ELEC 330 Test 1 Review

TOPICS

Microcontroller Components
- Microprocessor, Memory, I/O Ports (A-E)
- Support Devices (Timers, Analog-to-Digital (A/D) Converter, Serial Communications)

Number Systems
- Binary, Hexadecimal, 2's Complement
- Addition (Subtraction)

Codes
- Binary Coded Decimal (BCD), ASCII

PIC18F MPU & Memory (Programming Model)
- MPU
  - ALU
    - Working Register (WREG), Instruction Decoder, Product, Table Latch
    - Status (Negative (N), Overflow (OV), Zero (Z), Digit Carry (DC), Carry (C))
  - Registers
    - Bank Select Register (BSR), File Select Registers (FSRs), Program Counter (PC)
    - Table Pointer, Stack Pointer (SP)
- Memory
  - Program Memory (32K)
  - Data (File) Memory (4K)
    - Special Function Registers (SFRs)
      - I/O Ports, Serial Communications, Timers, A/D Converter

PIC18F Instruction Set (77 Instructions)
- Move (Data Copy) and Load, Table Read/Write
- Arithmetic, Logic, Bit Manipulation
- Program Redirection (Branch/Jump), Machine Control

Addressing Modes
- Immediate (Literal), Direct, Indirect (Pointers)

Problem Solving
- Modular Design, Subroutines
- Flowcharts (Start/End, Process, Decision Making, Pre-defined Process)

Assembly Language Programming
- Assembly Language Statements (Label, Opcode, Operand, Comment)
- Assembler Directives (#INCLUDE, ORG, EQU, DB, END)
- Radix Formats (Hexadecimal, Decimal, Binary, ASCII)

Simulation and Debugging (Single-step, Breakpoints)

Application Examples (Copy Data, Packed BCD, Switch Test, Highest Temperature)

Practice Questions

1. Perform the following signed addition using 8-bit 2's complement arithmetic and verify your answer in base 10.

$$4C_H + DE_H = \_\_\_\_\_{}_H$$

2.13
3.2
4.2
4.11
5.21
6.5

8. Draw a flowchart for a program that uses a counter to rotate a register right N times. Write the assembly language program for the flowchart.