I2C and SPI related interview questions

1. Can devices be added and removed while the system is running (Hot swapping) in I2C ?

**Ans**: Hot swapping is possible in I2C protocol.

1. What is the standard bus speed in I2C ?

**Ans:** a.     standard bus speed is 100Kbps  , fast mode is 400Kbps  , fast mode plus is 1Mbps , high speed mode is 4Mbps , Ultra speed mode is 5 Mbps

1. How many devices can be connected in a standard I2C communication ?

**Ans**: As per theoretically we can connect up to 127 devices for 7Bit  address and 2 ^10 devices will connect for 10Bit address. But practically depends on Capacitance load. If capacitance load is increase the speed will be reduced

1. What are the 2 roles of nodes in I2C communication ?

**Ans**: SCL :  It is for using synchronization or start communication between the slave and master. Always master will initiates the clock for synchronization. If synchronization fails then communication is fails between master and Slave.  SDA:   This is used to transfer the data between master and slave. This is bi-directional pin.

1. What are the modes of operation in I2C communication ?

**Ans**:  1.Mater transmitter and Slave receiver. 2.Slave transmitter and Master receiver.

1. What is bus arbitration ?

**Ans**: Arbitration is the process to avoid conflict the data on bus when multi master start communication at the same time.  In the arbitration – which is the lowest address of the salve, that salve will communication continues and other will be lost the arbitration.

1. Advantages and limitations of I2C communication ?

**Ans**: 1.Using I2C .. we can connect more slaves than SPI.

2.Cost effective compared to SPI.SPI

3.Different speeds available.

4.NO need of any GPIO pins.

5.hardware design implementation is simple than SPI because of 2 wire communication

6.Supports Multi master Communication    
7. More complexity to write a program

8. Transfer of data speed(100 Kbps) is less than SPI(1 Mbps)

1. How many wires are required for I2C communication ? What are the signals involved in I2C ?

**Ans**: 2 wire – SCL and SDA.

1. What is START bit and STOP bit ?

**Ans**: Start bit is used to start communication between the slave and master. Always START bit (MSB) transmits first.   START Condition : SCL is HIGH and SDA is HIGH to LOW transition.      Similarly,  Stop is used to end the communication between master and

slave.  STOP Condition: SCL is HIGH an SDA is LOW to HIGH Transition.

1. How will the master indicate that it is either address / data ? How will it intimate to the slave that it is going to either read / write ?

**Ans**:   As per I2C communication frame format – After start  bit followed by address then data will transmits . standard frame format of I2C by NXP .Here 7 bit address and One Read / write bit (LSB of Address).  If you give logic ‘1’ in LSB slave understands as read the data and If you give logic ‘0’ understands as write in to the slave.

1. Is it possible to have multiple masters in I2C ?

**Ans**: Multi master is possible in I2C communication using Arbitration process.

1. In write transaction, the Master monitors the last ACK and issues STOP condition – True/False?    
   **Ans**: True, In write transaction slave will gives the ACK.
2. In read transaction, the master does not acknowledge the final byte it receives and issues STOP condition – True/False ?

**Ans**: Yes, Read transaction master gives NACK before the stop condition.

1. What is SPI communication ?

**Ans**: Serial peripheral communication.. the data will transfer from master to slave serially i.e is bit by bit serially using shift registers(SISO).

1. How many wires are required for SPI communication ?

**Ans**: SPI is 4 wired Communication – MOSI , MISO, SCK and nCS.

1. What are the 4 logic signals specified by SPI bus ?

**Ans**: 1.MOSI : Master Out Slave IN 2. MISO : Master IN Slave Out. 3. SCK : Serail Clock 4. nCS : Chip Select

1. Does SPI slave acknowledge the receipt of data ?

**Ans**: Nope, SPI doesn’t give any ACK like I2C.

1. SPI has higher throughput than I2C – True / False ?

**Ans**: SPI is faster than I2C . Bit rates of I2C is 100 kbps and for SPI 1 Mbps.

1. Duplex communication is possible by simultaneously using MOSI and MISO during each SPI clock cycle – True / False?

**Ans**: True, because MOSI line to transfer the data to slave and mean while MISO line receive the data from slave Is it possible to connect SPI slaves in daisy chain?  **Ans**: Yes, possible using “daisy chain” concept we can reduce the number of GPIO pins.

1. What is the role of shift register in Master and Slave devices in SPI ?

**Ans**: In SPI, SISO shift register are used. Here data is transferring to save using MOSI bus and at the same time receiving the dummy data from MISO bus and vice versa. Every write there is dummy read and every read there is dummy write.

1. How will the master convey that it is stopping the transmission of data ?

**Ans**:  using Chip select (GPIO) pin. Whenever chip select pin is pulled to HIGH then data can not be transferred.

IRQ vs FIQ

* **IRQ(InterruptRequest)**  
  An (or IRQ) is a hardware signal sent to the processor that temporarily stops a running program and allows a special program, an interrupt handler, to run instead. Interrupts are used to handle such events as data receipt from a modem or network, or a key press or mouse movement.
* **FIQ(FastInterruptRequest)**  
  An FIQ is just a higher priority interrupt request, that is prioritized by disabling IRQ and other FIQ handlers during request servicing. Therefore, no other interrupts can occur during the processing of the active FIQ interrupt.

1. Which of the following are the pin efficient method of communicating between other devices?  
a) serial port  
b) parallel port  
c) peripheral port  
d) memory port

Answer: a  
Explanation: The serial ports are considered to be the pin efficient method of communication between other devices within an embedded system.

2. Which of the following depends the number of bits that are transferred?  
a) wait statement  
b) ready statement  
c) time  
d) counter  
 Answer: c  
Explanation: The time taken for the data transmission within the system depends on the clock frequency and the number of bits that are transferred.

3. Which of the following is the most commonly used buffer in the serial porting?  
a) LIFO  
b) FIFO  
c) FILO  
d) LILO  
 Answer: b  
Explanation: Most of the serial ports uses a FIFO buffer so that the data is not lost. The FIFO buffer is read to receive the data, that is, first in first out.

4. What does SPI stand for?  
a) serial parallel interface  
b) serial peripheral interface  
c) sequential peripheral interface  
d) sequential port interface

Answer: b  
Explanation: The serial parallel interface bus is a commonly used interface which involves master slave mechanism. The shift registers are worked as master and the slave devices are driven by a common clock.

5. Which allows the full duplex synchronous communication between the master and the slave?  
a) SPI  
b) serial port  
c) I2C  
d) parallel port

Answer: a  
Explanation: The serial peripheral interface allows the full duplex synchronous communication between the master and the slave devices. MC68HC05 developed by Motorola uses SPI for interfacing the peripheral devices.

6. Which of the following processor uses SPI for interfacing?  
a) 8086  
b) 8253  
c) 8254  
d) MC68HC11  
 Answer: d  
Explanation: The MC68HC05 and MC68HC11 microcontrollers uses the serial peripheral interface for the peripheral interfacing.

7. In which register does the data is written in the master device?  
a) index register  
b) accumulator  
c) SPDR  
d) status register  
 Answer: c  
Explanation: The serial peripheral interface follows a master slave mechanism in which the data is written to the SPDR register in the master device and clocked out into the slave device SPDR by using a common clock signal called SCK.

8. What happens when 8 bits are transferred in the SPI?  
a) wait statement  
b) ready statement  
c) interrupt  
d) remains unchanged

Answer: c  
Explanation: The interrupts are locally generated when 8-bits are transferred so that the data can be read before the next byte is clocked through.

9. Which signal is used to select the slave in the serial peripheral interfacing?  
a) slave select  
b) master select  
c) interrupt  
d) clock signal

Answer: a  
Explanation: The slave select signal selects which slave is to receive data from the master.

10. How much time period is necessary for the slave to receive the interrupt and transfer the data?  
a) 4 clock time period  
b) 8 clock time period  
c) 16 clock time period  
d) 24 clock time period  
Answer: b  
Explanation: The SPI uses an eight clock time period for the slave to receive the interrupt and transfer the data which determines the maximum data rate.