



**REPUBLIC OF KENYA**  
**COMPETENCY BASED MODULAR CURRICULUM**  
**FOR**  
**COMPUTER SCIENCE**  
**KNQF LEVEL 6**  
**(CYCLE 3)**

**PROGRAMME ISCED CODE: 0613 554 A.**



**TVET CDACC**  
**P.O. BOX 15745-00100**  
**NAIROBI**

# COMPUTER ORGANISATION AND ARCHITECTURE

**ISCED UNIT CODE:** 0613 554 01A

**UNIT CODE:** ICT/CU/CS/CR/01/6/MA

## **Relationship to Occupational Standards**

This unit addresses the unit of competency: Analyse Computer Organization and Architecture

**Duration of Unit:** 180 hours

## **Unit description**

This unit covers the competencies required to understand computer organisation and architecture. It involves understanding principles of computer organisation and design, understanding central processing unit functions, understanding computer memory organization, understanding input-output functions and understanding computer arithmetic and logic.

## **Summary of Learning Outcomes**

<b>Learning Outcomes</b>	<b>Durations (Hours)</b>
1. Principles of computer organization and design	30
2. Central processing unit functions	35
3. Computer memory functions	35
4. Input-output functions	30
5. Computer arithmetic and logic	50
<b>TOTAL</b>	<b>180</b>

## **Learning Outcomes, Content and Suggested Assessment Methods**

<b>Learning Outcome</b>	<b>Content</b>	<b>Suggested Assessment Methods</b>
1. Principles of computer	1.1 ICT concepts 1.2 Principles of computer organisation 1.3 Computer architecture is	<ul style="list-style-type: none"><li>• Practical tests</li><li>• Observation</li><li>• Oral tests</li></ul>

organisation and design	1.4 Structure and function of <b>computer hardware components</b>	<ul style="list-style-type: none"> <li>Written tests</li> </ul>
2. Central processing unit functions	2.1 Peripheral devices 2.2 The Central Processing Unit 2.3 CPU architecture 2.4 Registers 2.5 Instruction representation and execution 2.6 CPU specifications 2.7 CPU specifications are verification of computer system	<ul style="list-style-type: none"> <li>Practical tests</li> <li>Observation</li> <li>Oral tests</li> <li>Written tests</li> </ul>
3. Computer memory organization	3.1 Computer Memory Organization <ul style="list-style-type: none"> <li>3.1.1 Functions</li> <li>3.1.2 Categories of internal memory</li> <li>3.1.3 Standard memory specification factors</li> </ul> 3.2 Storage technologies <ul style="list-style-type: none"> <li>3.2.1 Solid state storage devices</li> <li>3.2.2 Optical storage devices</li> <li>3.2.3 Magnetic storage devices</li> </ul> 3.3 Cache and Virtual memory <ul style="list-style-type: none"> <li>3.3.1 Definitions</li> <li>3.3.2 Operations of cache and virtual memory</li> </ul> 3.4 Prescription of memory specifications as per user needs Verification of memory specifications for a given computer	<ul style="list-style-type: none"> <li>Practical tests</li> <li>Observation</li> <li>Oral tests</li> <li>Written tests</li> </ul>
4. Input-output organization	4.1 Peripheral devices 4.2 Standard I/O devices specification factors	<ul style="list-style-type: none"> <li>Practical tests</li> <li>Observation</li> </ul>

	<p>4.3 Role of Bus interface in I/O</p> <p>4.4 Modes of data transfer</p> <p>    2.4.1 Programmed I/O</p> <p>    2.4.2 Interrupt initiated I/O</p> <p>    2.4.3 Direct memory access (DMA)</p> <p>4.5 I/O devices' specifications as per user needs</p> <p>4.6 Verification of computer I/O devices' specifications</p> <p>4.7 Input-output processing</p>	<ul style="list-style-type: none"> <li>• Oral tests</li> <li>• Written tests</li> </ul>
5. Computer arithmetic and logic	<p>5.1 Number systems</p> <p>    5.1.1 Types</p> <p>    5.1.2 Operations</p> <p>    5.1.3 Conversion</p> <p>5.2 IEEE-based Integer and Floating point representations</p> <p>5.3 Integer and Floating-point arithmetic</p> <p>    5.3.1 Addition</p> <p>    5.3.2 Subtraction</p> <p>    5.3.3 Multiplication</p> <p>5.4 Logic operators</p> <p>    5.4.1 OR</p> <p>    5.4.2 AND</p> <p>    5.4.3 NAND</p> <p>    5.4.4 NOR</p> <p>    5.4.5 NOT</p> <p>5.5 Logic operations</p> <p>    5.5.1 Addition</p> <p>    5.5.2 Multiplication</p> <p>    5.5.3 Subtraction</p> <p>    5.5.4 Division</p>	<ul style="list-style-type: none"> <li>• Practical tests</li> <li>• Observation</li> <li>• Oral tests</li> <li>• Written tests</li> </ul>

	<p>5.6 Representing logic operations</p> <p>5.6.1 Truth table</p> <p>5.6.2 Karnaugh maps</p> <p>5.6.3 Logic gates</p>	
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### **Suggested Methods of Instruction**

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised activities and projects in a workshop
- Simulation
- Visiting lecturer/specialist from the ICT sector;
- Industrial visits.

### **Recommended Resources for 25 trainees**

<b>S/No.</b>	<b>Category/Item</b>	<b>Description/Specifications</b>	<b>Quantity</b>	<b>Recommended Ratio (Trainee: Item)</b>
1	Desktop Computers	Minimum: Intel i5 or Ryzen 5, 8GB RAM, 256GB SSD, USB ports, HDMI/VGA, Windows/Linux OS installed	13	2:1
2	Projector	HD resolution, HDMI/VGA input.	1	25:1
3	Whiteboard & Markers	Whiteboard (min 4x6 feet), assorted color markers	1 set	25:1
4	Computer Hardware Toolkit	Screwdrivers, anti-static wristbands, pliers, cable testers, etc.	5 sets	5:1

5	Sample Hardware Components	CPU (old and new), RAM (DDR3/DDR4), SSD/HDD, Motherboard, GPU, PSU, I/O cards	5 sets	5:1
6	Peripheral Devices	Keyboards, mice, scanners, webcams, printers (shared), microphones, external drives	25 sets (shared)	1:1 (essential); shared for optional items
7	Networking Devices	Switches, routers, Ethernet cables, RJ45 crimping tools	2 sets	Shared for demonstrations
8	Internet Access	Broadband/Wi-Fi for software downloads, online tools	1	25:1
9	Simulation Software	Logic simulator (e.g. Logisim), CPU simulators, memory management simulators	Site License	25:1 (individual access)
10	Number System Charts	Binary, Octal, Decimal, Hexadecimal conversion tables	5 sets	5:1
11	Printed Handouts/Manuals	Module notes, exercises, CPU cycle diagrams, logic gate explanations, memory hierarchy	25	1:1
12	Storage Devices	Flash drives for each trainee	25	1:1
13	Karnaugh Map Templates	Printed sheets or laminated reusable versions	10 sets	2.5:1
14	Logic Gate Kits	Breadboards, logic ICs (AND, OR, NOT, NAND, NOR, XOR), LEDs, resistors, power supply	10 sets	2.5:1

15	Digital Multimeters	For circuit testing and diagnostics	5	5:1
16	Instructor Computer/Laptop	Higher spec than trainee systems, used for demos, presentations	1	25:1
17	Software Licenses	OS, simulation tools, productivity software (MS Office or LibreOffice), compilers (GCC, Python, etc.)	Site License	25:1
18	Backup Storage Device	External HDD/SSD (1TB or more) for central data backup	1	Shared
19	Printer	Laser or inkjet printer with scanning functionality	1	Shared
20	Stationery Supplies	Pens, notebooks, sticky notes, highlighters, rulers, etc.	25 sets	1:1