
The same value is stored more than once thus taking up unnecessary space
Example: Airport names/flight dates/departure times/arrival times are stored in every record
[1] for each of two points   [4]

(b) 1NF – remove repeating groups
2NF – remove fields not dependent on the whole primary key/Remove non-key dependencies
3NF – Remove fields (other than candidate keys) that depend on other non-key fields
[1] for each of three stages   [3]

(c) <u>1NF</u>

FLIGHT
 <u>FlightID</u> AirportCode Airport Date Departure Arrival

FLIGHT-PASSENGER
 <u>FlightID+PassengerID</u> Name Contact

[1] for each of two entities including keys

<u>2NF</u>

FLIGHT As above

FLIGHT-PASSENGER
 <u>FlightID+PassengerID</u>

PASSENGER
 <u>PassengerID</u> Name Contact

[1] for each of three entities including keys

<u>3NF</u>

FLIGHT
 <u>FlightID</u> AirportCode Date Departure Arrival

AIRPORT
 <u>AirportCode</u> Airport

FLIGHT-PASSENGER
 <u>FlightID+PassengerID</u>

PASSENGER
 <u>PassengerID</u> Name Contact

[1] for each of four entities including keys   [9]

(d) <u>Operational</u>
Example of decision at <u>flight level</u>
… using the number of seats booked on a particular flight [1]
… to decide if occupied seats need to be spread out evenly/reduce the price of remaining seats [1]

<u>Tactical</u>
Example of decision at <u>multi-flight</u> or <u>route level</u>
… using passenger levels on particular routes [1]
… to decide on overall pricing levels/special deals/additional flights [1]

<u>Strategic</u>
Example of a <u>high level</u> decision
… using statistics on overall passenger levels [1]
… to decide on new routes/purchase of additional aircraft [1]

[2] for each of three levels [6]

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7 (a) (i) The use of UserIDs and passwords
           Each authorised user is allocated a unique UserID
           … and a default password
           … which can be changed by the user
           A valid UserID and password is required to log on
           [1] for each of four points

           The use of access rights/levels [1]
           Each user of the network is allocated specific rights to data files
           Examples include read only/read and write
           The access levels are maintained in an electronic table
           … and automatically checked when a user tries to access a data file
           [1] for each of three points

           Use a firewall [1]
           This monitors traffic into the network
           Traffic must comply with the security policy
           Different levels of security can be set
           If the policy is not met, access is denied
           [1] for each of three points

           [4] for one method   [4]

     (ii) Data encryption
           Data is coded before transmission
           … using a special algorithm/key
           On receipt the data is decoded
           … using the same algorithm/key
           Intercepted data is meaningless without the key
           [1] for each of four points   [4]

   (b) **SIM cards**
       A mobile phone contains a Subscriber Identity Module **(SIM)**
       … a **smart card** that gives the user access to a range of subscriber services.
       The SIM card **identifies** the subscriber to the network system

       The network
       The country is divided into overlapping **cells**
       … each using a different set of **radio frequencies**
       At the centre of each cell is a **base station**
       … connected to an **antenna** (mobile phone mast) which communicates with all of the mobile phones in the cell
       A group of base stations is connected to a **mobile telephone switching centre**
       … which will be connected to a **second level MTSO**, and so on
       These switching offices are connected to the **public telephone system**
       General Packet Radio Service **(GPRS)/3G protocols**
       … support mobile **data streaming** and transfer

Mobility

Each mobile phone is controlled by the base station for the cell it is **currently in**

When the phone is about to leave the cell, the base station detects that the received signal strength is **fading**

… and asks the **surrounding base stations** to report the power levels they are receiving from the phone

Control is **transferred** to the cell whose base station is receiving the strongest signal

A message is sent to the phone informing it that it will be under the control of a **different** base station

… and must **switch** to a new frequency

[1] for each of seven points
[2] for report structure – title/introduction/paragraphs/summary   [9]

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QWC	**5**
Total	**120**

Quality of Written Communication (QWC in GCE Mark Schemes).

The assessment of quality of written communication.

Marks are to be allocated to QWC in accordance with the following criteria.

Performance Level	Criteria	Marks
Threshold	Candidates spell, punctuate and use the rules of grammar with reasonable accuracy; they use a limited range of specialist terms appropriately.	0, 1
Intermediate	Candidates spell, punctuate and use the rules of grammar with considerable accuracy; they use a good range of specialist terms with facility.	2, 3
High	Candidates spell, punctuate and use the rules of grammar with almost faultless accuracy; deploying a range of grammatical constructions; they use a wide range of specialist terms adeptly and with precision.	4, 5