Question: Define Emedded system and write a note on classification of ES.

Solution:

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware an d mechanical parts. Embedded systems control many devices in common use today.

Classification of Embedded Systems:

1. Standalone Embedded Systems: These are the simplest type of embedded systems, which are designed to perform a single task. They are self-contained and do not require any external components or peripherals to operate.

2. Networked Embedded Systems: These are embedded systems that are connected to other devices or systems via a network. They can communicate with each other and exchange data over the network.

3. Real-Time Embedded Systems: These are embedded systems that must respond to external events within a certain time frame. They are used in applications such as process control, robotics, and medical equipment.

4. Mobile Embedded Systems: These are embedded systems that are designed to be used in mobile devices such as s martphones and tablets. They are typically designed to be power efficient and have low power consumption.

Question: Explain watch Dog timer in Embedded system. Answer in about 500 words.

Solution:

A watchdog timer (WDT) is a hardware timer that is used to detect and recover from computer malfunctions. It is an essential component of any embedded system, as it helps to ensure that the system is running correctly and can recov er from unexpected errors.

A watchdog timer works by periodically resetting a counter. If the counter reaches a certain value, the system will re set itself. This allows the system to recover from errors that may have caused it to become unresponsive. The counte r is usually reset by an external signal, such as a button press or a periodic interrupt.

The watchdog timer is typically implemented as a hardware timer, which is triggered by an external signal. The time r will count down from a preset value and if it reaches zero before being reset, the system will reset itself. This allow s the system to recover from errors that may have caused it to become unresponsive.

The watchdog timer can be used in a variety of ways. It can be used to detect and recover from software errors, such as infinite loops or deadlocks. It can also be used to detect and recover from hardware errors, such as power failures or communication link failures.

The watchdog timer can also be used to detect and recover from malicious attacks, such as denial of service attacks o r buffer overflows. In this case, the watchdog timer will detect when the system is not responding as expected and wi ll reset the system in order to prevent further damage.

The watchdog timer is an essential component of any embedded system, as it helps to ensure that the system is runni ng correctly and can recover from unexpected errors. It is important to configure the watchdog timer correctly in ord er to ensure that it works properly and does not cause unnecessary resets.

Question:
Write a short note on the following:
a) Clocking Unit

b) Reset Circuit
c) Universal Serial Bus.
d) RS 232
e) Power train domain in automatic

Solution: vehicles

a) Clocking Unit: A clocking unit is a device used to synchronize the operation of digital circuits. It is responsible fo r providing a steady stream of pulses, known as a clock signal, to the components of a digital system. The clock sign al is used to control the timing of operations within the system, allowing the components to work together in a coord inated manner.

b) Reset Circuit: A reset circuit is an electronic circuit that is used to reset a system or device to its initial state. It is t ypically used to ensure that the system or device starts up correctly and operates reliably. Reset circuits are commonl y used in computers, microcontrollers, and other digital systems.

c) Universal Serial Bus: Universal Serial Bus (USB) is a standard for connecting peripheral devices to computers. It is widely used for connecting keyboards, mice, printers, scanners, digital cameras, and other devices to computers. U SB also supports data transfer between devices and computers.

d) RS 232: RS 232 is a serial communication protocol used for connecting computers and other devices. It is commo nly used for connecting modems, printers, and other peripherals to computers. RS 232 supports data transfer rates up to 115200 bps (bits per second).

e) Power train domain in automatic vehicles: The power train domain in automatic vehicles refers to the components that provide power to the vehicle's wheels. This includes the engine, transmission, differential, and other related co mponents. The power train domain is responsible for providing the necessary power and torque to move the vehicle f orward or backward.

Question:
Explain the type of Programmable Logic Device and its advantage in embedded system. Answer in about 500 words.

Solution:

A Programmable Logic Device (PLD) is an integrated circuit (IC) that can be programmed to perform a variety of lo gic functions. PLDs are used in a wide range of embedded systems, from simple consumer electronics to complex in dustrial automation systems. They are used to reduce the cost and complexity of designing and manufacturing embe dded systems, as well as to increase the flexibility and performance of the system.

PLDs are typically composed of a number of logic elements, such as flip-flops, multiplexers, and gates. These eleme nts can be programmed to perform a variety of logic functions, such as Boolean logic operations, arithmetic operatio ns, and memory operations. The programming of the PLD is done using a hardware description language (HDL), suc h as Verilog or VHDL. This allows the designer to create a custom logic circuit that is tailored to the specific needs of the application.

One of the main advantages of using PLDs in embedded systems is their flexibility. Since they can be programmed t o perform a variety of logic functions, they can be used in a wide range of applications. This allows designers to crea te custom logic circuits that are tailored to the specific needs of their application. Additionally, since PLDs are progr ammable, they can be easily modified or updated if needed. This makes them ideal for applications that require frequ ent changes or updates.

Another advantage of using PLDs in embedded systems is their cost-effectiveness. Since they are programmable, the y can be used in place of more expensive custom logic circuits. This reduces the cost of designing and manufacturin g embedded systems, making them more affordable for consumers. Additionally, since PLDs are mass-produced, the

y can be purchased in large quantities at lower prices than custom logic circuits.

Finally, PLDs offer improved performance compared to other types of logic circuits. Since they are programmable, t hey can be optimized for specific applications, allowing them to run faster and more efficiently than other types of lo gic circuits. This makes them ideal for applications that require high performance or speed.

In conclusion, Programmable Logic Devices offer many advantages for embedded systems. They are flexible, cost-e ffective, and offer improved performance compared to other types of logic circuits. As such, they are an ideal choice for many embedded system applications.

Question:
Write a Program of 8051 using C to Toggle bits of P1 Continuously with some Delay.

Solution:

```
#include <reg51.h>
#include <stdio.h>

void delay(unsigned int x)  // Function for creating delay
{
 unsigned int i,j;
 for(i=0;i<x;i++)
  for(j=0;j<1275;j++);
}

void main()
{
 while(1)  // Infinite loop
 {
  P1 = 0xFF;  // Set all bits of P1 to 1
  delay(500);  // Delay of 500ms

  P1 = 0x00;  // Set all bits of P1 to 0
  delay(500);  // Delay of 500ms
 }
}
```

Question:
Write a note on 8051 Mirco Controller Hardware. Explain more than briefly.

Solution:

The 8051 microcontroller is a popular and widely used microcontroller developed by Intel in the 1980s. It is an 8-bit microcontroller, meaning it can process 8 bits of data at a time. It is based on the Harvard architecture, which means it has separate memory and data buses.

The 8051 microcontroller has four main components: the CPU, ROM, RAM, and I/O ports. The CPU is responsible for executing instructions and controlling the other components. The ROM stores the program code and data that the CPU needs to execute instructions. The RAM stores data that can be changed during program execution. Finally, th e I/O ports allow the microcontroller to communicate with external devices such as sensors, motors, and displays.

The 8051 microcontroller also has several features that make it attractive for embedded applications. It has a wide ra nge of I/O ports, allowing it to interface with a variety of external devices. It also has an on-chip timer/counter, whic

h can be used to measure time intervals or generate periodic interrupts. Finally, it has an interrupt system that allows it to respond quickly to external events.

Overall, the 8051 microcontroller is a powerful and versatile device that is well suited for embedded applications. Its wide range of features and low cost make it an attractive choice for many applications.

Question:
Explain Time delays in micro controller. Answer in about 500 words.

Solution:

Time delays in microcontrollers are used to control the timing of various operations within a system. They are used t o ensure that certain operations occur at specific times, or to create a delay between two operations. Time delays can be used to control the speed of a system, or to synchronize different parts of a system.

Time delays are implemented in microcontrollers using a variety of techniques. The most common technique is to us e a timer module, which is a dedicated hardware module that can be programmed to generate a time delay. Timer mo dules are typically used for short delays, such as milliseconds or seconds. For longer delays, such as minutes or hour s, software-based techniques are often used.

Software-based time delays involve writing code that will cause the microcontroller to wait for a certain amount of ti me before executing the next instruction. This can be done by using a loop that counts down from a certain number, or by using an interrupt-driven timer. Interrupt-driven timers are more efficient than loop-based timers, as they allow the microcontroller to continue executing other instructions while waiting for the timer to expire.

Time delays can also be implemented using hardware-based techniques. These techniques involve using external co mponents such as counters and timers to generate the time delay. These components can be connected directly to the microcontroller, or they can be connected via an interface such as I2C or SPI. Hardware-based time delays are typica lly used for longer delays, such as minutes or hours.

Time delays are an important part of any embedded system, as they allow the system to operate in a predictable man ner. Without time delays, it would be difficult to ensure that certain operations occur at specific times, or that differe nt parts of the system are synchronized correctly. Time delays can also be used to control the speed of a system, or to create a delay between two operations. By using the appropriate techniques, time delays can be implemented efficie ntly and accurately in any microcontroller-based system.

Question: Explain 8051 Pin Diagram (Embedded System). Answer in about 500 words.

Solution:

The 8051 pin diagram is a diagram of the pins on the 8051 microcontroller. The 8051 is an 8-bit microcontroller dev eloped by Intel in the 1980s. It is one of the most popular microcontrollers used in embedded systems. The 8051 pin diagram shows the various pins on the 8051 and their functions.

The 8051 has 40 pins, divided into four groups: power, input/output, memory, and control. The power pins provide p ower to the microcontroller and are labeled VCC (positive voltage) and GND (ground). The input/output pins are us ed to connect external devices to the microcontroller. These pins are labeled P0-P7 and can be used for both input an d output. The memory pins are used to connect external memory devices such as ROM, RAM, or EEPROM. These p ins are labeled A0-A15 and can be used for both reading and writing data. The control pins are used to control the op eration of the microcontroller. These pins are labeled ALE, PSEN, EA, RST, and XTAL1/XTAL2.

The 8051 pin diagram also shows the various ports on the microcontroller. These ports are labeled P0-P3 and can be used for both input and output. Each port has eight pins that can be used for either input or output. For example, port

0 has eight pins labeled P0.0-P0.7 that can be used for either input or output.

The 8051 pin diagram also shows the various interrupts on the microcontroller. These interrupts are labeled INT0-IN T7 and can be used to trigger an interrupt service routine (ISR). An ISR is a program that is executed when an interr upt occurs. The 8051 has eight interrupts that can be used to trigger an ISR.

Finally, the 8051 pin diagram also shows the various timers on the microcontroller. These timers are labeled T0-T2 a nd can be used to generate a periodic signal or count events. The 8051 has three timers that can be used for various p urposes such as generating a periodic signal or counting events.

In conclusion, the 8051 pin diagram is a diagram of the pins on the 8051 microcontroller and their functions. It show s the various power, input/output, memory, control, ports, interrupts, and timers on the microcontroller. Understandi ng this diagram is essential for anyone working with embedded systems using the 8051 microcontroller.