



ZIMBABWE

**MINISTRY OF HIGHER AND TERTIARY EDUCATION,
INNOVATION, SCIENCE AND TECHNOLOGY
DEVELOPMENT**

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL CERTIFICATE

IN

ELECTRONIC ENGINEERING: COMPUTER SYSTEMS

MODULE: Microcomputer Architecture

PAPER NO: 322/22/M06

DURATION: 3 Hours

MAY/JUNE 2024 EXAMINATION

REQUIREMENTS

Answer booklet and non programmable calculator.

INSTRUCTIONS TO CANDIDATE

- 1. Answer ALL TEN (10) questions.**
- 2. Each question carries 10 marks.**

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QUESTION 1

(a) Describe the following computing words:-

- | | |
|-------------------|----------|
| (i) Binary data | (1 mark) |
| (ii) Coded data | (1 mark) |
| (iii) Instruction | (1 mark) |

(b) With the aid of a state diagram, explain the general operation of a computer system. (7 marks)

QUESTION 2

With the aid of a diagram explain the following microprocessor terms:-

- | | |
|--------------------|-----------|
| (a) ALU | (2 marks) |
| (b) Input | (2 marks) |
| (c) Control unit | (2 marks) |
| (d) Memory unit | (2 marks) |
| (e) Register array | (2 marks) |

QUESTION 3

Draw the block diagram and truth table of the T flip flop. (10 marks)

QUESTION 4

Describe the following types of register:-

- | | |
|------------------------------|-----------|
| (a) Status register | (2 marks) |
| (b) Memory address register | (2 marks) |
| (c) Program counter | (2 marks) |
| (d) General purpose register | (2 marks) |
| (e) Instruction register | (2 marks) |

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QUESTION 5

- (a) State and explain four microprocessor packages. (8 marks)
- (b) Describe the following:-
- (i) 32 bit ($\times 86$) (1 mark)
 - (ii) 64 bit ($\times 86 - 64$) (1 mark)

QUESTION 6

- (a) Define cache memory and state the type of memory used. (2 marks)
- (b) State and explain three types of cache memory mapping methods. (6 marks)
- (c) Give any two factors to consider when choosing a mapping method. (2 marks)

QUESTION 7

- (a) Explain the following factors affecting computer memory efficiency:-
- (i) Memory speed (1 mark)
 - (ii) Memory architecture (1 mark)
 - (iii) CPU cache memory (1 mark)
 - (iv) Memory allocation (1 mark)
- (b) In memory management explain the following terms:-
- (i) Memory interleave (2 marks)
 - (ii) Paging (2 marks)
 - (iii) Pipelining (2 marks)

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QUESTION 8

- (a) Explain the term “addressing mode”. (2 marks)
- (b) State the common names of manufacturers of microprocessors. (4 marks)
- (c) Describe the following micro architectures.
 - (i) 64 bit (2 marks)
 - (ii) 32 bit (2 marks)

QUESTION 9

Explain the following addressing modes:-

- (a) Register indirect (2 marks)
- (b) Register addressing (2 marks)
- (c) Indexed (2 marks)
- (d) Immediate (2 marks)
- (e) Direct (2 marks)

QUESTION 10

On a computer with a 32 bit memory address and the length of the memory location of 1 byte is installed in set associate cache. Cache size is 16kb, block (line) size is 16 bytes, set associative code is 4 way

- (a) How many sets are there in cache? (6 marks)
- (b) Give four benefits of the set associative cache (4 marks)

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