Peripheral Devices - Homework

You should refer to the **homework policy** for details on how this homework should be submitted.

Attempt all questions.

Question 1

Explain how each of the devices listed below works. Include the main principles of how it works and include simple diagrams to illustrate relevant points. You should aim to have 8-12 points about how each device operates. Your spelling, grammar and punctuation will be assessed in your answers.

Barcode reader or scanner (**8 marks**)

- Barcode readers can be made up of a light source, a photo diode, and a simple decoder or complex CCD or camera based scanners.
- There are currently four different types of barcode scanners available, each using a slightly different technology for reading and decoding barcodes. These are pen type readers, laser scanners, CCD readers and camera based readers.
- Pen type readers consist of a light source and a photo diode that are placed next to each other in the tip of a pen or wand. To read a barcode, you drag the tip of the pen across all the bars in a steady even motion.
- Dark bars in the barcode absorb light and white spaces reflect light so that the voltage waveform generated by the photo diode is an exact duplicate of the bar and space pattern in the barcode.

- Laser scanners use a laser beam as the light source and typically employ either a reciprocating mirror or a rotating prism to scan the laser beam back and forth across the barcode.
- CCD (Charge Coupled Device) readers use an array of hundreds of tiny light sensors lined up in a row in the head of the reader. Each sensor can be thought of as a single photo diode that measures the intensity of the light immediately in front of it.
- Camera based readers use a small video camera to capture an image of a barcode. The reader then uses sophisticated digital image processing techniques to decode the barcode.
- Barcode readers are available with two types of output - either "keyboard wedge" output or RS232 output. The barcode readers with keyboard wedge output plug directly into the keyboard port on your PC and they also provide a pigtail connector so that you can plug in your keyboard at the same time. When you scan a barcode with the keyboard wedge barcode reader, the data goes into the computer just as if it were typed in on the keyboard.

Smart card reader (**8 marks**)

- The smart card is plugged into an ATM, pin reader or similar device, and the reader is in the ATM or the pin reader.
- When the card and the reader come into contact they send and receive information from each other.
- If the information doesn't match, no further information is processed to protect against unauthorized users.
- The reader provides a path for an application to send and receive commands from the card. There are many types of readers available, such as serial, PCCard, and standard keyboard models.
- The user inputs their request and pin into the ATM or pin reader, and the smart card reader accepts (or declines) the information and outputs the appropriate money, or withdraws the appropriate money.
- Smart card readers are available that interface to RS232 serial ports, USB ports, PCMCIA slots, floppy disk slots, parallel ports, infrared IRDA ports, and keyboards and keyboard wedge readers.
- Some card readers come with advanced security features such as secure PIN entry, secure display and an integrated fingerprint scanners for the next-generation of multi-layer security, and three-factor authentication.
- Readers can easily be integrated into a PC utilizing Windows 98/Me, 2000, or XP platforms. However, some computer systems already come equipped with a built-in smart card reader.

RFID reader (**8 marks**)

- Radio Frequency Identification.
- In a basic RFID system, tags are attached to all items that are to be tracked.
- These tags are made from a tiny tag chip, sometimes called an integrated circuit, which is connected to an antenna which can be built into many different kinds of tags including apparel hang tags, labels, and security tags, as well as a wide variety of industrial asset tags.
- The tag chip contains memory which stores the product's electronic product code (EPC) and other variable information so that it can be read and tracked by RFID readers anywhere.
- An RFID tag is comprised of an integrated circuit (called an IC or chip) attached to an antenna that has been printed, etched, stamped or vapor-deposited onto a mount which is often a paper substrate or PolyEthylene Therephtalate (PET). The chip and antenna combo, called an inlay, is then converted or sandwiched between a printed label and its adhesive backing or inserted into a more durable structure.
- The chip is pre-programmed with a tag identifier (TID), a unique serial number assigned by the chip manufacturer, and includes a memory bank to store the items' unique tracking identifier.
- The electronic product code (EPC) stored in the tag chip's memory is written to the tag by an RFID printer and takes the form of a 96-bit string of data.
- The first eight bits are a header which identifies the version of the protocol. The next 28 bits identify the organization that manages the data for this tag; the organization number is assigned by the EPCglobal consortium. The next 24 bits are an object class, identifying the kind of

product; the last 36 bits are a unique serial number for a particular tag. These last two fields are set by the organization that issued the tag.

Question 2

Name the most suitable storage medium for each of the following purposes.

Purpose	Device
Backing up a 20Kb file	USB Stick
Backing up 1Gb of data	USB Stick
Distributing a software package requiring 400Mb of storage space	CD
Transferring a 30Kb file from one stand-alone computer to another	USB Stick
An online database generated and used in the course of a police investigation of a major crime	Magnetic Tape Cartridge
Distributing an electronic copy of an encyclopaedia	DVD

(**6 marks**)

Question 3

A book lending library lends books to borrowers. Each borrower is assigned a unique borrower code. This code is encoded magnetically on to an identity card issued to each borrower when they join the library. The code is read from the identity card by swiping it through a machine connected to the library's computer system. The code is also printed on the card in human-readable form.

Image url: www.dropbox.com/s/sy0jg8i8o86h3kh/Peripheral_hw_qn2.png

Each book is allocated a unique book code. The book code together with other details are pasted on to the inside cover of the book as shown below. When a borrower borrows a book the book code is scanned into the computer system so that the loan can be recorded.

Image url: www.dropbox.com/s/1erfbpvxo5uczek/Peripheral_hw_qn2c.png

1. Name the type of machine used to read the *borrower code* from the card. (**1 mark**) Smart card reader

2. State one reason for having the human-readable form of the *borrower code* printed on the card. (**1 mark**) Because the user needs to have a unique code which can be recognised, to stop cards getting mixed up.

3. Name the device used to scan the *book code* into the computer system.

(**1 mark**) Barcode scanner.

Question 4

Figure 3 below shows a label removed from an item sold at a supermarket.

Image url: www.dropbox.com/s/6blgwt4lhjosbgz/Peripheral_hw_qn3.png

Figure 4 below shows a response form that customers of the supermarket have been asked to complete. The forms are processed using a computer system running a batch operating system.

Image url: www.dropbox.com/s/deyf1hq6v5whik2/Peripheral_hw_qn3a.png

1. What input device would have been used in the supermarket to read this label? (**1 mark**) Barcode scanner.

2. Name the most suitable input device to transfer the data on each survey form into a computer system. (**1 mark**) Text compatible scanner.

3. What is a smart card? (**1 mark**) A smart card is an device which holds information for a user, including bank details used to withdraw and deposit money safely without compromising. It has a magnetic strip which can send and receive information with the smart card reader.

Total 36 marks