TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATIONS FOR DIPLOMA IN TECHNOLOGY (ELECTRICAL & ELECTRONIC ENGINEERING)

EEE 2206

MICROPROCESSOR TECHNOLOGY

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2019

TIME: 2 HOURS

DATE:

Instructions to Candidates

You should have the following for this examination
-Answer Booklet, examination pass and student ID
This paper consists of **five** Questions
Attempt any THREE Questions.
Do not write on the question paper.

QUESTION ONE

(a) Explain the functions of the following microprocessor registers
   (i) Accumulator
   (ii) Stack pointer
   (iii) Program counter
   (iv) Instruction register (8 marks)

(b) Distinguish between machine cycle and instruction cycle (4 marks)

(c) Explain the following types of instructions and give ONE example for each case:
   i. One byte instruction
   ii. Two byte instruction
   iii. Three byte instruction (8 marks)

QUESTION TWO

(a) Explain following addressing modes and give ONE instruction example for each case.
   (i) Register addressing
   (ii) Direct addressing
   (iii) Immediate addressing
   (iv) Implicit addressing

(12 marks)

(b) Explain the operation for each of the following instructions
   (i) MOV B,C
   (ii) LDA 2050H
   (iii) XCHG
   (iv) MVI B,65H (8 marks)

QUESTION THREE

(a) For the program listing of table Q4b draw the trace table. (6 marks)

Table Q4b

```
LXI   SP, 4050
LXI   H, 3500h
MVI   B, 57h
MVI   A, B
ADD   B
MOV   C, A
INR   C
MOV   D, C
XCHG
```

(b) Explain the following terms:
   (i) T- state
   (ii) Subroutine
   (iii) Stack (6 marks)

(c) The program of table Q3 is run by a microprocessor whose clock speed is 8MHz. Determine the time it takes to execute the program.

Table Q3

LABEL	Instruction	T – state
MVI	A, 05H	5
DCR	A	4
MOV	B, A	4
HLT		4

(4 marks)

(d) With the aid of a diagram explain the operation of a 1-transistor DRAM cell. (4 marks)

QUESTION FOUR

(a) Explain the THREE instruction sizes and give ONE example in each case (7 marks)

(b) A microprocessor addresses 64kB of memory consisting of 20kB of ROM starting at address 3000h followed by 40kB of RAM. The rest of the memory is currently not used.

(i) Determine the size of the address bus

(ii) Draw the memory map. (7 marks)

(c) With the aid of a diagram explain the operation of a SRAM cell (6 marks)

QUESTION FIVE

(a) Table Q4a shows twenty data bytes stored in memory starting from address 3000H. All the data bytes are to be added together. Register B is to be used to store any carries generated while adding. The entire sum is stored in two consecutive memory locations 6000H and 6001H.

i. Draw the flowchart

ii. Write the program (14 marks)

Table Q4a

Data (H): 59, 78, 22, 9B, 06, 3A, 20, 2D, 4F, 5E, 35, 42, 1F, 75, D3, E5, 23, 34, D9, 47

(b) With the aid of a diagram explain the pin configuration of DB-25 parallel port (6 marks)