NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF COMPUTING AND INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE

QUALIFICATION: BACHELOR OF COMPUTER SCIENCE, BACHELOR OF COMPUTER IN CYBER SECURITY & BACHELOR OF INFORMATICS	
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COURSE: COMPUTER ORGANISATION AND ARCHITECTURE	**COURSE CODE:** COA511S
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DURATION: 2H	**MARKS:** 100

SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION QUESTION PAPER	
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THIS QUESTION PAPER CONSISTS OF 5 PAGES
(Excluding this front page)

INSTRUCTIONS
1. Answer ALL the questions on the answer scripts.
2. Write clearly and neatly.
3. Number the answers clearly.

PERMISSIBLE MATERIALS
1. Calculator.

SECTION A [15 MARKS]: Each Question Weighs 1 Mark.

1. RAM must be provided with a constant power supply.   [True/False]

2. The prefect buffer is a memory cache located on the RAM chip.   [True/False]

3. I/O channels are commonly seen on microcomputers, whereas I/O

    controllers are used on mainframes.   [True/False]

4. An interrupt is a hardware-generated signal to the processor.   [True/False]

5. In any number, the rightmost digit is referred to as the most significant digit.
                                                                        [True/False]

6. Microprogramming eases the task of designing and implementing the control
    Unit and   provides support for the family concept.   [True/False]
    +

7. The Instruction Set Architecture (ISA) defines the machine language

    instructions that a computer can follow.   [True/False]

8. Cache memory is a much faster memory than the register file.   [True/False]

9. Overflow can only occur if there is a carry.   [True/False]

10. Interrupt is one of the five states for a process.   [True/False]

11 Memory swapping is a situation where none of the processes in memory

    are in the ready state.   [True/False]

12 A sequence of hexadecimal digits can be thought of as representing an integer

    in base 2.   [True/False]

13. The instruction set is the programmer's means of controlling the   processor.
                                                                        [True/False]
14. Memory references are faster than register references.   [True/False]

15. The Kernel is a special type of programming language used to provide instructions to

    the monitor.   [True/False]

SECTION B [15 MARKS]: Each Question Weighs 1 Mark.

1. In an optical CD, the areas between pits are called _____.

        A. lands   B. sectors

        C. cylinders   D. strips

2. The _____ is the processor component that temporarily holds data and instructions waiting to be processed by the ALU.

        A. registers   B. CPU interconnection

        C. ALU   D. system bus

3. Binary 10100101 is hexadecimal _____.

        A. 0   B. 5
        C. A 5   D. 10

4. The operand _____ yields true if either or both of its operands are true.

        A. NOT   B. AND
        C. NAND   D. OR

5. In floating-point arithmetic, when a positive exponent exceeds the maximum possible exponent. It is known as _____.

        A. exponent underflow   B. exponent overflow

        C. significand underflow   D. significand overflow

6. _____ is implemented with combinational circuits.

        A. nano memory   B. random access memory
        C. read only memory   D. no memory

7. The _____ exists in one of two states and, in the absence of input, remains in that state.
        A. assert   B. complex PLD
        C. decoder   D. flip-flop

8. _____ are used in digital circuits to control signal and data routing.

        A. Multiplexers   B. Program counters
        C. Flip-flops   D. Gates

9. The _____ specifies the operation to be performed.

    A. source operand reference   B. opcode
    C. next instruction reference   D. processor register

10. All instructions in the ARM architecture are _____ bits long and follow a regular format.

    A. 8   B. 16
    C. 32   D. 64

11. The _____ controls the movement of data and instructions into and out of the processor.

    A. control unit   B. ALU
    C. shifter   D. branch

12. The _____ contains the address of an instruction to be fetched.

    A. instruction register   B. memory address register
    C. memory buffer register   D. program counter

13. _____ registers may be used only to hold data and cannot be employed in the calculation of an operand address.

    A. General purpose   B. Data
    C. Address   D. Condition code

14. A _____ is a dispatch able unit of work within a process that includes a processor context and its own data area for a stack.

    A. Process   B. Process switch
    C. Thread   D. Thread switch

15. A _____ architecture is one that makes use of more, and more fine-grained pipeline stages.

    A. parallel   B. superpipe lined
    C. superscalar   D. hybrid

SECTION C [70 MARKS]: Comprehension questions.

Question 1

(a) Technological advancement in 1940 and 1950s made a significant contribution in computer evolution. Distinguish by listing ay three distinct differences between the first and second generation of computers   (3 marks)

(b) CPU Instructions can be divided into 3 classes. List the three classes and provide at least one example of a typical operation of each. Class.   (6 marks)

(c) List any four, common types of computer expansion slots found in the PC's (Please note: expansion "slots" and not expansion "cards")   (4 marks)

Question 2

a) State the two most significant reasons for embracing RAID technologies in storage   (4 marks)

b) Illustrate the concept of direct cache mapping by means of a simple diagram (5 marks)

c) Briefly explain based on your diagram how direct cache mapping scheme works   (5 marks)

d) A smartwatch RAM has 512 MB of memory. The memory in this watch is divided into several words each 32 bytes. How many bits are needed to address any single word in this memory? Show your work step by step   (6 marks)

Question 3

a) There are different types of operating systems. Their use depends on the type of Computer and the type of applications that will be run on those computers. Distinguish between the Batch OS and Interactive OS.   (4 marks)

b) List and explain the 2 main objectives of an Operating System.   (4 marks)

c) Explain your understanding of the following virtual memory concepts   (4 marks)
  i)   paging
  ii)   demand paging

d) What is an ultimate importance of virtual memory management scheme?   (3 marks)

Question 4

Addressing modes are an aspect of the instruction set architecture in most central processing unit (CPU) designs. The various addressing modes that are defined in a given instruction set architecture define how machine language instructions in that architecture identify the operand(s) of each instruction.

Explain and provide one example of each of the following instruction addressing mode

(9 marks)

i)Immediate

ii)Direct

iii)Register

Question 5

a) What is Instruction pipelining? (2 marks)

b) List the basic five instruction pipeline stages (3 marks)

c) Show diagrammatically how instruction pipelining is implemented in typical modern microprocessor. Your diagram should emphasize how instructions, pipeline stages and clock cycle are related (8 marks)

*****END OF PAPER*****