Unit 1

1. **Q:** What is a microcontroller?
   A: A microcontroller is an integrated chip designed to perform specific control tasks in embedded systems.
2. **Q:** How does a microcontroller differ from a microprocessor?
   A: A microcontroller has built-in memory and peripherals, while a microprocessor requires external components.
3. **Q:** What is one criterion for selecting a microcontroller?
   A: One key criterion is the number and type of I/O ports and peripherals available.
4. **Q:** Name one microcontroller from the PIC18 series.
   A: PIC18F458 is an example of a PIC18 series microcontroller.
5. **Q:** What type of memory is used for storing programs in PIC microcontrollers?
   A: Programmable ROM (Flash memory) is used for program storage.
6. **Q:** What does the Program Counter do in a PIC18 microcontroller?
   A: It holds the address of the next instruction to be executed.
7. **Q:** What is bank switching in PIC18?
   A: Bank switching allows access to different memory banks using special registers.
8. **Q:** What is an addressing mode?
   A: An addressing mode defines how the operand of an instruction is accessed.
9. **Q:** What is the purpose of a watchdog timer?
   A: It resets the microcontroller if the program becomes unresponsive.
10. **Q:** What does the brownout reset feature do?
    A: It resets the microcontroller when the supply voltage drops below a safe level.

Unit 2

1. **Q: What is the main function of an I/O port in a microcontroller?**
   A: It allows the microcontroller to interact with external devices by reading inputs and sending outputs.
2. **Q: What is I/O port structure in PIC18?**
   A: It consists of TRIS (data direction), PORT (read), and LAT (write) registers.
3. **Q: How is an I/O pin set as input or output?**
   A: By configuring the TRIS register: '1' for input, '0' for output.

4. **Q: What is I/O bit manipulation programming?**
   A: It involves setting or clearing specific bits of a port to control individual I/O pins.
5. **Q: Give an example of setting a pin high using bit manipulation in Embedded C.**
   A: LATBbits.LATB0 = 1; sets pin RB0 high.
6. **Q: What is a Timer in a microcontroller?**
   A: A Timer is a hardware feature used for counting clock pulses or generating precise delays.
7. **Q: Which registers are commonly used for timer operations in PIC18?**
   A: TMRx, TCON, and PRx registers are used.
8. **Q: What does a prescaler do in timer configuration?**
   A: It divides the input clock to slow down the timer count rate.
9. **Q: How is delay calculated using a timer?**
   A: Delay = (Prescaler × Timer count × Instruction cycle time).
10. **Q: How is a timer started in Embedded C for PIC18?**
    A: By setting the appropriate control bits in the TCON register, e.g., T1CONbits.TMR1ON = 1;.

Unit 3

1. **Q: What is the main difference between polling and interrupts?**
   A: Polling continuously checks a condition, while interrupts respond immediately to events.
2. **Q: What does IVT stand for in PIC microcontrollers?**
   A: IVT stands for Interrupt Vector Table.
3. **Q: What is the first step in executing an interrupt?**
   A: The current program counter value is saved before jumping to the ISR (Interrupt Service Routine).
4. **Q: Name one source of interrupts in PIC18.**
   A: Timer overflow is a common source of interrupts.
5. **Q: How are interrupts enabled or disabled in PIC18?**
   A: Using interrupt enable bits like INTCONbits.GIE for global interrupt enable.
6. **Q: What is the purpose of interrupt registers?**
   A: They control, enable, and flag interrupt events.

7. **Q: How is interrupt priority handled in PIC18?**
   A: PIC18 supports high and low priority levels for managing multiple interrupts.
8. **Q: What is required to program a timer interrupt?**
   A: Enable the timer interrupt flag, configure the timer, and write the ISR.
9. **Q: How is a 16x2 LCD interfaced in 8-bit mode?**
   A: By connecting 8 data lines and 3 control lines (RS, RW, EN) to the microcontroller.
10. **Q: How is a 4x4 matrix keyboard interfaced with a microcontroller?**
    A: By connecting 4 rows and 4 columns to I/O ports and scanning them via code.

Unit 4

Q: What does CCP stand for in PIC microcontrollers?
A: CCP stands for Capture/Compare/PWM.

Q: What is the function of the Capture mode in CCP?
A: It records the timer value when a signal edge is detected.

Q: What does Compare mode do in CCP?
A: It generates an event when the timer matches a set value.

Q: What is PWM used for in microcontrollers?
A: PWM (Pulse Width Modulation) is used to control devices like motors and LEDs.

Q: How does PWM control DC motor speed?
A: By varying the duty cycle of the PWM signal.

Q: What type of signal is used to control a stepper motor?
A: A sequence of digital pulses applied to the motor coils.

Q: What is RS232 used for?
A: RS232 is a standard protocol for serial communication between devices.

Q: How does I2C communication work?
A: I2C uses two lines (SDA and SCL) for communication between a master and multiple slaves.

Q: What is the key feature of SPI protocol?
A: SPI is a full-duplex, high-speed communication protocol using separate lines for MISO, MOSI, SCLK, and SS.

Q: Which function is commonly used in Embedded C for serial communication via UART?
A: putch() or printf() is used for sending data via UART.

Unit 5

Here are 10 single-line questions and answers based on the Interfacing section you provided:

1. **Q: What is the function of ADC0808 when interfaced with PIC?**
   A: ADC0808 converts multiple analog inputs into digital signals readable by the PIC.
2. **Q: What is the purpose of DAC0808 in a PIC-based system?**
   A: DAC0808 converts digital values from PIC into analog voltages.
3. **Q: How is data from an analog temperature sensor read by a PIC?**
   A: The analog output of the sensor is connected to an ADC input of the PIC.
4. **Q: What protocol is used for digital temperature sensors like LM75 with PIC?**
   A: I2C protocol is used for communication.
5. **Q: What is the role of the I2C protocol in PIC microcontroller interfacing?**
   A: I2C allows serial communication with multiple devices using two wires (SDA and SCL).
6. **Q: What is the DS1306 module used for in embedded systems?**
   A: DS1306 provides real-time clock and calendar functionalities.
7. **Q: How is DS1306 RTC interfaced with PIC microcontroller?**
   A: It is interfaced using the I2C protocol.
8. **Q: What is EEPROM used for in PIC-based applications?**
   A: EEPROM stores non-volatile data that must be retained even when power is off.
9. **Q: How does PIC communicate with EEPROM memory?**
   A: Communication is done via the SPI protocol.
10. **Q: What are the typical SPI lines used for EEPROM interfacing?**
    A: SPI uses MISO, MOSI, SCK, and CS (chip select) lines.

Want a full revision sheet with all Q&A from every section?

Unit 6

□ Q: What is the core idea behind RISC design philosophy?
A: RISC focuses on a small set of simple instructions for faster execution.

□ Q: What does ARM stand for?
A: ARM stands for Advanced RISC Machines.

❓ Q: Name three versions of ARM processors.
A: ARM7, ARM9, and ARM11.

❓ Q: Mention one key feature of the ARM processor.
A: ARM processors offer low power consumption with high performance.

❓ Q: Why are ARM processors suitable for embedded systems?
A: They are efficient, compact, and support low-power operation, ideal for embedded use.

❓ Q: What is the ARM7 dataflow model used for?
A: It represents how data moves between registers and memory during execution.

❓ Q: What is the programmer's model in ARM architecture?
A: It defines the available registers and their functions from a coder’s perspective.

❓ Q: What is the function of CPSR in ARM?
A: CPSR (Current Program Status Register) holds the current state and flags of the processor.

❓ Q: What does SPSR stand for in ARM processors?
A: SPSR stands for Saved Program Status Register, used to store the previous CPSR during exceptions.

❓ Q: What is one major difference between PIC and ARM processors?
A: PIC is simpler and suited for basic control tasks, while ARM is more powerful and handles complex operations.