



Victoria University of Bangladesh

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Computer Peripherals and
Interfacing
CSE-333
Final Assessment

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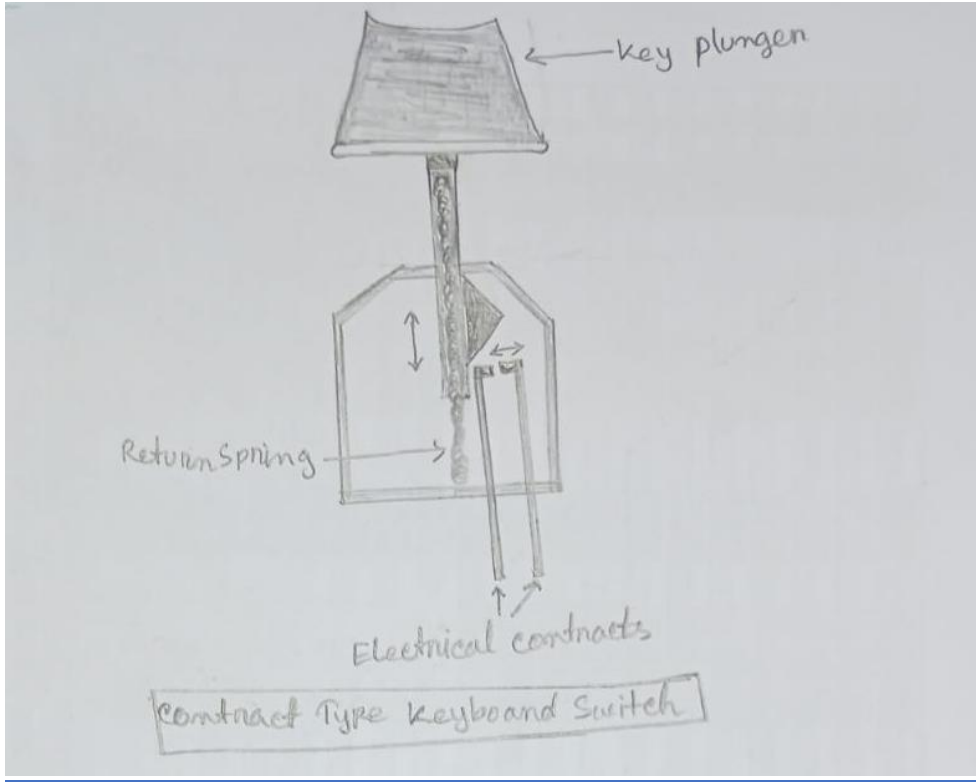
Answer to the Question No- 1 (a)

Keyboard - A keyboard is a bank of switches whose individual states can be detected by the computer system. It is a peripheral input device used to enter data and commands into a computer or other electronic device. It typically follows the QWERTY layout. Each key on a keyboard represents a specific character, symbol, or function.

The key components and characteristics of a typical keyboard -

- i) Keys.
- ii) Alphanumeric keys.
- iii) Function keys.
- iv) Modifier keys.
- v) Special keys.
- vi) Numeric keys.
- vii) Connectivity
- viii) Variations.

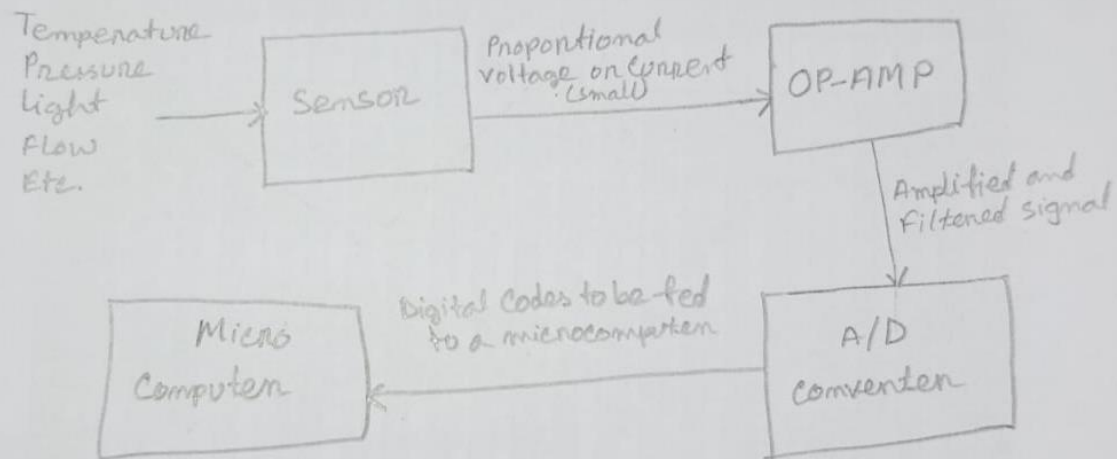
Contact Type Keyboard Switch Mechanism - Contact Type keyboard switches, also known as mechanical switches, widely used switches. Pressing the key plunger causes the contacts to touch and to produce a voltage. Key bounce - the contacts may bounce when the plunger is depressed giving the appearance of several rapid key depressions. This effect is known as key bounce. This must be eliminated by special circuitry which effectively ignores the key after its first depression for a very short period of time.



Answer to the Question No- 1 (b)

Analog Interfacing - It involves connecting and communicating between analog devices or sensors and digital systems, such as microcontrollers or computers. The basic concept of analog interfacing revolves around the conversion of continuous analog signals into digital representations that can be processed or interpreted by digital systems.

In order to control the machines in - Electronics Factory, Medical Instruments, Automobiles etc. we need to determine the values of some variables like pressure, temperature, light, flow etc.



Answer to the Question No- 2 (a)

Sensor - A sensor is a device or component that detects and responds to a physical, chemical, or environmental stimulus and converts it into an electrical or digital signal. Sensors are used to measure and monitor various parameters or conditions in the real world. They play a crucial role in collecting data from the physical environment and enabling the interaction between digital systems and the external world.

Sensor and Transducers - There are many different types of sensors and transducers available in the marketplace, and the choice of which one to use really depends upon the quality being measured or controlled, with the more common types given in the table below -

Quantity being Measured	Input Device (sensor)	Output Device (Actuator)
Light Level	Light Dependent Resistor (LDR) Photodiode Photo-Transistor Solar Cell	Light & Lamps LED's Displays Fiber Optics
Temperature	Thermocouple Thermistor Thermostat Resistive Temperature Detectors	Heater Fan
Speed	Tacho-generator Reflective/Slotted Opto-coupler Doppler Effect sensors	AC and DC Motors Stepper Motor Brake
Sound	Carbon Microphone Piezo-electric Crystal	Bell Buzzer Loudspeakers

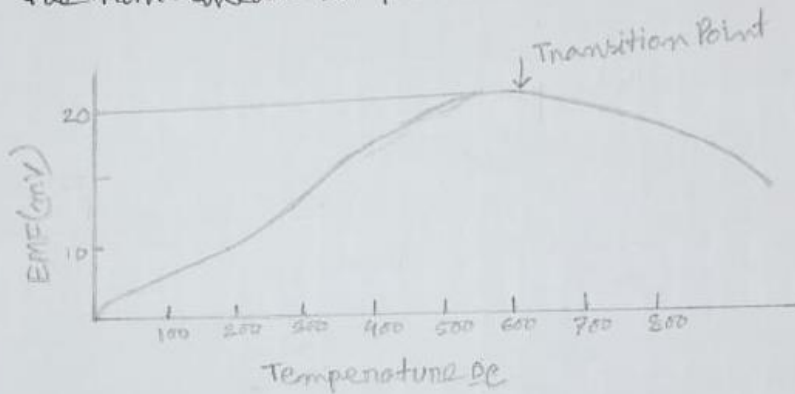
Answer to the Question No- 2 (b)

The thermocouple is an active sensor employed for the measurement of temperature. ~~All engineers are familiar with this unique sensor but few of them~~

Advantage of Thermocouple- One particular advantage of thermocouple is that the sensing elements themselves are very small, allowing thermocouples to be inserted into very small spaces and to respond to rapidly changing temperatures.

Disadvantage of Thermocouples

The shape of the typical characteristic is shown in below figure, from which we can see that the thermocouple is useful only over a limited range of temperature due to the non-linear shape of the characteristic.



The output from a thermocouple is small, of the order of millivolts for a 10°C temperature difference. Because of the small voltage output, amplification is usually needed unless the thermocouple is used for temperature measurement along with a sensitive millivoltmeter.

The main limitation is precision; system errors of less than 1°C can be difficult to achieve.

Answer to the Question No- 4 (a)

D/A application or Digital to Analog Converter (DAC) is a device that transforms digital data into an analog signal. According to the Nyquist-Shannon sampling theorem, any sampled data can be reconstructed perfectly with bandwidth and Nyquist criteria.

Applications of D/A -

Audio Amplifier: DACs are used to produce DC voltage gain with microcontroller commands. Often, the DAC will be incorporated into an entire audio codec which includes signal processing features.

Video Encoder: This system will process a video signal and send digital signals to a variety of DACs to produce analog video signals of various formats, among with optimizing of output levels. As with audio codecs, these ICs may have integrated DACs.

Display Electronics: The graphic controller will typically use a lookup table to generate data signals sent to a video DAC for analog outputs such as Red, Green, Blue (RGB) signals to drive a display.

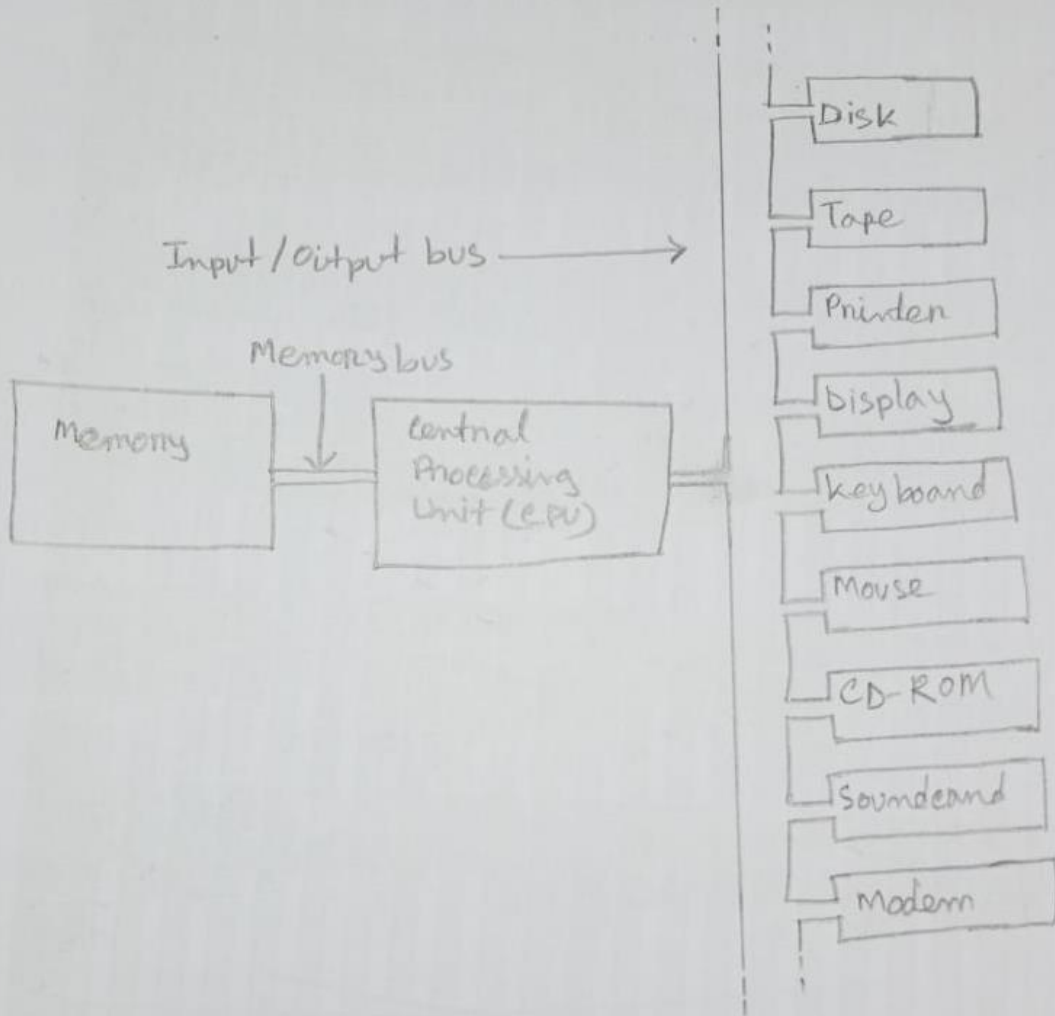
Calibration: The DAC provides dynamic calibration for gain and voltage offset for accuracy in test and measurement systems.

Motor Control: Many motor controls require ~~voltage controllers~~ "voltage control signals", and a DAC is ideal for this application which may be driven by a processor or controller.

Software Radio: A DAC is used with a digital signal processor (DSP) to convert a signal into analog for transmission in the mixer circuit, and then to the radio's power amplifier and transmitted.

Answer to the Question No- 4 (b)

Typical Computer System - Excluding CPU and memory all other input output devices connected with the computer systems are altogether referred to as peripheral devices.

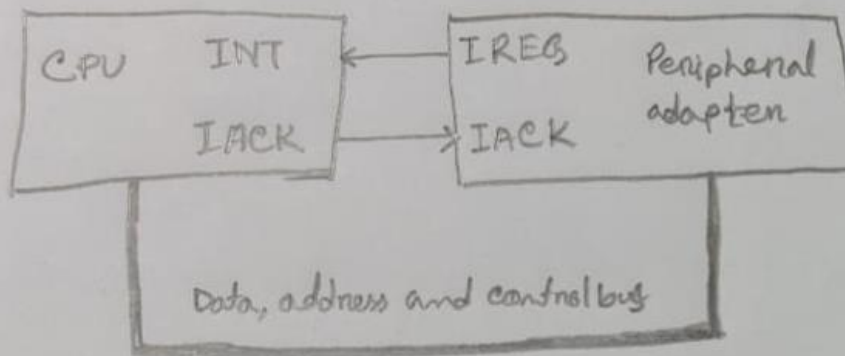


Answer to the Question No- 4 (c)

4(c)

Interrupt Acknowledgement - Interrupt requests are assumed to remain asserted until reset by instructions in the service routine, but this is not the most efficient technique. Until request is de-asserted it is not possible for another request to be seen. This may result in data from a fast peripheral being lost while service routine is getting around to clearing a low priority interrupt.

It could be better if the request could be cleared quickly after the request is noticed. To assist in this most computers have a signal (Interrupt Acknowledgement, IACK) generated by the CPU that is returned to the peripheral as soon as the interrupt is detected. This ~~clears~~ clears the interrupt request from that device and allows other devices to use the interrupt line.



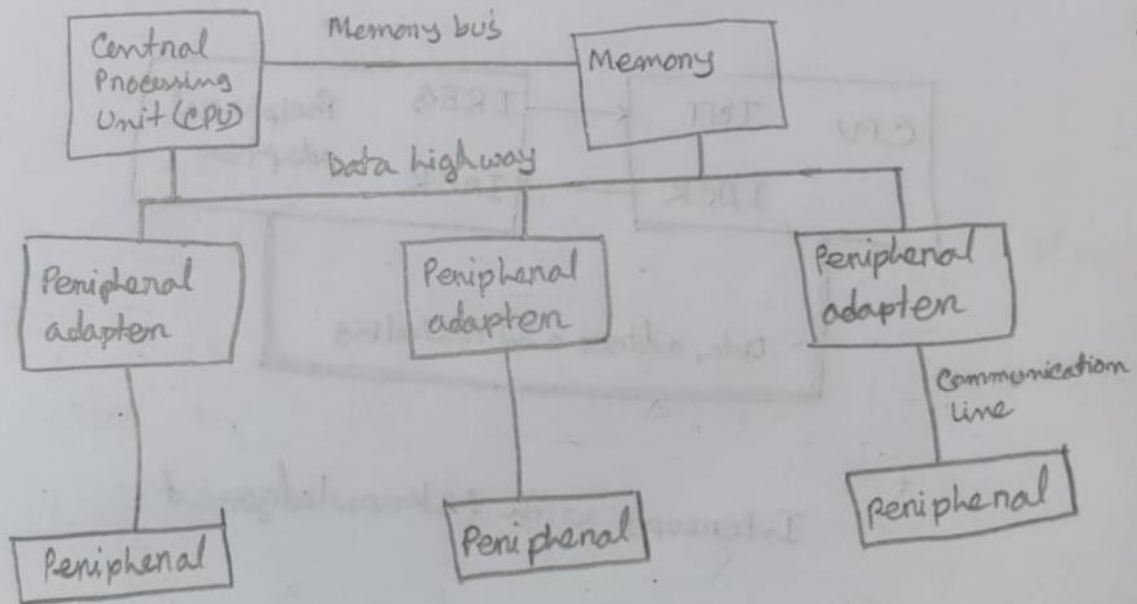
Interrupts with acknowledgement

Answer to the Question No- 5 (a)

Peripheral Adapter - Modern computers perform operations very much faster than most peripherals can generate or accept data.

Programs and data are moved between memory and the CPU at such a speed that it would be inappropriate to connect peripherals directly to the CPU. Some form of interface is required to convert between the fast internal communications and the relatively slow external devices.

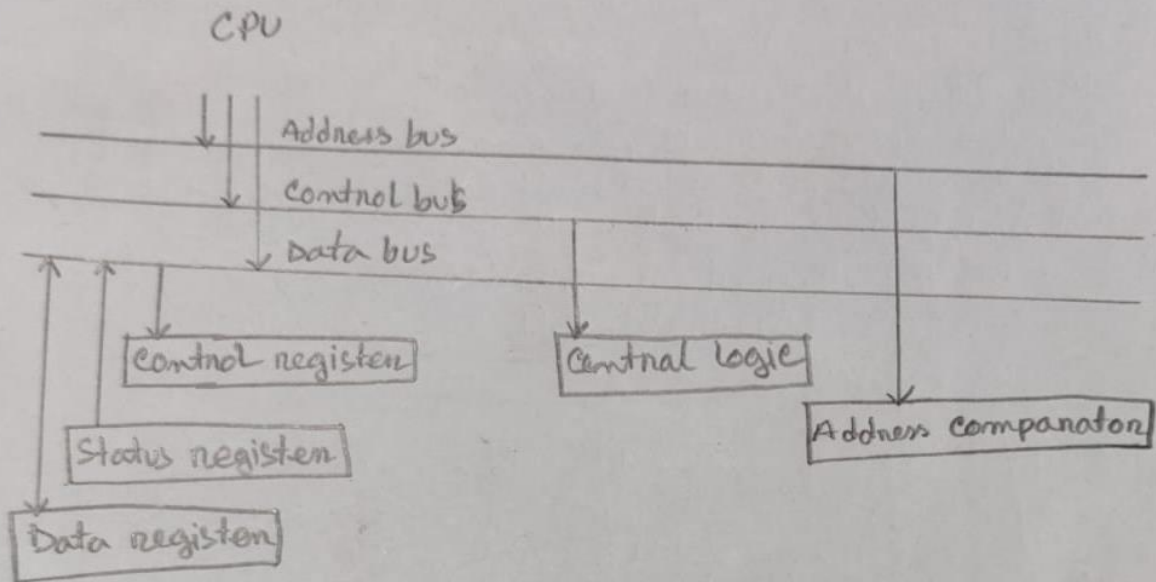
A peripheral adapter works as an interface between CPU (very fast) and a peripheral device (relatively slow) for data communication.



Components of a digital computer.

Data Highways- Data (including programs) are moved around the computer on a set of ~~wired~~ wires forming a data highway (Bus).

Address Bus, Control Bus, Data Bus.



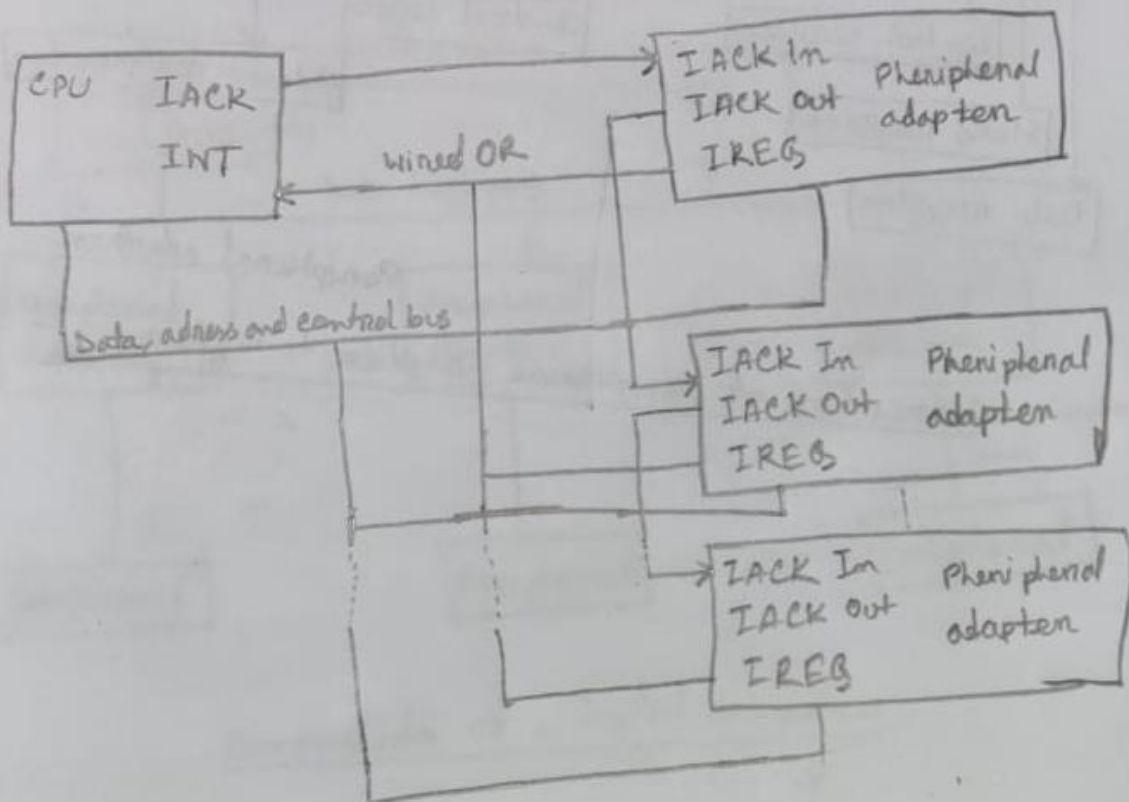
Peripheral adapter

Connection of peripheral adapter to highway

Answer to the Question No- 5 (b)

Priority Interrupts - Priority interrupts connection using daisy chain and interrupt acknowledgement it is possible to construct a simpler priority scheme.

In this scheme the CPU is able to determine priority not from the interrupt request but by which device the acknowledgement is sent to. In daisy chain fashion all the interrupt request lines are OR'ed together. The CPU IACK is connected directly to the highest priority device. So if more than one request has been made the highest priority device sees it first. If it ~~has~~ has not made a request, it passes the IACK along to the next device. This continues down to the lowest priority device which will receive an acknowledgement only if no other device has made a request.



Priority interrupts using a daisy chain

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