



***“Investing in Africa’s future”***  
**COLLEGE OF BUSINESS, PEACE, LEADERSHIP, AND GOVERNANCE**  
**NCIS 303: COMPUTER ARCHITECTURE AND ORGANIZATION**  
**END OF SECOND SEMESTER EXAMINATIONS**  
**APRIL 2023**  
**LECTURER: DR. YOGESH AWASTHI**  
**DURATION: 3 HOURS**

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***INSTRUCTIONS***

Answer the question as per the instructions given in the sections

Start **each** question on a new page on your answer sheet.

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The marks allocated to **each** question are shown at the end of the section.

## Section A (20 Marks)

### Q.1 Choose the correct or the best alternative in the following: (2×10)

- i. The addressing mode used in an instruction of the form ADD X Y, is
  - A. Absolute
  - B. indirect
  - C. index
  - D. none of these
- ii. In a program using subroutine call instruction, it is necessary
  - A. Initialise program counter
  - B. Clear the accumulator
  - C. Reset the microprocessor
  - D. Clear the instruction register
- iii. The BSA instruction is
  - A. Branch and store accumulator
  - B. Branch and save return address
  - C. Branch and shift address
  - D. Branch and show accumulator
- iv. A group of bits that tell the computer to perform a specific operation is known as
  - A. Instruction code
  - B. Micro-operation
  - C. Accumulator
  - D. Register
- v. Which register holds the address of the instruction that should be executed next?
  - A. PC
  - B. MAR
  - C. IR
  - D. None
- vi. Register which is used to store values of arithmetic and logical operations is termed as
  - A. Arithmetic register
  - B. accumulator
  - C. logical register
  - D. controller
- vii. Sequence control register is also known as
  - A. program counter
  - B. instruction counter
  - C. sequence register
  - D. controlling register
- viii. An example of implied addressing is
  - A. Stack addressing
  - B. Immediate Addressing

C. Indirect addressing

D. None of these

ix. In the indirect address mode

A. the effective address is equal to the address part of the instructions

C. a memory is addressed by the register

B. the content of the program counter is added to address part of the instructions

D. address in the instruction points to location of the effective address

x. In an instruction the address part points to the address of actual data. The addressing mode is

A. immediate addressing

C. Indirect Addressing

B. Direct Addressing

D. None of these

### Section B (40 Marks)

**Q2. Answer any five questions from Section B. (8×5=40)**

- Draw the hardware implementation of common bus system for 4 registers.
- What is Arithmetic Micro operation? Define following operations;  
 $R3 \leftarrow R1 - R2$ ,  $R2 \leftarrow (\overline{R2}) + 1$ ,  $R3 \leftarrow R1 + (\overline{R2}) + 1$
- Define the 4 bit binary adder. Draw hardware implementation of the 4 bit binary.
- List out all logic micro operations with Boolean function and explain their meaning.
- What do you mean by Instruction Code? Draw the flow diagram (H/W Connection) which shows the stored program organization with instruction codes.
- How is the Input-Output instructions defined in computer system? Name all Input-Output instructions with code.
- What is an Assembler? With clear flowcharts for first and second pass, explain its working.

### Section C (40 Marks)

**Q3. Answer any two questions from Section C. (20×2=40)**

- How is Shift Operations work in computer circuit? Draw the hardware implementation of 4 bit combinational circuit shifters which perform all shift operations.

- b. How are the instruction cycle executed in the computer system? Write the micro operation of instruction Fetch & Decode and draw the flow chart for instruction cycle.
- c. Define all the operations where accumulator register is involve. Draw the hardware implementation of accumulator logic to show LD, INR and CLR.

**END OF EXAMINATION**