MODEL ANSWERS

Information and Communication Technology

Safety Aspects

- Problem -electrocution
- Prevention – RCB installed
- Problem – trailing cables
- Prevention – create ducts/cover cables with carpets etc.
- Problem – heavy equipment falling
- Prevention – sturdy tables
- Problem – fire
- Prevention – extinguisher

Health Risks

- Problem – Headaches
- Prevention – Use anti-glare screen/Take regular breaks
- Problem – Eyestrain
- Prevention – Use anti-glare screen/Take regular breaks
- Problem – RSI
- Prevention – Use ergonometric keyboard / wrist rests/Take regular breaks
- Problem – Backache
- Prevention – Use straight backed chair/Take regular breaks

Encryption

- Causes data to be scrambled/encoded
- Requires an encryption key/software to encrypt
- Requires a decryption key/encryption software to decrypt
- Results in data which is not understandable/readable
- protects sensitive data
- from being understood if falls in to the wrong hands.

ADC/DAC

- Sensor measures analogue data
- Computer works with digital data

Online Banking

Disadvantages to customers

- Lack of socializing/ social contacts
- Identity theft/misuse of personal data
- Customers must have a computer/Internet access/(basic) computer skills
- Hackers may intercept data and defraud customer
- Cannot deposit/withdraw cash/money
- More vulnerable to phishing

Disadvantages to bank

- Lose older customers who don't like change
- Initial set up costs of equipment/ Initial outlay on computers expensive
- Need to employ highly paid technical experts to maintain system
- Greater risk of fraud so lose money/description of effects of phishing
- Need to retrain staff

Why computers are used in monitoring

- Will not take breaks/can operate continuously (not constantly)
- Fewer mistakes/greater accuracy
- More than one variable can be measured at any one time
- Readings can be taken more frequently
- Results are analyzed automatically/faster to react/charts are produced automatically
- More reliable/readings taken at regular intervals
- Experts are free to do other tasks

Verification and Validation

- Validation is checking data is reasonable
- Verification is checking data has been correctly copied from one medium to another
- Verification and validation does not check that data is correct
- Verification can be carried out by a user
- Validation is always carried out by a computer
- Verification picks up errors that validation doesn't
- Validation picks up errors that verification doesn't

Burglar Alarm System

- Inputs:
  - Pressure pads
  - Light sensors
  - Sound sensor
  - Infra red sensor/proximity sensor
  - Motion sensor/movement sensor
- Processing:
  - Microprocessor continually monitors sensors.
  - If light sensor detects light beam interrupted:
  - If movement sensor activated:
  - If sound sensed by processor is greater than preset value:
  - Microprocessor sends signal to output device.
- Outputs:
  - Alarm light flashes/lights come on
  - Alarm sounds
  - Signal automatically sent to police

Online Shopping

- Customer – advantages
  - Elderly/Disabled people don't have to travel to shop/leave home
  - Don't have to spend money on travelling expenses travelling (long distances to shops)
  - Greater choice of goods
- Customer – disadvantages
  - Lack of socializing/social contacts
  - Customers must have a computer/Internet access/(basic) computer skills
  - Cannot see/feel goods in reality
- Shop – advantages
  - Fewer staff needed/less spent on wages
  - Fewer shops needed/less spent on rates/rent
  - Potentially larger customer base
- Shop – disadvantages
  - Initial outlay on computers is expensive
  - Need to retrain staff
  - Greater costs due to more delivery staff

Analysis stage

- Interview
  - Can change questions in light of previous answers/interviewer can detect body language
- Questionnaire
  - Quicker to get every worker's response/easier to collate responses
- Examining documents
  - Can see exact details of inputs and outputs
- Observation
  - Easier to see data flow/can get more accurate overview of whole system

Why are models used?

- Real thing might be dangerous, model is less dangerous
- Saves expensive mistakes in the construction real thing/cost of rebuilding/repairing is expensive
- Real thing may waste raw materials/natural resources
- It may take a long time to obtain results from the real thing
- Easier to modify
- Extremes which can't be tested in real life can be tested using models

Verification

- Double entry
  - computer compares the two versions
- Visual checking
  - Typed in data is compared with original data

Researching on the internet

- Drawbacks:
  - Not all information is accurate
  - Some information is purely for advertising/selling purposes
  - Anyone can put information on the Internet
  - Much of the information on the Internet is not filtered
  - Need to identify the validity of the author
  - Need to be careful about whether information is fact or opinion
  - Information can be biased
  - Results from search engine could be skewed because of sponsorship/marketing
  - Internet is not policed
  - So much information available which might be unreliable

- Benefits:
    - Wide range of information to select (desirable/reliable information)
    - Able to search quickly (using search engines) to find (reliable/desirable) information
    - Information can be downloaded and edited (to make it desirable/reliable)
    - Can use the final part of a URL to identify reliability
    - Information can be up to date/real time so reliable
    - Can compare information from sites to see if it is reliable

GUI and CLI

- A graphical user interface has icons to help the user identify applications/folders
- A GUI has a system of menus to help the user choose options
- A GUI has windows to enable user to multi task
- A GUI has a pointer/pointing device to help navigate around the screen/to click to open files/software
- A CLI only allows you to type in commands
- With CLI syntax has to be precise
- Commands difficult to edit once entered
- Have to learn a lot of commands exactly/have to be familiar with the commands

Video Conferencing

- Advantages
    - Workers can use own office so documents do not get lost in transit/bulky documents/equipment do not have to be carried around
    - Company can call meeting at short notice
    - Employees can work from home
    - Company does not have to pay travelling expenses
    - Company does not have to pay hotel expenses
    - Company does not have to pay for conference room facilities
    - Travelling time is saved
    - Might be dangerous to fly/travel
    - Disabled people may find it difficult to travel
- Disadvantages
    - Takes time to train employees
    - Difficult to call international meetings because of time differences
    - Initial cost of hardware
    - Equipment can break down
    - Strength of signal/bandwith/lipsync can be a problem/connection can be lost/power cuts
    - Takes time for workers to learn new technology

- Hardware required
    - Web cam/video camera to input/capture video (images of participants/
    - documents)
    - Router/modem to transmit data to participants' (computers)
    - Microphone to input voices of participants/to speak to other participants
    - Headphones/speakers to output voices to participants/hear other participants
    - Large screen/projector to see other participants
    - Router to connect to internet
    - Codec to compress data

Difference between Intranet and Internet

- Internet - INTERnational NETwork
    - Is a Wide Area Network (WAN)
    - Can access it from anywhere
    - Greater amount of information available
    - Unlimited access
- Intranet - INTernal Restricted Access NETwork
    - Usually a Local Area Network (LAN)
    - Password controlled pages
    - Behind a firewall
    - Can set up specific information pages on Intranet systems
    - Can limit the places where users can go to study
    - No wasted time looking through millions of resources
    - Intranet is better protected for use of emails/from viruses/from hackers

Expert systems

How is an expert system created?

- Data is gathered/collected from experts
- Knowledge base is designed/created
- A user interface is designed/created
- The inference engine is designed/created
- The rules base is designed/created
- The system is tested

Describe the inputs, outputs and processing of this system

- Interactive user screen appears
- Questions about geological profile/engine type/medical problems are asked
- Answers to questions are typed in
- Inference engine searches
- Searches the Knowledge base
- using the Rules (base)
- Suggested probabilities of finding oil/engine problems/medical issues are output using
- Detailed Output format

Chip and PIN Systems

- Card details checked for validity
- PIN is entered
- PIN is read from chip
- Numbers compared
- If identical transaction is authorised
- If not identical transaction refused
- Customer bank contacted by computer/automatically
- Check if enough funds in account
- If card invalid/insufficient funds then transaction is rejected
- If card valid and sufficient funds then transaction is authorised
- Money deducted from customer account
- Money credited to supermarket account

Input screens

Features of a well-designed input screen

- Data fills the screen
- Clearly defined input area for each record
- Appropriate spacing for each field
- Back button/arrow/previous record facility
- Forward button/arrow/next record facility
- Submit button/facility
- An easy to read font/font size/
- A sensible font colour/background colour
- Easy to follow instructions for completing screen/help icon
- No overlapping of items
- Exit button/return to homepage button/facility

Example of designing an input screen

- All fields included
- Appropriate spacing for all fields
- Buttons to go forward/backwards
- Screen filled/not too much white space
- Data has text boxes for completion
- Date of birth is a drop down list
- Gender field has radio buttons for male/female/tick box/drop down
- Button to save data

Testing strategies

- Testing each module with normal/live data/user testing
    - To see how system behaves in an ordinary day to day situation/system works as you would expect i.e. no error messages/to ensure system meets the needs of the user
- Testing each module with abnormal and extreme data
    - To see how system reacts in unusual circumstances/to make sure error messages appear when data is abnormal
- Testing whole system
    - To ensure the whole system works when all modules are combined

What is live data and how is it used?

- Data that has already been used in the previous system
- Data that has known results
- A table of expected results is drawn up
- Live data is input to the system
- Actual results are recorded
- The results are compared
- Any resulting differences will highlight limitations of the system

Advantages and Disadvantages of the Internet

- Advantages:
    - Only one printer/scanner is needed
    - Data can be shared between computers/data can be accessed by one computer from another more easily
    - Software can be shared
    - All computers can access the internet through one connection
    - Network games can be played

- Disadvantages:
    - Viruses will be more easily spread
    - All computers would now be susceptible to hackers
    - If all computers are using the internet at the same time there will be speed issues

Travel agent – booking system

- Departure airport typed in
- Arrival airport/destination/country typed in
- Date of departure typed in
- Duration of holiday typed in
- Computer database searches for matching departure airport
- If match found
- Computer database searches for matching arrival airport
- If flight on correct date found
- Search if seats/tickets available
- If so marks seat as booked
- Reduces number of seats/tickets available by one
- Prints flight details

Discussing implementation

- Parallel running/implementation
    - Information is not lost/always a second copy
    - Have to pay two sets of workers
- Phased implementation
    - Still have most of system if things go wrong
    - No expense of running two systems together
    - Lose some data if things go wrong
- Direct implementation/changeover
    - Time is not lost
    - Do not have expense of running two systems together
    - If things go wrong lose all data
- Pilot running
    - Pilot/phased/parallel are slow methods of implementation

Communication methods

- DTP:
  - Advantages
    - Disabled people / elderly people do not have to go to the library
    - It can be printed in Braille
    - You can read it at a time which suits you
  - Disadvantages
    - Need for physical distribution
    - No sound
    - No animation
    - No video
    - Printing costs/paper and ink costs
- Presentation:
  - Advantages
    - Sound
    - Animation
    - Video
    - Interactive / hyperlinks
  - Disadvantages
    - Library will need to have screen / computer / appropriate software
    - Not everyone will visit the library / takes time to go to the library / costs money to travel to the library / may not get information to every household / may not be seen by everyone

Communicate using ICT systems

- Fax
  - Advantages
    - Can be used as a legal document
    - Documents can be very long
  - Disadvantages
    - Cannot be certain if correct person has received it
    - Very slow transmission rates
    - Not very good quality
    - Documents cannot be edited easily
    - Cannot send multimedia files
    - Won't be received if line is busy/receiving fax machine switched off/out of paper
    - Wastes/expense of ink/paper

- Email
    - Advantages
        - Can be confident message will only go to the correct person (if addressed correctly)
        - Fast transmission times
        - Attachments can be downloaded and edited
        - Easier to send large documents
    - Disadvantages
        - Can be slow turnaround times
        - Some systems have limits to size of attachments
        - Addresses more difficult to remember than phone numbers
        - Description of how phishing can occur
        - Description of how viruses can be transmitted
- Bulletin boards
    - Advantages
        - You don't need an ISP
        - Messages can be moderated
        - Automatically creates an archive
    - Disadvantages
        - Lack of privacy (every member of the group can see every message)
        - In older systems only one person can be online at one time
        - Doesn't alert you to incoming messages
        - One mark available for reasoned conclusion

Labor saving devices

- Advantages:
    - Microprocessor controlled devices do much of housework
    - Do not need to do many things manually
    - Do not need to be in the house when food is cooking
    - Do not need to be in the house when clothes are being washed
    - Can leave their home to go shopping/work at any time of the day
    - Greater social interaction/more family time
    - More time to go out/more leisure time/more time to do other things/work
    - Are able to do other leisure activities when convenient to them
- Disadvantages:
    - Can lead to unhealthy eating due to dependency on ready meals
    - Can lead to laziness/lack of fitness

Items include in file structure designed

- Field name
- Field type
- Key field
- Field length
- Validation check/rules