Chapter 6 :

A school is setting up a new computerised system to manage many aspects of the school administration.
(a) Describe how this system can be used to manage student registration and attendance.

Student scans a card // teacher records the student as present on computer system
System records time of arrival
System sends the data to the school administration database
The data is searched in the database
If student arrives after a certain time the student's attendance record is flagged as late/absent
Attendance/lateness records are automatically printed/sent to parents
Letters/texts are automatically sent to parents to show absenteeism/lateness of students
Parents can logon to the system to check student's attendance/lateness records

(b) Benefits :

The information is more up to date
Information about the student can be obtained quickly after fire/emergency
Information regarding patterns of absence can be found quickly
Helps to tackle truancy/lateness
Parents can be informed automatically about patterns of lateness/attendance
Lateness is entered consistently in the school
Automatic lateness reports for the form tutor can be generated
Accurate/up to date records if there is a fire
Speeds up the process as attendance is not marked manually

Why do we need an ADC:
The sensors read analogue data
The computer reads digital data
The data needs to be converted from analogue to digital

The manager is checking stock on the shelves and in the stock room. He notices that an item has run out of stock. The database shows that the number in stock is above the reorder level. Give three reasons why this could have happened.

The items could have been damaged and removed from the shelf
The items could have been stolen
The items could have been picked up, but they have not yet passed through the till
The staff/customers placing the items on the shelves may have put them in the wrong place.
The quantity of items on the database may not have been recorded properly
Database may not have been updated

Advantages and disadvantages of online booking systems :

Benefits
Faster booking system as there is no need to contact individual departments
Bookings can be made last minute
24/7 booking
The bookings can be easily checked on the internet
Easier to cancel/change a booking
Faster to cancel/change a booking
Easier to book in other medical facilities
Multiple bookings can be made for different medical units
Email/text reminders
More convenient can book from any device/on the move
Automatic confirmation of the booking
Less time spent on the phone therefore freeing up the system
Less staff needed at the medical units therefore cheaper
The bookings can be planned easily in advance
Reminders can be sent via email/text therefore reducing cost of posting them
Repeat appointments can be made automatically therefore saving time
Frees up staff to do other things
Reduced the patients that do not show up as reminders sent this saves money

Drawbacks
Fear of lack of privacy of the data
Fear of lack of security of data
If the system goes down the ability to book an appointment is lost
Some people prefer to talk to a medical person
Medical emergencies may be overlooked
Cost of making the system secure
Cost of maintaining/setting up the system

Describe how GPS systems work:
The position/location of the player is calculated using GPS software
Data is transmitted/sent to the pitch side computer every few seconds
Algorithm calculates the speed/distance player has moved
The data is stored/saved in the computer
The coordinates of the player are shown onto the map of the pitch

Advantages and Disadvantages of Drones :

Drawbacks
Max **five** marks:
Drones can break down due to chemicals in the gas cloud
The chemicals/heat/dust can corrupt the readings of the sensors
The drone may have to fly a long distance to reach the gas cloud and run
out of fuel/battery/signal
Navigation can be affected by the gas cloud
The cost to buy/setup the drone is expensive
Need a skilled operator therefore more expensive

Benefits
Max **five** marks:
The results are collected faster
More accurate results produced
Results are processed automatically
Graphs and charts can be produced automatically
The drone can get closer to the cone than a human
Safer as humans do not need to risk lives taking the measurements
Drones can operate continuously/24/7
Drones can analyse the data continuously
Readings can be taken more frequently
Multiple variables can be monitored at the same time
Can operate in areas that are not accessible/dangerous to humans

Describe some ways digital cameras can be used which would cause people to think that their privacy is being invaded.

Digital cameras could be placed in drones
They can be hidden in ATMs
Digital cameras can be used in special glasses
Digital cameras are used in CCTV/Security cameras
Digital cameras are in people's mobile phones

Max **five** from:
They can be used to film people without them knowing/without permission
The photographs/images can be used for blackmail
They can be used to film people covertly
Digital cameras can be hacked and used to spy on the users
Filming vacation activities without permission/filming a car accident
They can be used to photograph houses without the owners knowing
They can be used to capture PINs

How are frequencies identified :

The traffic signals have a radio-frequency reader/scanner
The reader sends out radio signals to the chip
The RFID reader extracts data from the RFID chip
The scanning device/reader provides energy/activates so that the chips can
broadcast the information in them to the reader
The scanning antenna sends out radio-frequency signals in a relatively short
range
It provides a means of communicating with the RFID chip (in the
ambulance)
The reader sends data to the computer/microprocessor/actuator
The data is compared with data stored in the database

Advantages and Disadvantages of RFID

Advantages of RFID
Not affected by the weather – must be qualified
All ambulances need to register their number plates so if one arrives from
out of the area it could cause problems
Does not need a live connection to a database of number plate numbers
RFID more accurate – less likely to be misread // not all number plates can
be read by recognition systems
Line of sight not required

Max **three** from:
Disadvantages of RFID
Signals may affect other electronic equipment in the ambulance
Cost of fitting/maintaining to all ambulances
Difficult to use temporary ambulances // The chip needs to be present in the
ambulance for it to work

Robotic systems are now widely used in the production of cars. Describe the effects this has had on job
roles and working conditions in a car production factory.

Increased unemployment of manual workers/vehicle production line workers
May be opportunities to retrain/employment as maintenance workers of
robots
More pleasant atmosphere to work in/less noise
Workers are in a safer environment
Workers become deskilled
Job opportunities for job sharing/part time

Describe how food items can be ordered by an automated stock control system so they are delivered before the stock in the supermarket runs out.

Each item is scanned/bar code is read at the POS terminal
Bar code is searched in the database
The quantity of products is reduced
The stock database is updated
When the minimum stock number/level/reorder level is reached
Reads re-order quantity
Goods flagged as ordered
The automated stock system sends a signal to the warehouse computer to order new items
The warehouse sends the items to the supermarket
Re-order quantity is found in the database
Flags removed
The stock control system updates the stock levels in the stock control database with the new stock

Discuss the advantages and disadvantages to the hospital of using robots within this environment rather than using humans to carry out the task.

Advantages
Robots can work in environments where humans would have difficulty i.e. cooler and less light
Can work without breaks/non-stop/can work 24/7
Less expensive in the long run
Overall wage bill is reduced as there are fewer workers
Productivity is higher
Less mistakes are made/more accurate
Allow humans to do more skilled work than picking the tablets
Greater consistency

Any **four** from:
Disadvantages
Expensive to maintain (only if Less expensive in the long run has not been given)
Expensive to purchase/set up
Replace labour, leads to increased redundancy payments
If the bar code damaged the human would read the number but robot cannot think for itself

Explain the advantages of using RFID chips in this scenario

Can be read at a greater distance
Don't need to be positioned in line of sight
Can be updated easier
Read at faster rate
More reusable/more robust
Larger storage capacity
Greater security
Cannot misread if RFID grouped together

Discuss the advantages and disadvantages of using online banking rather than other banking methods to the customer.

Due to laptops/tablets/smart phones banking can take place on the move therefore there is no need to go to a bank
Fewer banks are available to customers
Non IT literate user/ users without equipment will have less access to banking
Need to purchase a computer
Need internet/broadband connection
There is a chance of bank fraud due to devices being used
There is little physical money
Physical money cannot be withdrawn or deposited
Could mismanage account/make a mistake by pressing wrong button
Requires stable internet connection, to ensure is doesn't disconnect midway through a transaction
Available 24/7
Available anywhere your computer can get an internet connection
Saves customers money by not having to travel to the branch
Saves customers time by not having to travel to the bank or stand in queues.

Give three advantages of using an existing robot device rather than developing a new one.

More likely to be reliable as it is known that the device will work
It is cheaper than paying full development costs
It is quicker to get into operation as the device has been built
Lower maintenance costs as faults will be known
Lower costs for training staff

Discuss the advantages and disadvantages of sensors in relation to automobile journeys.

Advantages

Max **four** from:
- The journey becomes a lot safer as the driver uses the devices to help, whilst they focus on driving
- If the driver falls asleep then the car remains in control
- If the temperature is colder outside then the windscreen clears quickly
- The ABS stops the driver sliding on ice
- Automatic (full beam) lights stop other drivers getting dazzled
- Automatic lights (full beam) shows the road ahead in different conditions
- Cost of repair reduced as it tells the driver of problems immediately.
- The GPS can guide the driver on shortest/quickest route

Disadvantages

Max **four** from:
- The driver relies too heavily on the device and can become over reliant/You are legally responsible for the car
- The device may fail and put the driver/pedestrians in danger
- Sometimes the device is more of a hindrance than a help e.g. parking sensors in traffic jams
- Can increase the price of the car
- Very difficult for the driver to repair the car himself
- GPS can take the driver a long way out of his way when trying to avoid hold ups
- The driver can believe the GPS and drive into the river/narrow road.
- Air bags can accidentally trigger is there is a small collision/they have a life span
- Excessive number of devices/devices left activated can lead to battery drain

Describe three benefits of the doctor using an expert system to help diagnose a patient's illness.
An expert system may help the doctor make a more accurate diagnosis
An expert system uses data from many experts therefore it contains more knowledge than a single doctor
Cheaper than regularly re-training the doctor
The expert system's knowledge may be more up to date than the knowledge of a single doctor
Cheaper than employing many specialists
The diagnoses given are more consistent

Describe the advantages and disadvantages of grocery shopping using the internet rather than other methods.

Advantages
Saves time rather than travelling to the shops/No waiting in queues therefore saves time shopping
Saves cost of travelling to the shops
Orders can be repeated at the touch of a button
Schedule in advance/choose time for delivery
Can shop worldwide
Shop 24/7
Shop from anywhere there is an internet connection
Overall wage bill decreases
Smaller/fewer shops needed reduces costs
More customers from around world

Any **three** from:
Disadvantages
Extra costs for delivery/tax
With fruit and vegetables customer cannot choose the ripest/best goods
Takes time to order
Problems if items are forgotten/alternative goods delivered
Need a computer/device and stable internet connection
Need online payment method
Takes time to deliver
Need to be in when the goods arrive
Loses loyalty
Increased delivery drivers (therefore more expensive)

Describe the computer processing involved when a book is borrowed using this system

Converts the image of the thumbprint into a code
Searches for the code in its database…
…until a matching record is found
…or error returned
Reads the number of books from the borrowers record/on loan
if less than 6 transaction continues…
…otherwise error message produced
Searches the books table for the book code data
…until a matching book record is found
…flag as book as being borrowed
…produces error message if no match
Updates the borrowers table
Updates the books table

A theatre uses an online booking system to allow customers to book specific seats for its performances. A customer has loaded the theatre website. Describe the inputs and outputs of such a system before the customer pays for a ticket.

A list of performances/shows is displayed
Customer selects a performance/show
A list of dates/times is displayed
Customer selects a date/time
A plan of the seats are displayed
A customer selects the number of seats to book/number of people
A customer selects the location of the seats
Displays the payment page/shows the booking information
Customer selects checkout

Contactless debit cards are replacing standard debit cards. Some countries are introducing contactless debit card transactions at ATM machines. Discuss the advantages and disadvantages to the bank of using these cards at an ATM.

Disadvantage
The cost of producing new cards
The cost of producing new readers
The cost of re-writing the ATM software
They are liable to fraud therefore compensate customers...
...Increasing costs
Less money removed at transaction therefore potentially more small transactions
...Increased administration
...Increased hardware use

Five from:
Advantage
The cards last longer as they are not in contact with the machine
Attracts new customers
Reducing the cost of replacement cards
Reduction in fraud as less money taken out
Cards not retained therefore less cost for replacements
The transactions are faster

Identify the four components of an expert system.

Knowledge base
Inference engine
Rules base
User interface

A person wishes to use telephone banking without speaking to an operator to transfer money from one bank account to another. Describe the steps needed to do this.

User telephones the bank telephone centre
System asks for the long number on the credit / debit card / sort code ar
account number / customer ID number
The user taps out on the phone keypad / speaks the number
System asks for certain characters in a password
The user taps out the characters asked for
System rejects the password
The user re-enters the characters
After three attempts the telephone connection drops
System asks other security answers
The user taps it in / speaks the answer
System asks which service you require / options given
Users tap in the number (transfer from one account to another)
System asks number of account transfer from
User taps in account number
System connects with the bank account
System asks for number of account transfer money to
User taps in account number
System asks amount to transfer
User taps in the amount
System asks when the transfer should happen
The user taps in the date
System ask you to confirm it/sends a text message / send email

List four items of data found on a debit card which can be read by computer.

Sort code
PIN
Debit card number
Bank account number
Valid from
Expires end

Advantages of RFID :

More secure than a traditional passport as biometric measurement data difficult to forge
Counterfeits can be more easily identified than non-RFID passports
More rapid flow at security check points/quicker than reading it manually

Name three components of an expert system.

Knowledge base
Rules base
Inference engine
Interactive user interface

Recently mobile phones have been used to pay for goods in stores and supermarkets. One method of payment involves holding the phone close to a reader in the store. Discuss the advantages and disadvantages of this method of payment compared with other methods of credit/debit card transactions.

Advantages
Simple to use as all have to do is hold the phone by the reader
No swiping of a card so less damage to the card
Faster method than swiping the card
No PIN
No signature
Stops shoulder surfing
As the credit card does not have to be physically present it cannot be stolen
The credit card number is not used in transactions
…stores do not gain access to names and numbers
No tracking of the data as there is no card
Several cards can be stored and selected
Everyone carries a phone nowadays
Doesn't matter if you forget credit/debit card

Disadvantages
Need a compatible phone
Not available online
Stores need the reader
May be issues with connectivity as a phone is used
Hackers accessing the phone signal
Phones can run out of battery
There is a limit on how much can be paid
Older people may not have phones
More difficult for older people to use

Describe what is meant by a web-conference.

A conference held over the internet using TCP/IP connections
Examples webinars/webcasts/VOIP
Can be point to point (VOIP) or multicast
Allows text communication
Allows voice communication
Allows video communication
Uses a web browser

Give three reasons why computer models are used

Cheaper than building the real thing
Quicker to see results rather than building it
Safer than building the real thing
Easier to change variables in the model/can use what ifs

Describe how an expert system can be used to suggest car engine fault diagnoses.

Enter data into/use the interactive user interface
Questions are asked about the car engine fault
The user answers the questions/Yes or No answers to the questions are typed in
Further questions are asked based on the previous answers
The inference engine compares data
Compares data with that held in the knowledge base…
…using the rules base/set of rules…
…until it finds a match/matches found
System suggests probabilities/possible solutions
The explanation system explains how the solutions were arrived at

Name four pieces of information that the bank's computer may read from the bank cheque.

Bank/city/branch code/Acc Number for RBI/clearing centre/IFSC code
Cheque number/Unique coding number/UCN/transaction code
Account number
Amount
Account type (current/deposit)
Account holder's name/payee/drawer
Date written on the cheque

Describe what is involved in the clearing of bank cheques which the bank has collected in the course of the day

Using standard paper cheques
The cheques are sent to the clearing bank/centre
The amount is read using OCR
The city code/bank code/branch code/sort code/cheque number/account number is read using MICR
Sort the cheques into bank code order
The cheque is scanned using OCR and stored
Amount is written onto the cheque using magnetic ink

or

Using digitally image/scanned cheques
The cheques are sent to the bank clearing system/centre from a smartphone/ATM machine
Details of the amount and payee are sent electronically
The sort code/account number/unique coding number/UCN is encoded as text
The cheque details and encoded MICR are read using OCR and stored

For both methods
Check signature correct/cheque correct
Date of cheque is checked
Amount is checked
Payer recognised

benefits of smart technology
Smart technology devices can be used to turn on devices remotely....
...if you are coming home you can turn on cookers
...you can come home to a warm house by turning on central heating
Smart fridges can analyse food taken out of fridge so you can get a healthy diet
...also re-orders stock automatically
Smart washing machines stop washes if incorrect materials present in the wash
it new materials are produced then the washing machine can analyse the materials and tell you the correct dose of powder
if you want to watch up to date films then then TV can connect to the internet

drawbacks to smart technology
Over reliance on technology; if the device breaks down then it is difficult to use alternatives
If the device breaks it is more difficult to repair
Personal data can easily be hacked through internet connected devices
...personal data easily found
...wifi key easily found
If controller/smart phone lost/stolen the devices may not work in the home
New technology is expensive
Too many gadgets
reliance on internet connection.

Describe how a satellite navigation system (sat nav) in a motor vehicle would calculate the quickest route from A to B.

Destination B is input by driver
Position of motor vehicle at A is calculated using GPS…
…using data transmitted from 3/4 satellites
Algorithm calculates shortest distance from A to B (going through C)
Algorithm calculates distance from A to B not going through C
Makes allowances for traffic in town C
Takes into account average road speeds…
…using traffic/speed sensors on roads
Takes into account regular updates of traffic conditions
Takes into account max. speed on the road/type of road

Describe how RFID technology reads the details from the chip.

The chip is presented near a computer with a radio-frequency scanner
The scanning antenna puts out radio-frequency signals in a relatively short range.
It provides a means of communicating with the transponder/the RFID tag
The scanning device provides energy…
…so that the chips can broadcast the information in them…
…for the computer to read.

Describe the processing involved in a computer controlled burglar alarm.

Computer checks the input from the user is authentic.
Computer is programmed with pre-set values.
Computer reads data from the sensors.
If the light sensor is activated…
If the contact switch is activated…
If pressure greater than pre-set value…
If sound greater than pre-set value…
If temperature greater than pre-set value…
If the movement sensor is activated…
Computer sends signal to sound the alarm.
Computer sends signal automatically to the police station/alarm company/security company.
Computer sends signal the flashing lights/house lights.
Computer sends message/text/calls automatically to the owner.

Describe how an Electronic Number Plate Recognition System works.

the system has cameras/CCTV
The images and the text from the number plate are captured by the camera
Infrared lighting is used so it can be used in all weathers/at night
The system uses optical character recognition
The licence/number plate is checked against its database to find the car owner's details

Describe web-conferencing and how it could be used in this scenario.

Real time collaboration/communication
Multiple users are connected to the internet.
See the same screen at all times in their web browsers
Allows: texting, for example of the car details
VOIP, for example, the delegates discussing the car range
Full motion video to show the car being test driven

Expert system :

Enter data into/use the interactive user interface
Questions are asked by the system
The user answers the questions
With yes or no answers
Further questions are asked based on the previous answers
The inference engine compares data
Compares data with that held in the knowledge base…
…using the rules base/set of rules
System produces probabilities/possible types of animal

Describe three drawbacks of setting up and using video-conferencing

Power cuts/load shedding…
…can lead to parts of the video-conference shutting down.
Lip sync problems/time lag…
…this means that the picture is not running at the same speed as the sound.
Need to consider time zone implications of when to hold the video-conference…
…some participants may be video-conferencing outside of work hours/in the night.
Initial cost of hardware/software…
…expensive to buy extra hardware and software
Needs reliable internet access…
…otherwise the video-conference will suffer interference/break down of signal.
Difficult to stop them all talking at once/manage contributions…
…if more than one person talks at once it is difficult to hear what is said.
Difficult to manage the video-conference starts on time…
…due to time differences/setting up issues.
Difficult to keep participants on task…
…they are not in the same room so could be doing other things/not concentrating.
Increased cost/time of training staff…
…The host of the conference would need training/participants may need training.
Cost/time of technician/support staff…
…the support staff will need to be on hand in case of problems.
Document cannot be signed…
…there will be only one copy of the document.
Physical objects cannot be examined…
…this would need to be set up before the conference which takes time.

Uses of expert system

Oil prospecting/rock classification
Medical diagnosis
Car engine fault diagnosis
Chess
Tax systems

The weather station continuously monitors the sensors on the weather balloon. Describe the monitoring process

Data is read by the sensors.
The data is converted to digital data/using the ADC.
The data is sent to the microprocessor/computer (in the ground base unit)…
…using a satellite link.
…by radio waves.
Graphs/results are automatically produced by computer.
Graphs are plotted against time.
Data is saved in the computer for later use.

Discuss the advantages and disadvantages to the store of customers using internet shopping.

Advantages:
An online shop costs less to set up and run.
Reduced overheads in an online shop
Reduced cost on wages as less shop staff needed
Customers can be better targeted…
…for example: It's also much cheaper, for example, to send a marketing message by email to 1000 customers than it is to send 1000 newsletters by post.
A local business can become nationwide or even international.
An online shop can be updated instantly and as often as you like…
…for example, to promote a 'deal of the day' on your front page, without the need for expensive printed display material.
Can target products and services at specific groups based on buying data.
Business can be promoted through search engines.

Disadvantages:
In order for an online shop to work it needs constant development.
Shops need to understand tax and import/export issues if they become international.
Need to re-train staff to use the online system
The cost of setting up/maintain a website
Costly to re-train
Drop in customer loyalty therefore fewer customers
Need to pay more delivery drivers
Need to buy more delivery vehicles to deliver goods to customers

Describe the inputs and processing involved in booking tickets online for a music event.

Uses transaction/online processing for booking seats/tickets
The customer enters the number of seats/tickets they want.
The customer selects the performance they want.
The customer selects the time of the performance they want.
The customer selects the date of the performance they want.
Computer searches database to check for availability of seat.
Customer selects seat/ticket.
Customer confirms seat/ticket.
Seat marked as unavailable
Customer enters contact details.
Customer enters payment details.
Seat/ticket booked in customer's name
booking reference is generated.
bar code/QR code/e-ticket generated
transaction completed

Identify four uses of online booking systems.

Air flight tickets
Theatre tickets
Holiday booking
Cinema tickets
Rail tickets
Hotel room booking
Restaurant table/seat booking
Football match booking
Concert/performance booking

There are many microprocessor-controlled devices used in the modern home. Describe benefits and drawbacks in terms of lifestyle for users of such devices.

Microprocessor controlled devices do much of the 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
Can encourage a healthy lifestyle because of smart fridges analysing food constituents
Do not have to leave home to get fit

Can lead to unhealthy eating due to dependency on ready meals
Can lead to laziness
Lack of fitness/exercise
Manual household skills are lost

Describe the computer processing which takes place at the ATM.

The bank account details are read from the chip
The (ATM) checks to see if the card is valid
The customer is asked which language/currency they require
The customer is asked to type in their PIN
The typed PIN number is compared with that stored in the chip…
…if they are the same the transaction proceeds
…if they are not the same the customer is asked to re-enter PIN
If three failed attempts transaction rejected and card withheld
The customer is asked which service is required
Customer is asked if they want a printed balance/onscreen balance
If yes, signal sent to print balance/message sent to screen giving balance
The customer is asked if further services are required

Describe the computer processing which takes place at the bank's computer

Checks whether card is stolen/account number exists
Customer account number is searched
Balance field is read/is calculated
Message sent to ATM giving balance

Give three items of information that are pre-printed on the cheque in magnetic ink.

Account number
Bank/branch sort code
Cheque number

Explain what is meant by GPS.

Global Positioning System
space-based navigation system
typically four satellites must be visible to the receiver
calculates the distance from a receiver to the satellite
calculates the position of the receiver

used in cars to calculate routes
used by walkers to locate position on hills/mountains
used by runners to calculate distance run
used by farmers for tractor navigation/soil evaluation/livestock control/yield monitoring
used in satellite navigation systems for ships
used in tracking aircraft

There are many microprocessor controlled devices in the modern home. Discuss the effects of these on people's lifestyles.

Positive:
– microprocessor controlled devices do much of the 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
– can encourage a healthy lifestyle because of smart fridges analysing food constiti
– do not have to leave home to get fit

Negative
– can lead to unhealthy eating due to dependency on ready meals
– can lead to laziness/lack of fitness
– microprocessor controlled burglar alarm provides a sense of security
– manual household skills are lost

Describe how the computer would process the data into a form the student could use to analyse the results.

The sensor feeds back data to computer
Data is converted from Analogue to Digital
Readings are stored in a spreadsheet/software package
Graphs are <u>automatically</u> produced by computer…
…plotted against time
Calculations performed on spreadsheet to show rate of cooling
Graphs examined to see general overview of rate of cooling

Discuss the advantages and disadvantages to supermarkets of this development.

Initial cost of <u>hardware/software</u> is expensive
Fewer staff needed – less spent on wages
Fewer shops needed – less spent on rates/rent/utilities
Potentially larger customer base
Need to retrain staff
Less customer loyalty/loss of customers/more difficult to sell other services/products due to lack of personal touch
Costs of system maintenance
Greater costs due to more delivery staff/vans   **[6]**

Give three other examples of types of modelling.

Simulations
Mathematical models
Civil engineering models
Flight/pilot simulation/training
Design of fairground rides
Traffic control
Building fire simulation
Weather forecast models
Population modelling