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Final term Exam (Fall 2019) **Paper:** CSE-304 Computer Organization and Architecture
Time: 2 Hours **Marks: 60**

Note: Attempt all questions on answer sheet.

Question No. 1 (Marks=10):

i. What are the parts of an instruction? Briefly explain it with examples.

ii. What is stack? How it works for the following program:

PUSH A
PUSH B
PUSH C
POP D

Status of registers:

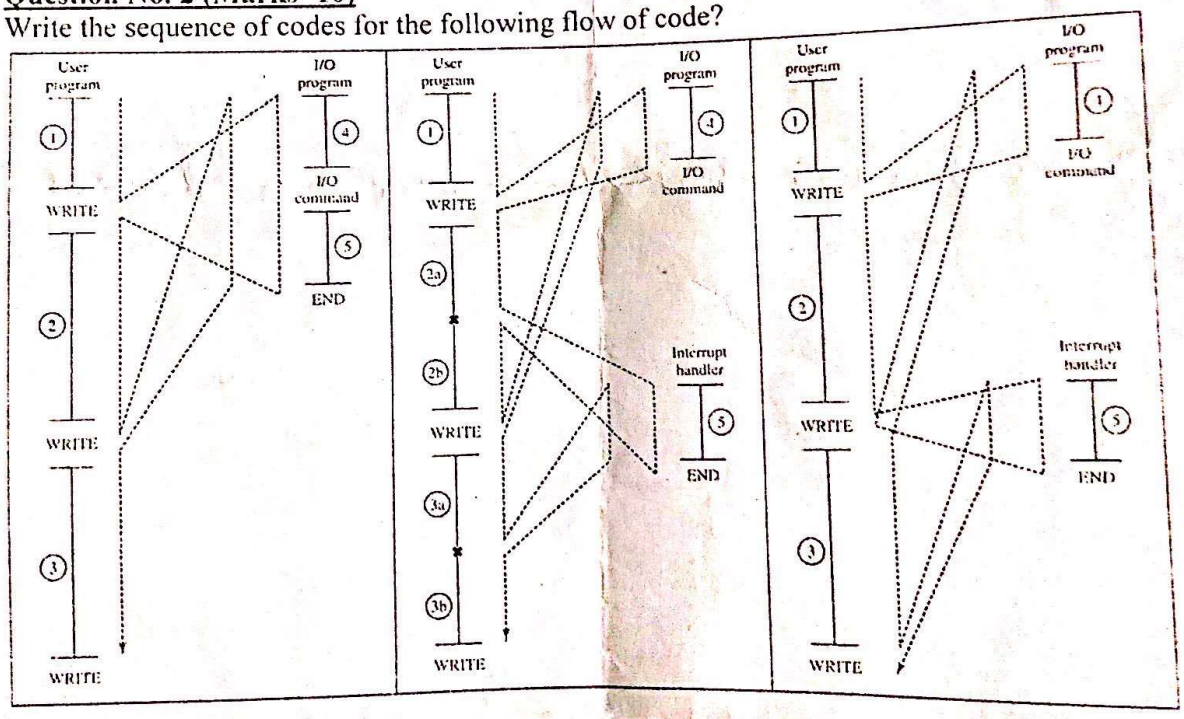
SP=2100H; A=1234H; B=5678H; C=9A25H

Where;

SP(stack pointer), A, B, C, D are 16 bit-registers while each memory location is of 8-bit size.

Question No. 2 (Marks=10)

Write the sequence of codes for the following flow of code?



Question No. 3 (Marks=10)

i. Write the assembly code for the expression: F=(X+Y)*Z–W using: 0-address, 1-address, 2-address, and 3-address instruction format. Compare them using a number of instructions required in each addressing format. Which instruction format will be easier for the compiler to process?

ii. Store the 32-bit word $(A1B3C5D7)_{16}$ in the memory having each location of 8-bit size using big endian and little endian format. Consider the memory addresses as 0h, 1h, 2h. 3h, ...

Question No. 4 (Marks=15) (CLO-2)

You have to design an instructions set architecture (ISA), whose characteristics are:

- 16 different operations (ADD, SUB, OUT, HLT etc.)
- 12-bit address (program counter (PC), a memory address register (MAR) etc.)
- 16-bit data registers (accumulators, B, Temp etc.)
- 16-bit instruction register (IR)

i. What will be the instruction size?
ii. Opcode size?
iii. Operand size?
iv. A number of locations in memory?
v. Memory data size?

Question No. 5 (Marks=15) (CLO-3)

Explain the following:

a) How the scoreboard algorithm (Dynamic Scheduling Algorithm) solves the structural hazard?
b) Explain the concept of data forwarding using 5 stages of MIPS architecture?
c) How the backward forwarding problems can be resolved?
d) What are the five different ways to solve the control hazards problem?
e) What is the difference between direct and indirect addressing schemes?