1. **In software development, what is the significance of using top-down and bottom-up design strategies? Can they be combined for better results, and if so, how?**
Top-Down: Top down design proceeds from the abstract entity to get to the concrete design. It is most often used in designing brand new systems. **Bottom-Up:** Bottom-up design proceeds from the concrete design to get to the abstract entity. It is sometimes used when one is reverse engineering a design, (i.e) when one is trying to figure out what somebody else designed in an existing design.

2. **What are the specific functions and privileges granted to the ARM processor when operating in supervisor mode, and how does it differ from other execution modes in terms of system-level access and control?**
The various functions of ARM processor in supervisor modes are:
- Exception
- Prioritization
- Vectoring
- Traps.

3. **What are the primary functions of memory, and how do they contribute to our ability to learn, recall information, and make sense of the world around us?**
The basic function of computer memory is essentially to store data. Depending on the type of data it stores and the role it plays in computer operation, however, memory performs several different functions. Although all of these functions involve data storage, RAM, ROM, flash memory and hard drives each perform a different and necessary function to keep a computer and its peripherals working.

4. **What is RISC (Reduced Instruction Set Computer) architecture, and how does it differ from CISC (Complex Instruction Set Computer) architecture in terms of design principles and performance characteristics?**
RISC, or Reduced Instruction Set Computer is a type of microprocessor architecture that utilizes a small, highly-optimized set of instructions, rather than a more specialized set of instructions often found in other types of architectures.

5. **What is the bus protocols especially, the four-cycle handshake?**
Protocols are the set of rules and conditions for the data communication. The basic building block of most bus protocols is the four-cycle handshake. Handshake ensures that when two devices want to communicate. One is ready to transmit and other is ready to receive. The

handshake uses a pair of wires dedicated to the handshake; such as enq(meaning enquiry) and ack (meaning acknowledge). Extra wires are used for the data transmitted during handshake.

6. What are the different compilation techniques used in the process of converting high-level programming languages into machine code?
There are three types of compilation techniques:
- Analysis and optimization of execution time.
- Power energy and program size
- Program validation and testing.

7. Name any two techniques used to optimize execution time of program.
- Instruction level optimization
- Machine independent optimization.

8. What is ROM and what are its primary functions in computing and electronic devices?
Read-Only memory (ROM) is a class of storage medium used in computers and other electronic devices. Data stored in ROM can only be modified slowly, with difficulty, or not at all, so it is mainly used to distribute firmware (software that is very closely tied to specific hardware, and unlikely to need frequent updates).

9. What are the major inter process communication mechanism?
- Shared memory communication
- Message passing.

10. What are processes, and how do they contribute to the functioning and efficiency of various systems or organizations?
- A process is a single execution of a program.
- If we run the same program two different times, we have created two different processes.
- Each process has its own state that includes not only its register but also all of its memory.

11. What are the key challenges associated with ensuring real-time performance in computing systems?

The various issues in Real Time computing is:

- Real -time Response
- Recovering from failures
- Working with distributed architecture
- Asynchronous communication
- Race condition and timing.

12. What are the various in embedded system designs modelling refining (or) partitioning?

- Structural modelling
- Behaviour modelling
- State machine modelling
- Process algebra modelling
- Logic based modelling
- Petri-nets modelling.

13. What does USB stand for, and what is its primary purpose in computing and electronics?

Universal Serial Bus is an external bus standard that supports data transfer rates of 12 Mbps. A single USB port can be used to connect up to 127 peripheral devices, such as mice, modems, and keyboards.

14. State the basic principles of basic compilation techniques.

- Compilation combines translation and optimization.
- The high level language program is translated in to lower level form of instructions; optimizations try to generate better instruction sequences.
- Compilation = Translation + optimization

15. What is the bus protocols especially, the four-cycle handshake?

Protocols are the set of rules and conditions for the data communication. The basic building block of most bus protocols is the four-cycle handshake. Handshake ensures that when two devices want to communicate. One is ready to transmit and other is ready to receive. The handshake uses a pair of wires dedicated to the handshake; such as enq(meaning enquiry) and ack (meaning acknowledge). Extra wires are used for the data transmitted during handshake.

16. In the realm of manufacturing, what is the exact definition of a process and its impact on product consistency?

A process is a single execution of a program.

- If we run the same program two different times, we have created two different processes.
- Each process has its own state that includes not only its register but also all of its memory.

1. Enumerate the essential hardware components and their selection criteria in **designing an embedded system** (Page 14)

2. **ARM**? Also elaborate the memory and instructions of ARM. With neat architecture **(Page 26)**

3. essential steps involved in the **design process when working with computing platforms.** (Page 53)

4. What are the key steps involved in **program validation and testing**, and how do these processes ensure the reliability and correctness of software applications? Provide examples to illustrate their importance in software development. **(Page 72)**

5. What are **Tasks and Processes**? Explain the difference between tasks and processes in the context of project management, and how they contribute to the overall success of a project. **(Page 79)**

6. Define **Multirate Systems**. Explain how multirate systems are used in digital signal processing and provide examples of real-world applications where multirate techniques are beneficial. **(Page 80)**

15. Marks

1. How do factors like resource utilization, response time, and throughput contribute to the overall assessment of **program-level performance**? **(Page 66)**