1.Explain the following acronyms: IC, ALU, CPU ?

1. IC : Semiconductor Wafer made up of thousands of transistors, resistors and capacitors. Together, these can perform calculations and store data using digital or analog technology.
2. ALU : Arithmetic Logical Unit. Part of a CPU that performs arithmetic and logical operations using the operands in a computer instruction word.
3. CPU: A central processing unit (CPU) is the electronic circuitry within a computer that carries out the instructions of a computer program by performing the basic arithmetic, logical, control and IO operations specified by the instructions.

2.Describe an embedded system in less than 100 words.

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 and mechanical parts. Embedded systems control many devices in common use today.

3.What are the differences between a microprocessor and a microcontroller?

A microcontroller is a system that consists of a microprocessor , memory and peripherals. The peripherals that form the system allow the microcontroller to interact with the outside world and provide the stimulus to the microprocessor inside of it which executes the various functionalities it is capable of

4.What range of numbers can be represented by a I6-bit ALU?

A 16 bit ALU can present the following :

Unsigned Arithmetic: 0 to (216) -1

In terms of signed arithmetic : 215-1 to -215

5.What is a "bus” in the context of embedded systems and describe two types of buses that might be found in an embedded system?

A bus is a collection of wires that carry information between the components of an embedded system. The two kinds of buses found are data bus and address bus which carry data and address information respectively

6.Describe the term "instruction set" and explain how use of the instruction set differs for high-and low-level programming.

An instruction set, with its instruction set architecture is the interface between a computer's software and hardware; it defines the valid instructions that a machine may execute.

Low level programming usually involves assembly language which is specific to an architecture and machine architecture. A High level language involves coding in a more user readable format which is architecture agnostic.

7.What are the main steps in the embedded program development cycle?

1. Develop Code.

2. Compile Code.

3. Debug and Simulate Code.

(Repeat 1,2,3 until simulation makes sense)

4.Download Code to hardware.

5. Simulate and Debug in hardware

(Repeat 1-5 until it works)

8.Explain the terms RISC and CISC and give advantages and disadvantages for each.

RISC : Reduced Instruction Set Computing

CISC: Complex Instruction Set Computing

1. RISC processors typically use simpler instructions to execute commands. So it is easier to structure the code and pipeline the execution in a systematic way compared to CISC.
2. A CISC instruction is a complex instruction where one instruction represents more than 1 “action”. CISC instructions can help with having lesser code density.
3. Only LOAD STORE instructions in RISC can access memory. In CISC, complex instructions can access memory locations including data operands.
4. RISC chips have smaller area because of simpler and smaller instruction sets.
5. Having a simpler instruction set for RISC means there is a greater burder on the software with instructions that are available. Compilers for CISC are simpler than RISC because of this

9.What is pipelining?

Pipelining involves breaking up instruction/an operation execution activities into stages that can operate independently. Every instruction passes through the same stages much like an assembly line. Pipelining an operation helps increase the clock speed while also increasing the thru’put of the system. It guarantees in most cases an output per cycle after the initial latency without compromising the clock speed.

10.What did the acronym and company name ARM stand for ?

Acorn Risc Machine