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COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL/ELECTRONICS & COMPUTER ENGINEERING

Session: 2021/2022 Semester: Second
 Course Code: COE 306 Course Title: Assembly Language
 Units: 3 Time Allowed: 3 hours Total Marks: 60 Marks
 Course Lecturer(s): Engr. Joseph Akinwumi
 Instructions: Attempt five out of seven. Show all workings.

Question 1 [12 marks]

(a) Convert the following binary numbers to hexadecimal and decimal.

S/N	Binary	Hexadecimal	Decimal
i.	0101 1100	5C	92 ₁₀
ii.	0011 0001	31	49 ₁₀
iii.	0110 1011	6B	07

(b) Convert the following binary floating point numbers to base-10 fraction.

S/N	Binary Floating Point	Base-10 Fractions
i.	111.11 ₂	7 ³ / ₄
ii.	101.0011	5 ³ / ₁₆
iii.	1101.100101	13 ³ / ₁₂

(c) Compute the two's complement equivalent of each of the following binary numbers.

S/N	Binary Number	Twos Complement
i.	1100 1101	0011 0011
ii.	1111 0001	0000 1111
iii.	1000 1101	0111 0011
iv.	0011 1011	1100 0101

(d) Convert the following signed decimal numbers to their binary equivalents.

S/N	Signed Decimal	Binary
i.	-43	-101011 ₂
ii.	-60	-111100 ₂

Question 2 [12 marks]

- a. Describe the modes of operation of the x86 processor. (3 marks)
 b. Describe the flat segmentation model. (3 marks)

1x2² + 1x2² + 1x2²
 1x2²

10 - A
 11 - B
 12 - C
 13 - D
 14 - E
 15 - F

divide segments
 into
 four byte
 blocks of
 size

- c. Describe the multi-segment model. (3 marks)
- d. Briefly describe paging and virtual memory in x86 processors. (3 marks)

Question 3 [12 marks]

- a. Draw the block diagram of a basic microcomputer. (4 marks)
- b. Discuss the components of a basic microcomputer. (4 marks)
- c. Discuss the importance of the clock in a microcomputer. (2 marks)
- d. What is the wait state of a microcomputer? (2 marks)

Question 4 [12 marks]

- a. Describe the Instruction Execution Cycle of the x86 processor. (3 marks)
- b. Write a pseudo-code for the sequence of steps involved in the Instruction Execution Cycle. (2 marks)
- c. Draw the block diagram of a CPU showing the data flow within the CPU. (4 marks)
- d. Explain the data flow within the CPU. (3 marks)

*loop
Fetch N I
Decrase counter
Decode I
Read operand from
memory
Execute I
write operand
from mem
loop continue*

Question 5 [12 marks]

- a. Discuss the memory read cycle. (3 marks)
- b. What is the cache memory? (3 marks)
- c. Explain multitasking. (3 marks)
- d. A round robin scheduler arbitrarily assigned 100 milliseconds to each task and switching between tasks consumed 8 milliseconds. How much time will it take one full circuit of task list to complete. The task list consists of 9 active tasks. (3 marks)

Question 6 [12 marks]

- a. Discuss the basic program execution registers. (6 marks)
- b. Explain the status flags. (2 marks)
- c. Discuss the control flags. (1 marks)
- d. Discuss the floating point unit registers. (3 marks)

Question 7 [12 marks]

- a. Explain the terms hyperthreading and Multi-core processing. (2 marks)
- b. Discuss RISC and CISC design. (2 marks)
- c. Write a template of a program in x86 assembly language. (6 marks)
- d. Explain an assembler and a linker. (2 marks)

size / C