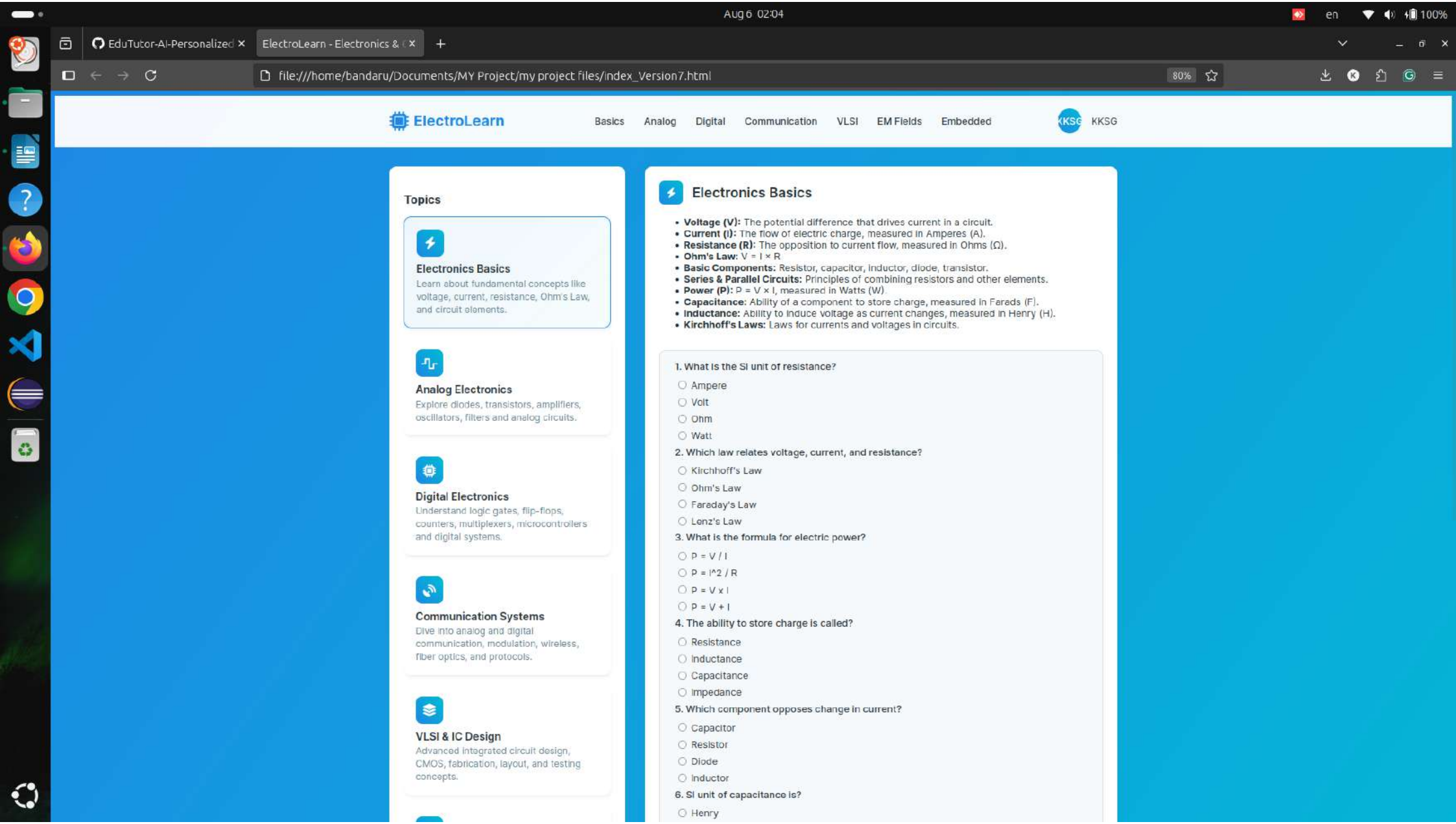
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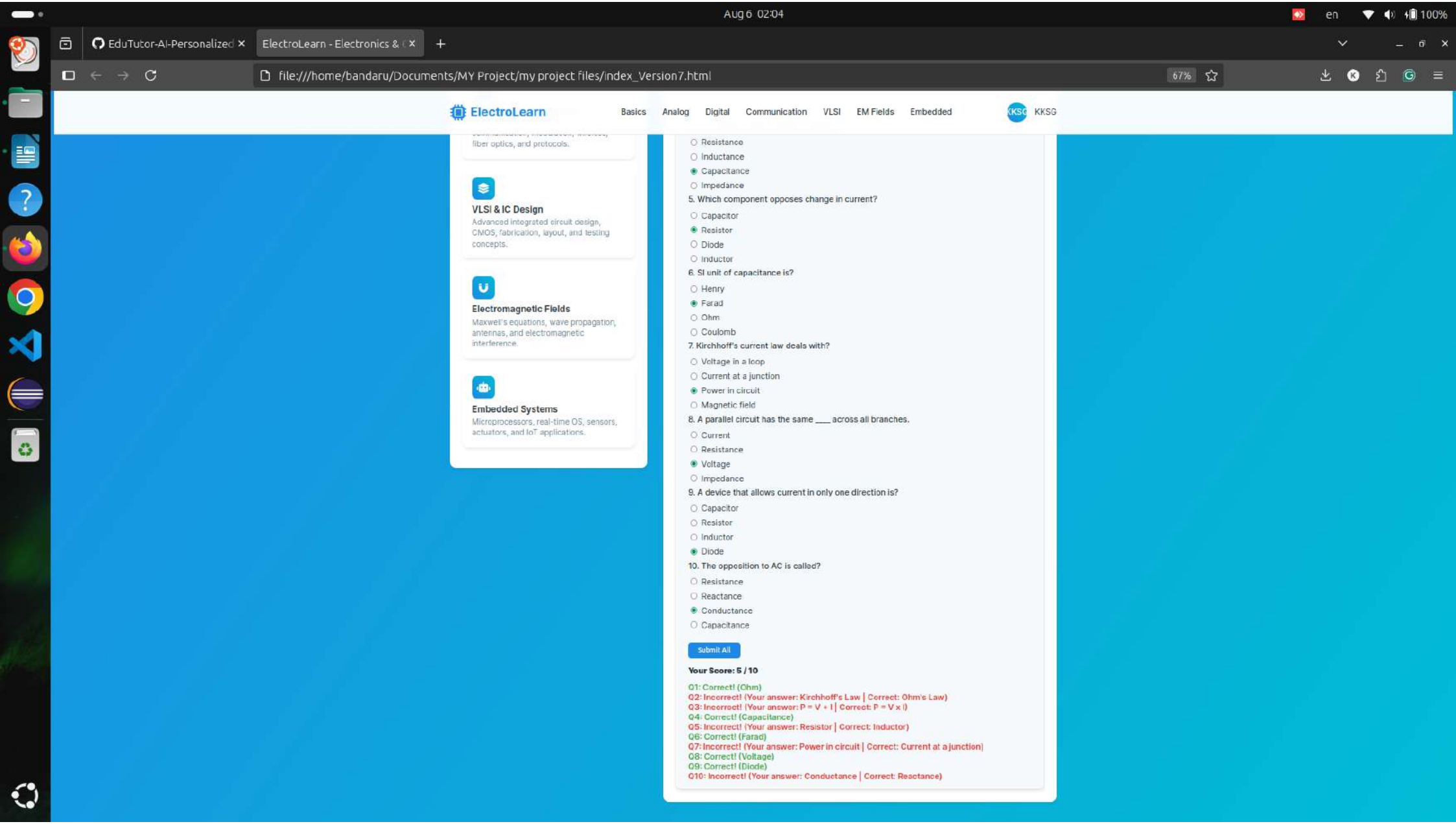
• Voltage (V): The potential difference that drives current in a circuit.
• Current (I): The flow of electric charge, measured in Amperes (A).
• Resistance (R): The opposition to current flow, measured in Ohms (Ω).
• Ohm's Law: V = I × R
• Basic Components: Resistor, capacitor, inductor, diode, transistor.
• Series & Parallel Circuits: Principles of combining resistors and other elements.
• Power (P): P = V × I, measured in Watts (W).
• Capacitance: Ability of a component to store charge, measured in Farads (F).
• Inductance: Ability to induce voltage as current changes, measured in Henry (H).
• Kirchhoff's Laws: Laws for currents and voltages in circuits.
1. What is the SI unit of resistance?
Ampere
Volt
Ohm
Watt
2. Which law relates voltage, current, and resistance?
Kirchhoff's Law
Ohm's Law
Faraday's Law
Lenz's Law
3. What is the formula for electric power?
P = V / I
P = I^2 / R
P = V x I
P = V + I
4. The ability to store charge is called?
Resistance
Inductance
Capacitance
Impedance
5. Which component opposes change in current?
Capacitor
Resistor
Diode
Inductor
6. SI unit of capacitance is?
Henry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Impedance
5. Which component opposes change in current?
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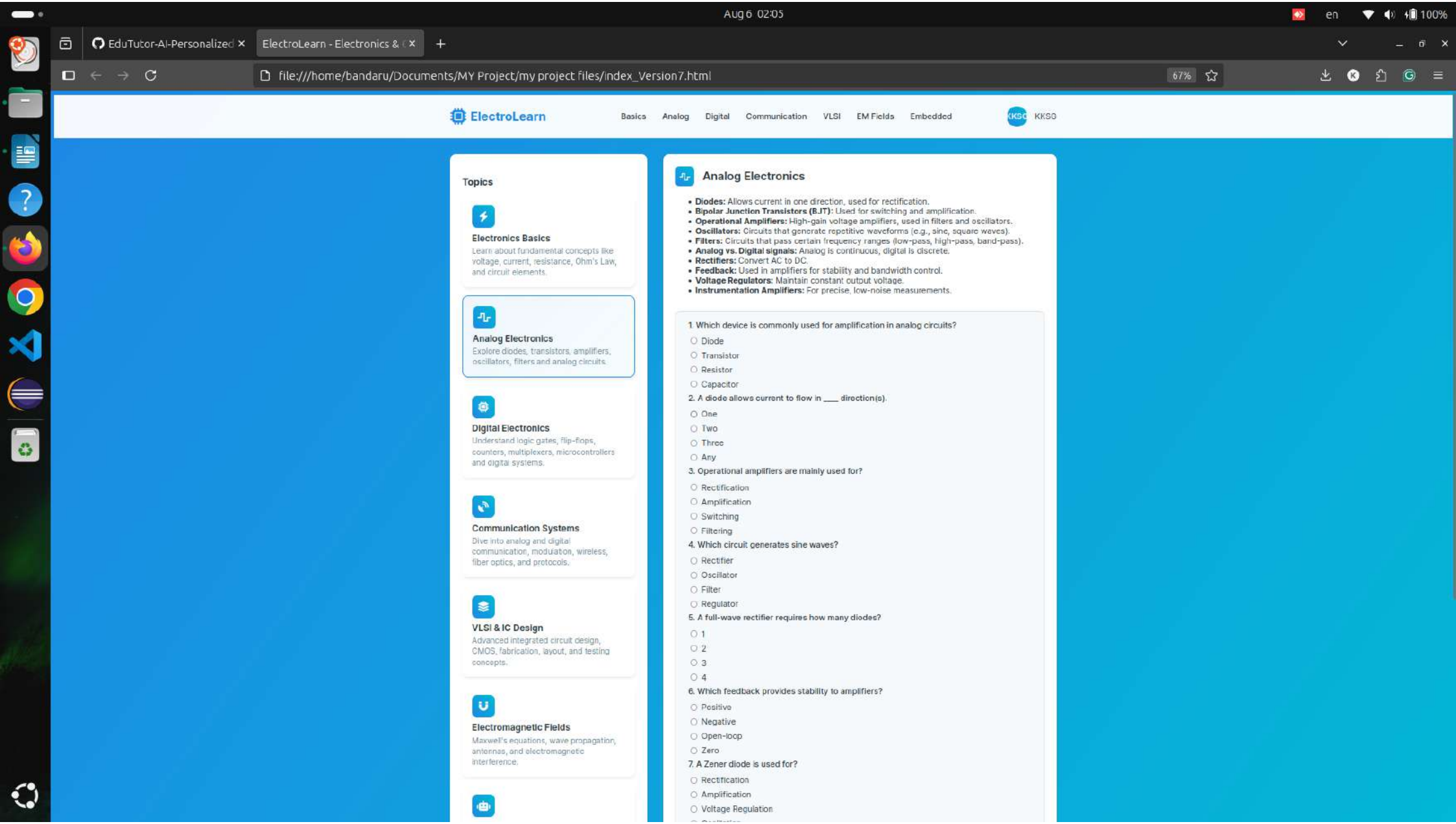
Inductor
6. SI unit of capacitance is?
Henry
Farad
Ohm
Coulomb
7. Kirchhoff's current law deals with?
Voltage in a loop
Current at a junction
Power in circuit
Magnetic field
8. A parallel circuit has the same ___ across all branches.
Current
Resistance
Voltage
Impedance
9. A device that allows current in only one direction is?
Capacitor
Resistor
Inductor
Diode
10. The opposition to AC is called?
Resistance
Reactance
Conductance
Capacitance
Submit All
Your Score: 5 / 10
Q1: Correct! (Ohm)
Q2: Incorrect! (Your answer: Kirchhoff's Law | Correct: Ohm's Law)
Q3: Incorrect! (Your answer: P = V + I | Correct: P = V x I)
Q4: Correct! (Capacitance)
Q5: Incorrect! (Your answer: Resistor | Correct: Inductor)
Q6: Correct! (Farad)
Q7: Incorrect! (Your answer: Power in circuit | Correct: Current at a junction)
Q8: Correct! (Voltage)
Q9: Correct! (Diode)
Q10: Incorrect! (Your answer: Conductance | Correct: Reactance)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Analog Electronics
• Diodes: Allows current in one direction, used for rectification.
• Bipolar Junction Transistors (BJT): Used for switching and amplification.
• Operational Amplifiers: High-gain voltage amplifiers, used in filters and oscillators.
• Oscillators: Circuits that generate repetitive waveforms (e.g., sine, square waves).
• Filters: Circuits that pass certain frequency ranges (low-pass, high-pass, band-pass).
• Analog vs. Digital signals: Analog is continuous, digital is discrete.
• Rectifiers: Convert AC to DC.
• Feedback: Used in amplifiers for stability and bandwidth control.
• Voltage Regulators: Maintain constant output voltage.
• Instrumentation Amplifiers: For precise, low-noise measurements.
1. Which device is commonly used for amplification in analog circuits?
Diode
Transistor
Resistor
Capacitor
2. A diode allows current to flow in ___ direction(s).
One
Two
Three
Any
3. Operational amplifiers are mainly used for?
Rectification
Amplification
Switching
Filtering
4. Which circuit generates sine waves?
Rectifier
Oscillator
Filter
Regulator
5. A full-wave rectifier requires how many diodes?
1
2
3
4
6. Which feedback provides stability to amplifiers?
Positive
Negative
Open-loop
Zero
7. A Zener diode is used for?
Rectification
Amplification
Voltage Regulation

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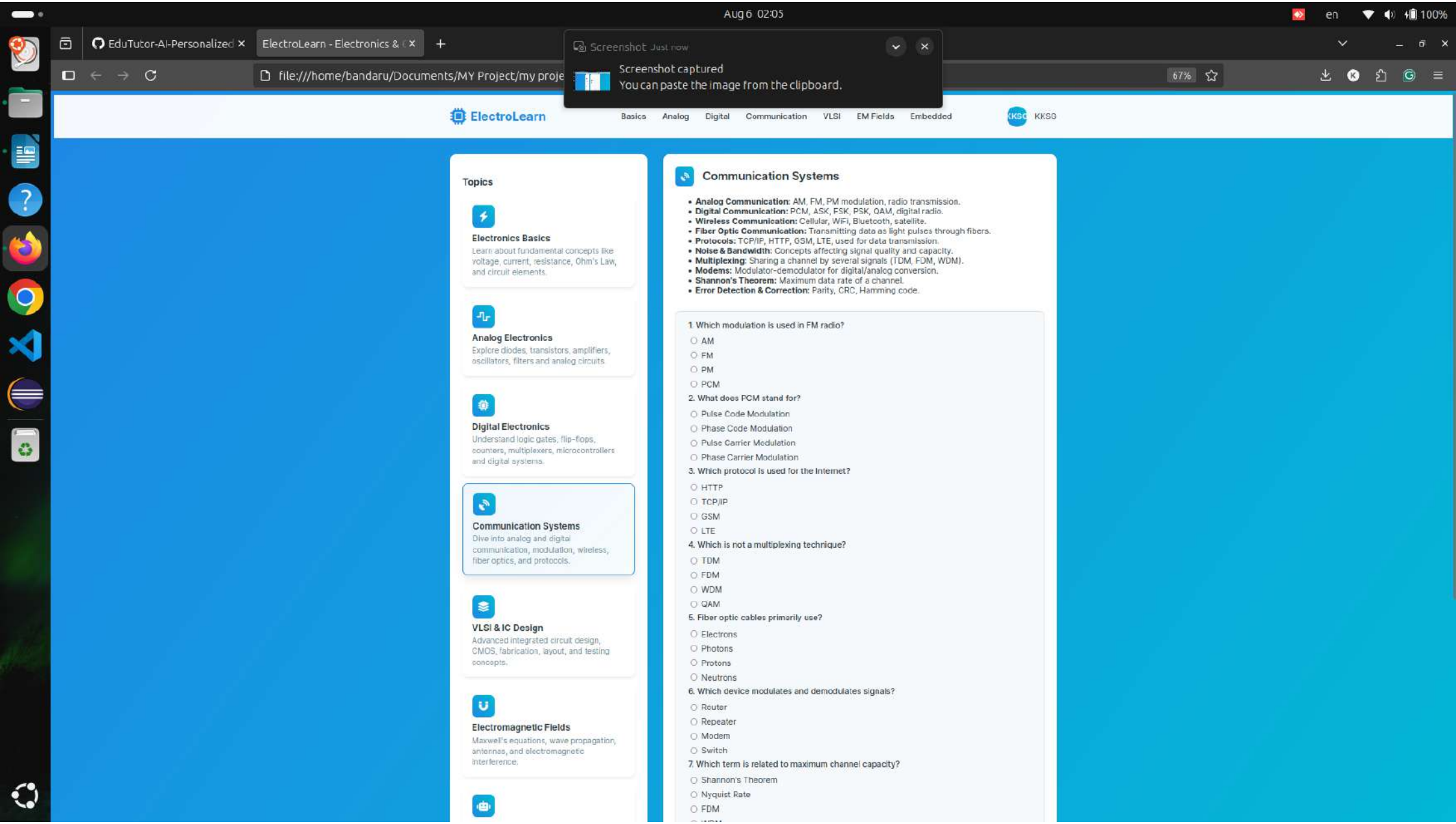
Digital Electronics

- **Logic Gates:** AND, OR, NOT, NAND, NOR, XOR, XNOR.
- **Flip-Flops:** Bistable devices used for memory and storage.
- **Counters & Registers:** Used for counting, data storage, and transfer.
- **Multiplexers & Demultiplexers:** Data routing components.
- **Microcontrollers:** Programmable integrated circuits for embedded systems.
- **Binary System:** 1s and 0s form the foundation of digital electronics.
- **FSM:** Finite State Machines for control logic.
- **PLDs:** Programmable Logic Devices like PAL, PLA, FPGA.
- **ADC/DAC:** Analog-to-digital and digital-to-analog converters.
- **Clock Signals:** Synchronize operations in circuits.

1. Which logic gate outputs HIGH only when all inputs are HIGH?
   - ○ AND
   - ○ OR
   - ○ NAND
   - ○ XOR
2. A flip-flop can store?
   - ○ 0
   - ○ 1
   - ○ 1 bit
   - ○ 8 bits
3. Which device converts analog signals to digital?
   - ○ ADC
   - ○ DAC
   - ○ MUX
   - ○ Demux
4. Binary of decimal 10 is?
   - ○ 1010
   - ○ 1100
   - ○ 1001
   - ○ 1110
5. Which is not a combinational circuit?
   - ○ Multiplexer
   - ○ Adder
   - ○ Counter
   - ○ Decoder
6. SR flip-flop stands for?
   - ○ Set-Reset
   - ○ Select-Reset
   - ○ Set-Read
   - ○ Sum-Reset
7. Which of the following is a sequential circuit?
   - ○ Adder
   - ○ Flip-Flop
   - ○ Multiplexer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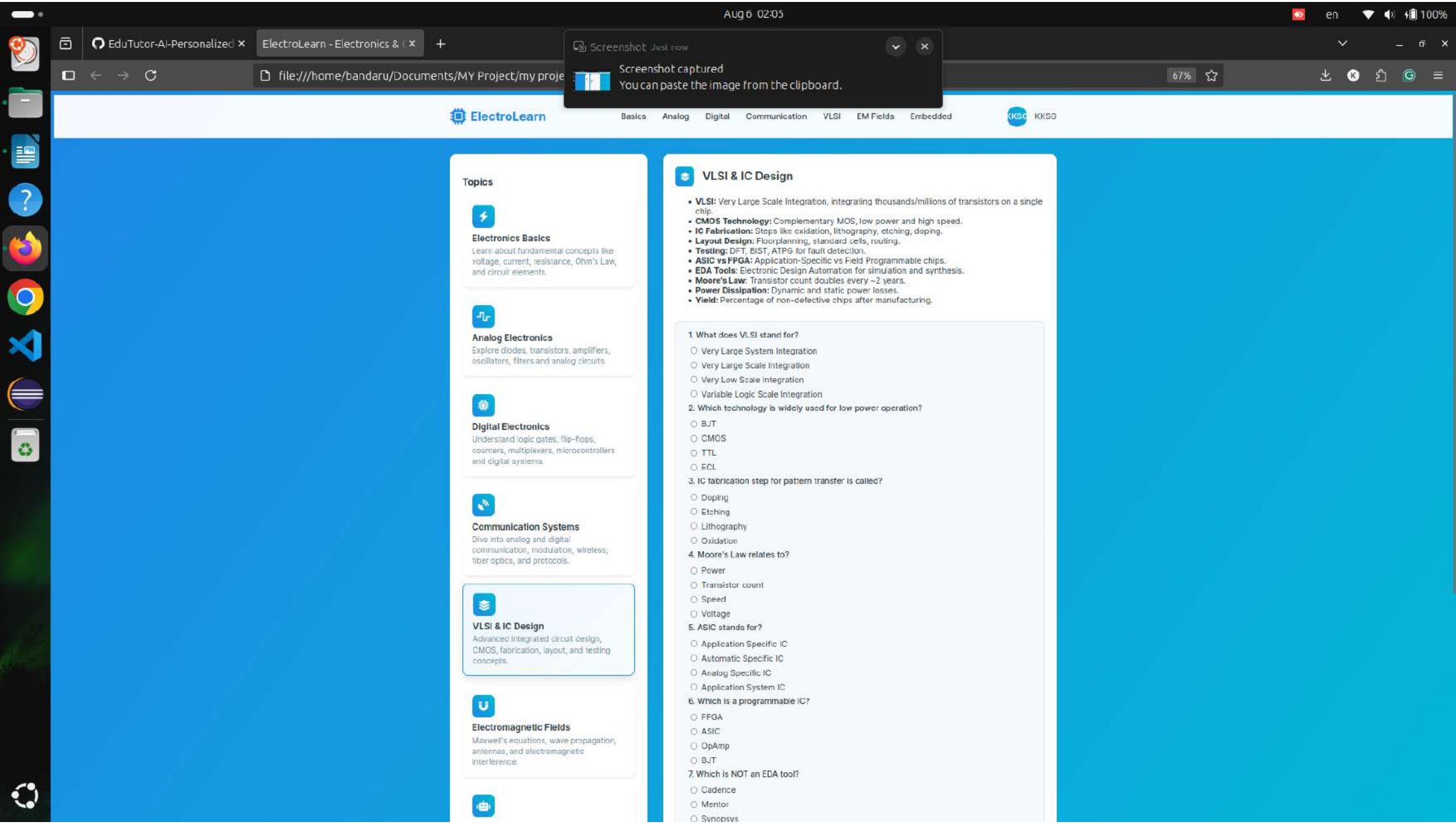
Communication Systems
• Analog Communication: AM, FM, PM modulation, radio transmission.
• Digital Communication: PCM, ASK, FSK, PSK, QAM, digital radio.
• Wireless Communication: Cellular, WiFi, Bluetooth, satellite.
• Fiber Optic Communication: Transmitting data as light pulses through fibers.
• Protocols: TCP/IP, HTTP, GSM, LTE, used for data transmission.
• Noise & Bandwidth: Concepts affecting signal quality and capacity.
• Multiplexing: Sharing a channel by several signals (TDM, FDM, WDM).
• Modems: Modulator-demodulator for digital/analog conversion.
• Shannon's Theorem: Maximum data rate of a channel.
• Error Detection & Correction: Parity, CRC, Hamming code.
1. Which modulation is used in FM radio?
AM
FM
PM
PCM
2. What does PCM stand for?
Pulse Code Modulation
Phase Code Modulation
Pulse Carrier Modulation
Phase Carrier Modulation
3. Which protocol is used for the Internet?
HTTP
TCP/IP
GSM
LTE
4. Which is not a multiplexing technique?
TDM
FDM
WDM
QAM
5. Fiber optic cables primarily use?
Electrons
Photons
Protons
Neutrons
6. Which device modulates and demodulates signals?
Router
Repeater
Modem
Switch
7. Which term is related to maximum channel capacity?
Shannon's Theorem
Nyquist Rate
FDM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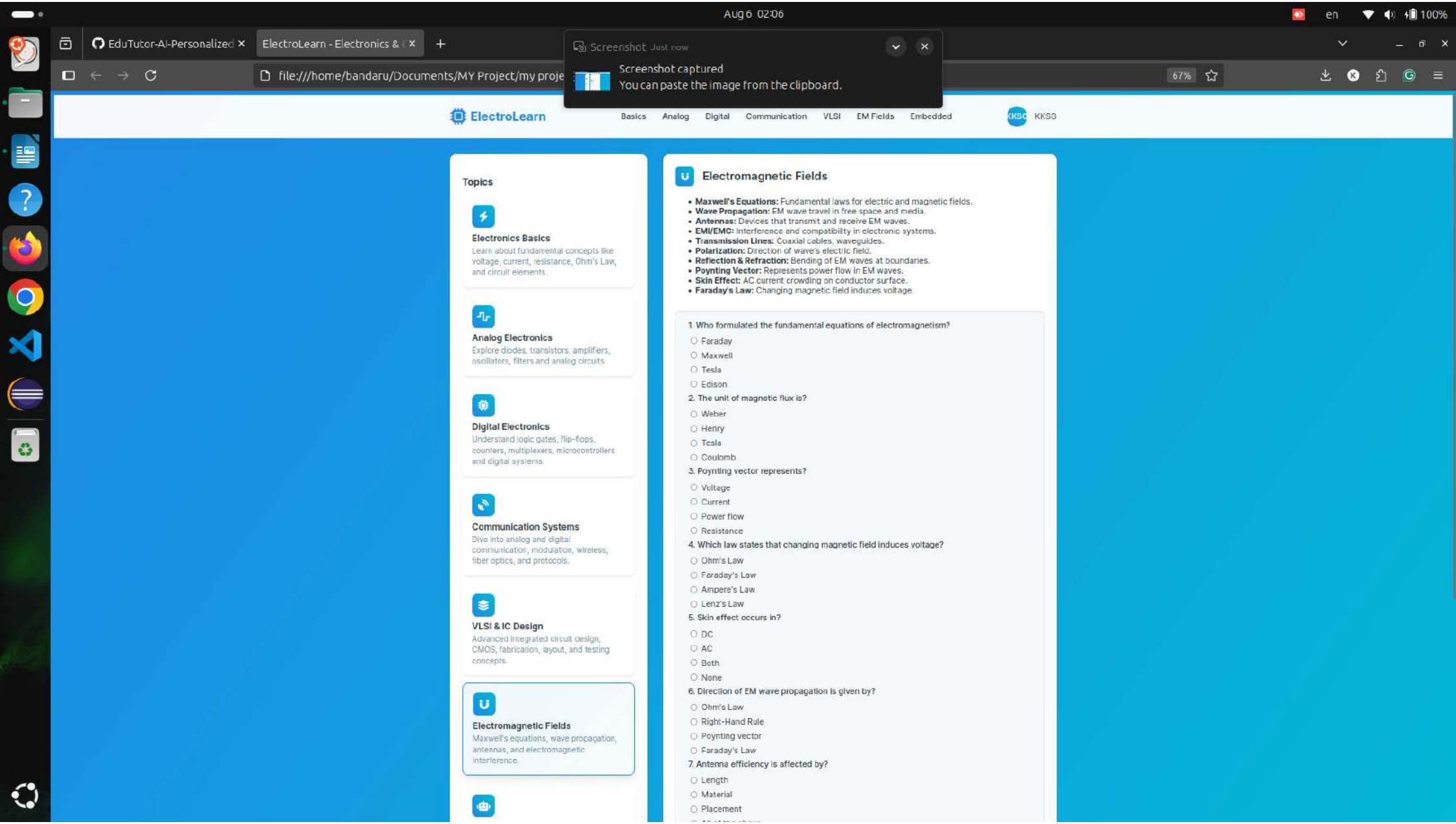
VLSI & IC Design
VLSI: Very Large Scale Integration, integrating thousands/millions of transistors on a single chip.
CMOS Technology: Complementary MOS, low power and high speed.
IC Fabrication: Steps like oxidation, lithography, etching, doping.
Layout Design: Floorplanning, standard cells, routing.
Testing: DFT, BIST, ATPG for fault detection.
ASIC vs FPGA: Application-Specific vs Field Programmable chips.
EDA Tools: Electronic Design Automation for simulation and synthesis.
Moore's Law: Transistor count doubles every ~2 years.
Power Dissipation: Dynamic and static power losses.
Yield: Percentage of non-defective chips after manufacturing.
1. What does VLSI stand for?
Very Large System Integration
Very Large Scale Integration
Very Low Scale Integration
Variable Logic Scale Integration
2. Which technology is widely used for low power operation?
BJT
CMOS
TTL
ECL
3. IC fabrication step for pattern transfer is called?
Doping
Etching
Lithography
Oxidation
4. Moore's Law relates to?
Power
Transistor count
Speed
Voltage
5. ASIC stands for?
Application Specific IC
Automatic Specific IC
Analog Specific IC
Application System IC
6. Which is a programmable IC?
FPGA
ASIC
OpAmp
BJT
7. Which is NOT an EDA tool?
Cadence
Mentor
Synopsys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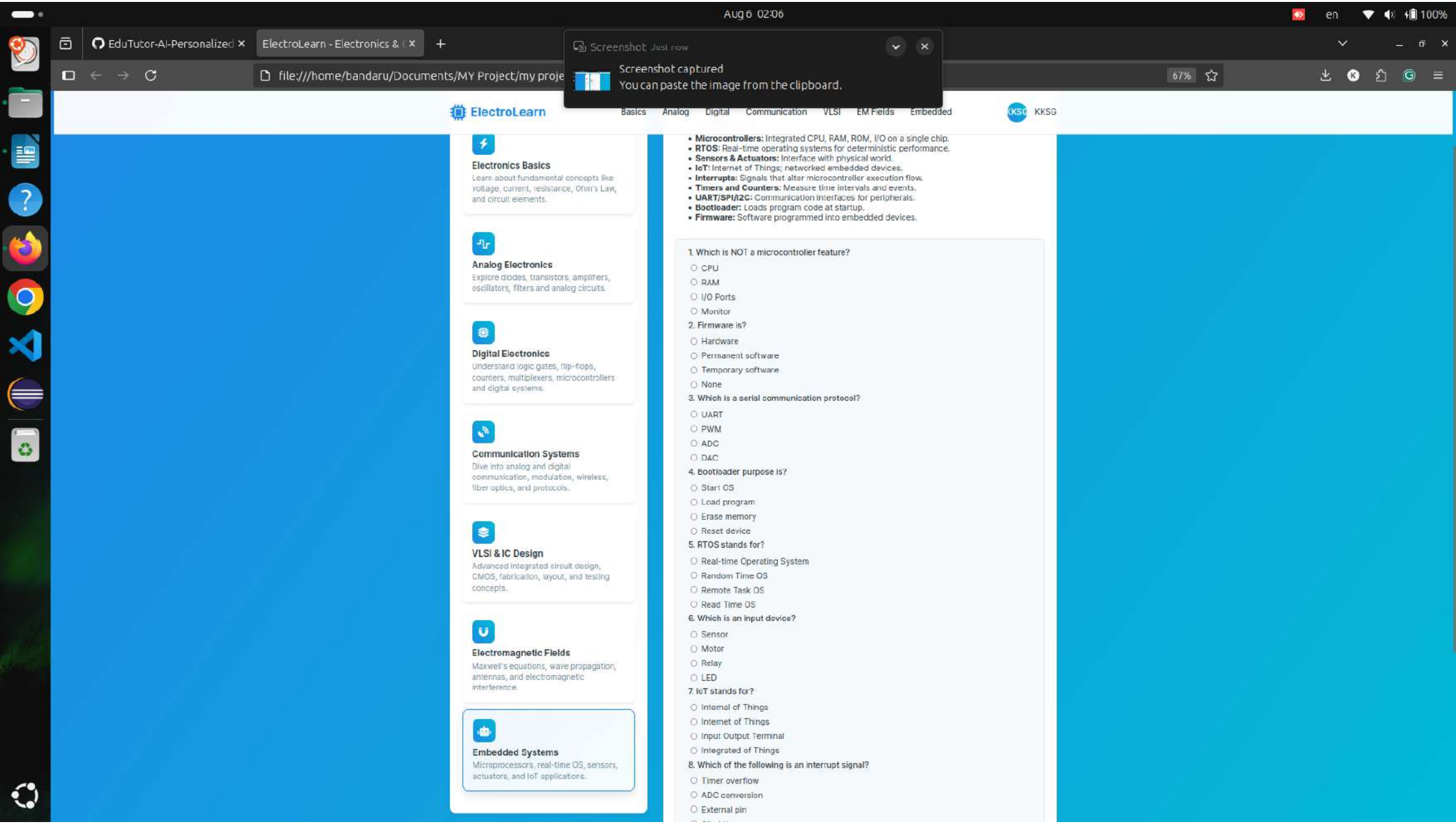
Electromagnetic Fields
Maxwell's Equations: Fundamental laws for electric and magnetic fields.
Wave Propagation: EM wave travel in free space and media.
Antennas: Devices that transmit and receive EM waves.
EMI/EMC: Interference and compatibility in electronic systems.
Transmission Lines: Coaxial cables, waveguides.
Polarization: Direction of wave's electric field.
Reflection & Refraction: Bending of EM waves at boundaries.
Poynting Vector: Represents power flow in EM waves.
Skin Effect: AC current crowding on conductor surface.
Faraday's Law: Changing magnetic field induces voltage.
1. Who formulated the fundamental equations of electromagnetism?
Faraday
Maxwell
Tesla
Edison
2. The unit of magnetic flux is?
Weber
Henry
Tesla
Coulomb
3. Poynting vector represents?
Voltage
Current
Power flow
Resistance
4. Which law states that changing magnetic field induces voltage?
Ohm's Law
Faraday's Law
Ampere's Law
Lenz's Law
5. Skin effect occurs in?
DC
AC
Both
None
6. Direction of EM wave propagation is given by?
Ohm's Law
Right-Hand Rule
Poynting vector
Faraday's Law
7. Antenna efficiency is affected by?
Length
Material
Placement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• Microcontrollers: Integrated CPU, RAM, ROM, I/O on a single chip.
• RTOS: Real-time operating systems for deterministic performance.
• Sensors & Actuators: Interface with physical world.
• IoT: Internet of Things; networked embedded devices.
• Interrupts: Signals that alter microcontroller execution flow.
• Timers and Counters: Measure time intervals and events.
• UART/SPI/I2C: Communication interfaces for peripherals.
• Bootloader: Loads program code at startup.
• Firmware: Software programmed into embedded devices.
1. Which is NOT a microcontrolier feature?
CPU
RAM
I/O Ports
Monitor
2. Firmware is?
Hardware
Permanent software
Temporary software
None
3. Which is a serial communication protocol?
UART
PWM
ADC
DAC
4. Bootloader purpose is?
Start OS
Load program
Erase memory
Reset device
5. RTOS stands for?
Real-time Operating System
Random Time OS
Remote Task OS
Read Time OS
6. Which is an input device?
Sensor
Motor
Relay
LED
7. IoT stands for?
Internal of Things
Internet of Things
Input Output Terminal
Integrated of Things
8. Which of the following is an interrupt signal?
Timer overflow
ADC conversion
External pin