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Introduction to AI and Applications (BAI103)

CCA – 1

1. Basic Prompt writing: Create two different prompts to ask an AI about the topic "Electricity." The first prompt should be vague, and the second prompt should be clear and specific. Compare the responses you get and describe which prompt gave a better answer and why.

Prompt 1:

What is electricity?

Answer:

Electricity is a form of energy created by the movement of charged particles—usually electrons—through a material. You can think of it as a flow of tiny particles that carry energy from one place to another.

- **Electric charge:** Some particles (like electrons and protons) have electric charge.
- **Flow of electrons:** When electrons move through a conductor (like a wire), that movement is called *electric current*.

- **Energy carrier:** Electricity is a way to transfer energy so we can power lights, fans, phones, machines, etc.

Electricity is typically generated by:

- Spinning turbines (hydro, thermal, wind, nuclear)
- Solar panels
- Batteries (chemical reactions create electron flow)

Electricity flows when there is a **difference in electric potential** (voltage) between two points — like water flowing from high pressure to low pressure.

Prompt 2:

What are the different ways of generating electricity?

Answer:

Different Ways of Generating Electricity

1. Thermal Power Generation

Electricity is produced by burning fossil fuels such as coal, natural gas, or oil. The heat converts water into steam, and the steam rotates a turbine connected to a generator. This method is reliable but produces high carbon emissions and requires continuous fuel supply.

2. Nuclear Power Generation

Nuclear reactors use controlled fission of uranium to produce heat. The heat generates steam, which drives turbines to produce electricity. Nuclear power provides stable, large-scale electricity with very low operational emissions, but it requires careful handling of radioactive waste.

3. Hydroelectric Power

Flowing or falling water (usually from dams) spins turbines that power generators. Hydroelectric plants are very efficient and renewable but depend on water availability and can impact local ecosystems.

4. Wind Power

Wind turns large turbine blades, and the rotation drives a generator.
Wind power is clean and renewable, but generation varies depending on wind conditions and location suitability.

5. Solar Power

Two main types:

- Solar Photovoltaic (PV): Converts sunlight directly into electricity using semiconductor panels.
- Concentrated Solar Power (CSP): Uses mirrors to focus sunlight, producing heat that drives steam turbines.

Solar is widely used but depends on sunlight availability.

6. Geothermal Power

Heat from beneath the Earth's surface is used to produce steam that drives turbines.
Geothermal provides steady electricity but is limited to geologically suitable regions.

7. Biomass and Waste-to-Energy

Organic materials (like wood, agricultural waste, or biogas) are burned or processed to produce heat and electricity.

It can reduce waste but must be managed carefully to avoid air pollution.

8. Tidal and Wave Power

The movement of ocean tides or waves turns turbines to produce electricity.
This method is predictable but still in developing stages and depends on suitable coastlines.

Comparison & Reason: Prompt 2 gives a much more accurate and precise result than Prompt 1 as the prompt is clear and concise

2. Zero-Shot Prompting: Create a prompt that asks an AI to explain Ohm's Law without giving any example or background. Evaluate how well the AI explains the concept based on your prompt alone.

Prompt:

Explain ohm's law

Answer:

Ohm's Law describes the relationship between **voltage**, **current**, and **resistance** in an electrical circuit.

It states that:

The current flowing through a conductor is directly proportional to the voltage across it and inversely proportional to its resistance.

Mathematically:

$$V = I \times R$$

Where:

- **V** = Voltage (measured in volts, V)
- **I** = Current (measured in amperes, A)
- **R** = Resistance (measured in ohms, Ω)

Meaning of the Formula

1. **If voltage increases and resistance stays the same → current increases.**
More electrical "push" makes more charge flow.
2. **If resistance increases and voltage stays the same → current decreases.**
A higher resistance reduces the flow of current.
3. **If current increases at constant voltage → resistance decreases.**

Why Ohm's Law is Important

- It helps you **calculate how much current** a device will draw.
- It allows you to design circuits safely.
- It is used in **choosing resistors, protecting components**, and analyzing electrical behavior.

Evaluation: As the prompt was too vague, the response tries to cover most of the material related to the topic whilst keeping each of them short.

3. One-Shot and Few-Shot Prompting: Provide the AI with a single example of how to calculate the resistance in a simple circuit. Then write your own prompt asking the AI to solve a similar resistance calculation. After that, add two more examples to your prompt and observe any changes in the AI's response quality.

Prompt 1:

Given that voltage is 3V and current is 3A, Resistance is calculated as $R = V/I = 3V/3A = 3 \text{ ohms}$. Calculate resistance if the voltage in the circuit is 24 volts and the current through the circuit is 8 amperes.

Answer:

To calculate resistance, we use **Ohm's Law**:

$$R = \frac{V}{I}$$

Given:

- Voltage $V = 24 \text{ V}$
- Current $I = 8 \text{ A}$

Now substitute:

$$R = \frac{24}{8} = 3 \Omega$$

Final Answer:

The resistance is 3 ohms.

Prompt 2:

If voltage is 10 volts and current is 2 amperes, then resistance $R = 10 / 2 = 5$ ohms.
If current is 3 amperes and voltage is 12 volts then resistance $R = 12 / 3 = 4$ ohms.
What is the resistance given that voltage is 220 volts and the current is 5 amperes?

Answer:

If voltage is 10 volts and current is 2 amperes, then resistance
 $R = 10/2 = 5 \Omega$.

If current is 3 amperes and voltage is 12 volts, then resistance
 $R = 12/3 = 4 \Omega$.

What is the resistance given that voltage is 220 volts and the current is 5 amperes?

Answer

The resistance for a voltage of **220 V** and a current of **5 A** is calculated using Ohm's law:

$$R = \frac{V}{I} = \frac{220}{5} = 44 \Omega$$

This matches the pattern shown in the earlier examples, confirming that the relationship between voltage, current, and resistance is consistent for an ohmic conductor.

Verification of Provided Examples

- **First case:**

$$R = \frac{10}{2} = 5 \Omega$$

This is correct.

- **Second case:**

$$R = \frac{12}{3} = 4 \Omega$$

Also correct.

These values reflect how different combinations of voltage and current produce different resistances according to Ohm's law, assuming ideal conditions without temperature effects.

Detailed Calculation for the Query

Using

$$R = \frac{V}{I}$$
$$R = \frac{220}{5} = 44 \, \Omega$$

This resistance represents how much the circuit opposes current flow at 220 V when 5 A is drawn.

Power for this setup is:

$$P = V \times I = 220 \times 5 = 1100 \text{ watts}$$

Analysis:

In prompt 1, it calculates the problem and gives the step-by-step calculation process while in prompt 2, it calculates the solution to the problem and also verifies the examples provided in the prompt and also gives extra information about power.

4. Chain-of-Thought Prompting: Develop a prompt that guides the AI step-by-step through calculating current flow in a circuit using Ohm's Law with resistors in series. Then, ask a final question for the AI to solve. Analyze how breaking down the reasoning steps impacts the accuracy of the answer.

Prompt:

In series combination, individual resistances are added up in a 3 resistor system with resistances 5 ohms, 10 ohms and 5 ohms. The voltage through the circuit is 100 volts. The current can be calculated with ohm's law: $I = V/R$, hence current $I = V / (R_1 + R_2 + R_3) = 100 / (5 + 10 + 5) = 100/20 = 5$ amperes. Similarly calculate current given that there are 4 resistors with 5 ohms, 6 ohms, 7 ohms, 8 ohms respectively and voltage is 150 volts.

Answer:

To find the current in a **series circuit**, first add all the resistances, then apply Ohm's Law:

$$I = \frac{V}{R_{\text{total}}}$$

Step 1: Add the resistances

Given resistors:
5 Ω , 6 Ω , 7 Ω , 8 Ω

$$R_{\text{total}} = 5 + 6 + 7 + 8 = 26 \Omega$$

Step 2: Apply Ohm's Law

Voltage $V = 150\text{volts}$

$$I = \frac{150}{26}$$

Step 3: Calculate

$$I \approx 5.769 \text{ amperes}$$

Final Answer:

The current in the circuit is approximately **5.77 amperes**.

Analysis:

The answer given by the AI is very accurate and it also breaks down its reasoning process while verifying the example given in the prompt

5. Prompt Refinement: Start with an ambiguous prompt related to the "Water Cycle." Test the AI's response, note the confusion or errors, and then refine your prompt to make it clearer and more specific. Repeat this process twice and record how the AI's responses improve with each refinement.

Role-Based Prompting: Create three prompts asking the AI to explain "Newton's Laws of Motion," each with a different role instruction: (a) as an expert engineer, (b) as a high school teacher, (c) as a beginner. Compare the tone, detail, and style of the responses.

Prompt 1:

Explain water cycle.

Answer:

The **water cycle** (also called the hydrological cycle) describes the continuous movement of water on, above, and below the surface of the Earth. It operates in a loop powered mainly by the **Sun's heat**.

The major stages are:

1. Evaporation

- Heat from the sun causes water from oceans, rivers, lakes, and wet soil to turn into water vapor (a gas).
 - This vapor rises into the atmosphere.
-

2. Transpiration

- Plants lose water through tiny openings in their leaves.
 - This water also becomes vapor and rises into the air.
 - Combined with evaporation, this process is sometimes called **evapotranspiration**.
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3. Condensation

- As water vapor rises higher, the air becomes cooler.
 - The vapor cools and changes back into tiny water droplets, forming **clouds**.
-

4. Precipitation

- When cloud droplets combine and become too heavy, they fall back to Earth as **rain, snow, sleet, or hail**.
-

5. Collection

- The fallen water gathers in rivers, lakes, oceans, and underground reservoirs.
 - Much of this water will again evaporate, continuing the cycle.
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Why the Water Cycle Is Important

- It distributes fresh water across the planet.
- It maintains weather patterns and climate.
- It supports life by providing plants, animals, and humans with water.

Prompt 2:

What is the difference between evaporation and transpiration?

Answer:

Difference Between Evaporation and Transpiration

Evaporation

- **Process:** Water changes from a liquid to a vapor due to heat.
 - **Where it happens:** On the **surface of water bodies** like oceans, lakes, rivers, ponds, and wet soil.
 - **Caused by:** The **sun's heat** warming the water.
 - **Involves:** Only **water**—no living organisms are required.
-

Transpiration

- **Process:** Plants release water vapor from tiny openings (stomata) in their leaves.
 - **Where it happens:** In the **leaves of plants and trees**.
 - **Caused by:** Plant processes and sunlight that drive water movement inside the plant.
 - **Involves:** **Living plants**, not open water bodies.
-

Main Difference (Short Form)

- **Evaporation:** Water turning into vapor from surfaces.
- **Transpiration:** Water vapor released from plants.

Analysis:

As prompt 1 was vague and prompt 2 was specific about the sub-topic, the response for prompt 2 is much more readable and clear while prompt 1 explains the overall idea about each sector/sub-topic that come under water cycle.

Prompt 3:

Explain Newton's laws of motion as an expert engineer.

Answer:

Newton's laws form the foundation of classical mechanics. They describe how forces interact with mass and how objects behave under applied forces. Engineers use these laws in designing structures, machines, vehicles, robotics, and virtually every physical system.

1. Newton's First Law: Law of Inertia

Statement:

A body at rest remains at rest, and a body in motion continues to move at constant velocity in a straight line *unless acted upon by a net external force*.

Engineering Interpretation:

- If the net force on an object is zero, its velocity does not change.
- Machines and vehicles require an external force (engine torque, friction reduction, braking, etc.) to change motion.
- This law defines *equilibrium conditions*:
 - Static equilibrium: Object remains at rest.
 - Dynamic equilibrium: Object moves at constant velocity.

Application Examples:

- Designing supports for buildings to ensure forces balance (sum of forces = 0).
 - Understanding why a vehicle continues rolling when engine power is cut until friction and drag slow it down.
-

2. Newton's Second Law: Law of Acceleration

Statement:

The acceleration of an object is directly proportional to the net force acting on it and inversely proportional to its mass.

$$F_{\text{net}} = ma$$

Engineering Interpretation:

- This law quantifies how much force is required to produce a desired motion.
- Larger masses require larger forces for the same acceleration.
- It is the basis for analyzing mechanical systems, such as:
 - Vehicle acceleration calculations
 - Load and stress analysis
 - Robotics motion control
 - Structural response to dynamic forces

Key Point:

The direction of acceleration is the same as the direction of the net applied force.

3. Newton's Third Law: Action–Reaction Law

Statement:

For every action, there is an equal and opposite reaction.

Engineering Interpretation:

- Forces always occur in pairs.
- When one body exerts a force on another, the second body exerts an equal and opposite force back.
- Engineers must account for reaction forces in:
 - Bridge supports
 - Machine mounts
 - Rocket propulsion
 - Hydraulic and pneumatic systems

Examples:

- A rocket moves upward because the expelled gases push downward with equal force.
- When a car accelerates forward, the tires push backward on the road, and the road pushes forward on the tires.

Prompt 4:

Explain Newton's laws of motion as a high school teacher.

Answer:

Newton's laws describe how and why objects move. They help us understand everyday things like why a ball stops rolling, why a car speeds up, or why you feel pushed back when a bus starts moving.

1. Newton's First Law — Law of Inertia

Statement:

An object will stay at rest or keep moving in a straight line at the same speed unless a force acts on it.

Meaning:

- Things don't start moving, stop moving, or change direction by themselves.
- They need a push or pull (a force).

Examples:

- A book on a table won't move unless you push it.
- A rolling ball eventually stops because friction acts on it.
- When a bus suddenly stops, you fall forward because your body wants to keep moving.

2. Newton's Second Law — Law of Acceleration

Statement:

The acceleration of an object depends on the force applied and its mass.

Mathematically:

$$F = m \times a$$

Meaning:

- More force → more acceleration.
- More mass → less acceleration for the same force.

Examples:

- It's easier to push an empty cart than a full one because the full cart has more mass.
- A bigger force (like a stronger push) makes things speed up more quickly.

3. Newton's Third Law — Action and Reaction

Statement:

For every action, there is an equal and opposite reaction.

Meaning:

- Forces always come in pairs.
- If object A pushes object B, then B pushes back with the same amount of force in the opposite direction.

Examples:

- When you jump, your feet push down on the ground, and the ground pushes you upward.
- A rocket moves up because it pushes gases downward.
- When you push a wall, the wall pushes you back — which is why you don't fall through it.

Why These Laws Matter

Newton's laws explain almost all motion around you — cars, sports, falling objects, running, jumping, and even how planets move. They are the foundation of physics and help us understand how the physical world works.

Prompt 5:

Explain Newton's laws of motion as a beginner.

Answer:

1. Newton's First Law — Things stay how they are

Idea:

If something is not moving, it will stay still.

If something is moving, it will keep moving in the same way unless a force stops it or changes it.

Example:

- **A ball will keep rolling until friction or someone stops it.**
- **A book won't move unless you push it.**

This law is also called the Law of Inertia, meaning things resist changes to their motion.

2. Newton's Second Law — Force changes motion

Idea:

If you push an object, it will speed up, slow down, or change direction depending on:

- **How hard you push (force)**
- **How heavy the object is (mass)**

The formula is:

$$F = m \times a$$

Example:

- **A stronger push makes a ball move faster.**
 - **It's harder to push a heavy box than a light box.**
-

3. Newton's Third Law — Every action has a reaction

Idea:

Whenever you push something, it pushes back with the same amount of force in the opposite direction.

Examples:

- When you jump, you push down on the ground, and the ground pushes you up.
- When a rocket fires downward gases, the rocket moves upward.

Analysis:

The complexity and technical jargon reduces with each prompt starting from expert engineer until beginner level and in doing so still keep the essential definition with the language being simpler each time.

6. Creative Engineering Problem Prompts: Craft a prompt that asks the AI to brainstorm ideas for designing a low-cost water purification system suitable for rural areas. Encourage creativity by adding phrases like “limited resources” and “sustainability”.

Prompt:

Brainstorm ideas for designing a low-cost water purification system suitable for rural areas that also considers factors like sustainability and limited resources.

Answer:

1. Solar-Based Purification Methods

a. Solar Water Disinfection (SODIS)

- Uses sunlight and heat to kill pathogens.
- Done by exposing transparent bottles (PET) filled with water to direct sunlight for 6+ hours.
- Very low cost, minimal materials.

b. Solar Thermal Distillation

- A simple solar still can evaporate and condense water.
- Removes salts, sediments, and pathogens.
- Can be built with glass sheets, black paint, and metal trays.

c. Solar UV + Heat Hybrid Unit

- Combine UV exposure with slight heating.
- Improves pathogen kill rate.
- Can be made with reflective aluminum sheets and glass containers.

2. Sand and Gravel Filtration Systems

a. Slow Sand Filters (Bio-sand Filters)

- Layers of gravel, coarse sand, fine sand.
- A natural bio-layer forms on top that kills bacteria.
- Long-lasting, locally sourced materials, works without electricity.

b. Riverbank Filtration

- If a river is nearby, water naturally filters through sand and soil into wells.
- Low-cost, uses natural purification.

3. Activated Carbon Filtration

a. Locally Made Charcoal Filters

- Charcoal from coconut shells, wood, or agricultural waste.
- Removes chemicals, odors, and improves taste.
- Can be packed into clay, bamboo, or PVC cylinders.

b. Biochar Integration

- Biochar from crop waste (rice husk, sugarcane bagasse).
- Sustainable and low-cost filtration material.

4. Ceramic Filtration

a. Clay + Sawdust Ceramic Pot Filters

- Clay mixed with sawdust; when fired, sawdust burns away leaving pores.
- Good for removing bacteria.
- Can be locally produced, job-creating for communities.

5. Natural Coagulants and Flocculants

a. Moringa Seed Powder

- Crushed moringa seeds act as a natural coagulant.
- Helps settle suspended particles and some bacteria.

b. Banana Stem or Cactus Mucilage

- Bio-gels trap dirt and metals.
- Useful where moringa trees or cactus plants are common.

6. Simple Chlorination Methods

a. Low-cost Chlorine Droppers

- A vial that dispenses correct chlorine dosage for household containers.
- Works well for highly contaminated water.

b. Community Chlorination Centers

- A central tank chlorinated daily.
- Saves cost and ensures consistent treatment.

7. Rainwater Harvesting Systems

a. Rooftop Rain Capture

- Gutters + clean storage tanks.
- Minimal contamination if stored properly.

b. Ground Catchment + First-Flush Systems

- Filtering first dirty water ensures better quality collection.

8. Multi-Stage Systems (Hybrid Designs)

Example Hybrid System

1. Sedimentation tank (allow dirt to settle)
2. Moringa seed coagulation
3. Sand + gravel filter
4. Charcoal filter
5. Solar disinfection

Low-cost, no electricity required, highly effective.

9. Hand-Pump Attachments

a. Inline Cloth / Fiber Filters

- Cotton/muslin filters attached to hand pumps.
- Stops large particles.

b. Inline Ceramic or Charcoal Units

- Very effective and cheap maintenance.

10. Education + Community Involvement

a. Training programs

- Teach locals how to maintain filters.
- Increases long-term sustainability.

b. Using locally available materials

- Reduces cost.
- Encourages local innovation and ownership.

11. Sustainable Material Choices

- Clay, bamboo, coconut shells, agricultural waste biochar.
- Solar energy instead of electricity.
- Reusable and repairable parts rather than disposable ones.

Analysis:

Including keywords like sustainability and limited resources forces the AI to be more creative with its responses while still suggesting good methods

7. Ethical Prompt Design Discussion: Identify a biased prompt related to job descriptions (e.g. language with respect to a gender). Rewrite the prompt to remove bias and create a neutral, inclusive version. Explain why this revision is more ethical.

Biased Prompt:

"Write a job description for a caregiver who is gentle, nurturing, and naturally suited for this role—women are usually better at this type of work."

Issues:

This biased prompt assumes women are naturally better at caregiving, which wrongly suggests men can't do it well or aren't suited for it. It strengthens old gender stereotypes, like saying caregiving is only a "woman's job." This can scare men away from important roles in nursing, teaching, or child care, saying they're not a good match. In hiring, it creates unfair bias, pushing companies to pick based on gender instead of skills. This is not just wrong—it's unethical and can break laws against discrimination. Overall, it hurts equality and keeps society stuck in unfair ideas about who can do what.

Improved Prompt:

"Write a job description for a caregiver who is patient, attentive, and skilled in providing supportive care to individuals in need."

Evaluation:

The AI identifies and rejects gender-based assumptions in the original prompt, recognizing how they reinforce harmful stereotypes. It rewrites the prompt to focus on skills rather than gender, promoting neutrality and inclusivity. Overall, the AI behaves ethically by encouraging fairness, equal opportunity, and non-discriminatory language in job descriptions.

8. Simulated Customer Support Chatbot: Develop a prompt that instructs the AI to play the role of a technical support agent helping a customer troubleshoot a failure in an electronic circuit. Include instructions to keep the tone friendly and professional and to ask diagnostic questions.

Prompt:

You are playing the role of a technical support agent that is helping a customer troubleshoot a failure in an electric circuit. Keep the tone friendly and professional and to ask diagnostic questions.

Answer:

Hello! I'm Alex, your technical support specialist here to help troubleshoot the issue with your electric circuit. I'm sorry to hear you're experiencing a failure—let's work together to get this sorted out safely and quickly. For safety first, please ensure the power to the affected circuit is turned off at the breaker before we proceed with any checks.

To better diagnose the problem, could you tell me more about what's happening? For example, is the circuit completely dead (no lights or devices working), or are there signs like flickering, buzzing, or a burning smell? Also, what kind of circuit is this—household wiring, an appliance, or something like a simple LED setup?

Once I have those details, we can start with some basic steps, like a visual inspection for loose wires or damaged components. Have you noticed any recent changes, such as new devices plugged in or any physical damage to the wiring?

9. Multi-Language Prompting: Develop a prompt that asks the AI to translate a simple engineering glossary (5 technical terms) from English to your native language. Then modify the prompt to request additional explanations of these terms in the translated language.

Prompt 1:

Translate the following words in kannada: Software , Internet , Compiler , Application , Encryption.

Answer:

Software: ತಂತ್ರಾಂಶ

Internet: ಇಂಟರ್ನೆಟ್

Compiler: ಕಾಂಪೈಲರ್

Application: ಅನ್ವಯ

Encryption: ಗೂಢಲಿಪಿಕರಣ

Prompt 2:

Explain the following words in kannada: Software, Internet, Compiler, Application, Encryption.

Answer:

- **Software:** ತುತ್ತ್ಂಶ ಎಂದರೆ ಗಣಕಯಂತರ ಕ್ಕೆ ಸೂಚನೆಗಳನ್ನು ನೀಡುವ ಕಾಯಯಕರ ಮಗಳ ಸಮೂಹ. ಇದು ಗಣಕವನ್ನು ನವಯಹಿಸುವ ಮತ್ತು ನಯಷ್ಠ ಕ್ಕಲಸಗಳನ್ನು ಮಾಡುವಂತೆ ಮಾಡುತು ದೆ, ಉದಾಹರಣೆಗೆ ವಿಂಡೀಸ್ ಅಥವಾ ಮೈಕ್ರೋಸಾಫ್ಟ್ ವರ್ಡ್‌ಯ.
- **Internet:** ಇಂಟರ್‌ನೆಟ್ ಎಂದರೆ ವಿಶ್ವದ ಯಂತ ಸಂಪಕಯಗಂಡಿರುವ ಗಣಕಗಳ ನೆಟ್ವರ್ಕ್‌ಯ. ಇದು ಮಾಹಿತಿ, ಚಿತ್ರಗಳು ಮತ್ತು ವೀಡಿಯೋಗಳನ್ನು ಹಂಚಿಕೆಗಳ ಲು ಸಹಾಯ ಮಾಡುತು ದೆ, ಉದಾಹರಣೆಗೆ ವೆಬ್‌ಸೈಟ್‌ಗಳ ಮೂಲಕ.
- **Compiler:** ಕಂಪೈಲರ್ ಎಂದರೆ ಉನ್ು ತ ಮುಖ್ಯದ ಫೈಗ್ಂ ಕ್ಕೀರ್ಡ್ ಅನ್ನು ಗಣಕದ ಮಷೀನ್ ಭಾಷೆಗೆ ಪರಿವತಿಯಸುವ ತುತ್ತ್ಂಶ. ಇದು ಕ್ಕೀರ್ಡ್ ಅನ್ನು ತುರಿತವಾಗಿ ನ್ನಿಸುವಂತೆ ಮಾಡುತು ದೆ, ಉದಾಹರಣೆಗೆ ಸಿ++ ಕಂಪೈಲರ್.
- **Application:** ಅನ್ವಯ ಅಥವಾ ಅಪಿ ಕ್ಕೀಶನ್ ಎಂದರೆ ನಯಷ್ಠ ಕ್ಕಲಸಕಾಿ ಗಿ ರೂಪಸಲಾದ ತುತ್ತ್ಂಶ. ಇದು ಉಪಯೋಗಕತಯರಿಗೆ ಸುಲಭ ಕಾಯಯಗಳನ್ನು ಮಾಡಲು ಸಹಾಯ ಮಾಡುತು ದೆ, ಉದಾಹರಣೆಗೆ ಮೊಬೈಲ್ ಅಪ್ ಅಥವಾ ವರ್ಡ್‌ಯ ಥ್ರೆಸರ್.
- **Encryption:** ಗೂಢಲಿಪೀಕರಣ ಎಂದರೆ ಮಾಹಿತಿಯನ್ನು ಡಾಕುಗಳಿಸುವ ಪುಠ್ಯಯ, ಅನ್ವಿಕೃತ ಮುಕ್ತಗಳಿಗೆ ತಲುಪದಂತೆ ಕ್ಕೀರ್ಡ್ ಮಾಡುವುದು. ಇದು ಡೇಟಾವನ್ನು ಸುರಕ್ಶಿ ತಗಳಿಸುತು ದೆ, ಉದಾಹರಣೆಗೆ ಪಾಸ್ವರ್ಡ್‌ಯ ಅಥವಾ SSL.

10. Review a curated set of different prompt types (e.g., for summarization, information extraction, paraphrasing, question answering) from a "Prompt Gallery." For each prompt type, match it with a real-world task (e.g., summarizing a lecture note, extracting names from a project report). Test at least three prompt templates on an AI tool or by role-play (students simulate being the AI), with varied wording. Record the outcomes and discuss which prompt (or template) was most effective for each task, and explain why you think it worked best. Reflect on how changing small parts of a prompt can alter model response quality, completeness, or accuracy.

A. Summarization Prompts:

Ohm's law states that the electric current through a conductor between two points is directly proportional to the voltage across those points, provided the temperature and other physical conditions remain constant. This relationship is expressed mathematically as $V=IR$, where V is voltage in volts, I is current in amperes, and R is resistance in ohms. Definition and Formula: The law describes how voltage drives current through a material, with resistance acting as the constant factor that opposes the flow. Rearranged forms include $I = V/R$ for calculating current given voltage and resistance, or $R=V/I$ for finding resistance. It applies primarily to ohmic conductors,

where resistance does not vary with current or voltage. Historical Background: Georg Simon Ohm, a German physicist, formulated the law in 1827 based on experiments measuring voltage and current in simple wire circuits. His work built on earlier observations but provided a precise empirical relationship, initially facing skepticism but later becoming foundational in electromagnetism. The unit of resistance, the ohm (Ω), is named in his honor. Physical Explanation: In a conductor, an applied voltage creates an electric field that accelerates free electrons, causing them to drift and form current. Electrons collide with atoms, scattering their motion and converting kinetic energy to heat, which limits the current proportional to the field strength. This drift velocity model, derived from statistical mechanics, shows why the proportionality holds over wide voltage ranges in most materials. Applications and Limitations: Ohm's law is essential for analyzing DC and AC circuits, designing resistors, and calculating power dissipation as $P = VI = (I^2)R = (V^2)/R$. It enables troubleshooting in electronics, such as determining why a circuit draws excessive current. However, non-ohmic materials like diodes or semiconductors violate it under varying conditions, requiring other models for analysis.

Prompt 1:

Summarise the text into 7 to 8 lines.

Answer:

Ohm's law states that current in a conductor is directly proportional to the voltage across it, provided temperature and physical conditions stay constant. It is expressed as $V = IR$, with rearranged forms $I = V/R$ and $R = V/I$. The law explains how voltage drives current while resistance opposes it, and it applies mainly to materials with constant resistance (ohmic conductors). Georg Simon Ohm discovered this relationship in 1827 through experiments on simple circuits. The unit of resistance, the ohm (Ω), is named after him. Physically, voltage creates an electric field that accelerates electrons, whose collisions with atoms limit current flow. Ohm's law is used to analyze circuits, design components, and calculate power. It does not apply to non-ohmic devices like diodes or semiconductors, which require different models.

Prompt 2:

Summarize the key engineering concepts from the text, focusing only on definitions and formulas.

Answer:

Ohm's Law defines the relationship between voltage (V), current (I), and resistance (R), stating that current is directly proportional to voltage when physical conditions remain constant. The main formula is $V = IR$, with rearranged forms $I = V/R$ and $R = V/I$ for

solving different circuit variables. Resistance is treated as a constant factor opposing current flow in ohmic materials. Power dissipation in circuits is calculated using $P = VI$, $P = I^2R$, or $P = V^2/R$.

Prompt 3:

Summarize the text for a first-year engineering student. Highlight the main law, formula, and one use-case.

Answer:

Ohm's Law explains how voltage, current, and resistance are related in a circuit. It states that the current through a conductor increases when voltage increases, as long as temperature and other conditions stay constant. The basic formula is $V = IR$, which can also be written as $I = V/R$ or $R = V/I$ depending on what you need to find. This law works well for materials whose resistance stays constant. A useful application is troubleshooting circuits—for example, if a device draws too much current, you can use $I = V/R$ to check whether a resistor has failed or changed value.

Observations

- Prompt 1 created a general summary but missed formulas.
- Prompt 2 focused well on formulas but ignored examples and context.
- Prompt 3 produced the best-balanced summary with explanation & formula & usage

B. Information Extraction Prompts:

Our group project focused on exploring upcoming AI technologies such as edge AI, autonomous robotics, and generative design tools. The team included Arjun, Meera, Rohit, and Sana, each taking responsibility for different research areas. Arjun studied how edge AI reduces latency in smart devices, while Meera analyzed new trends in AI-powered medical diagnostics. Rohit created a small prototype using a lightweight neural network to recognize gestures. Sana worked on the presentation and integrated all findings into a single framework. Our teacher, Prof. Kavitha, actively guided us by suggesting reliable research papers and helping us refine our prototype. She also conducted a mini-workshop on model optimization techniques. With her support, we identified practical challenges such as data privacy and model bias. By the end of the project, we prepared a detailed report and demonstrated our prototype. This

collaboration helped us understand both the potential and limitations of future AI technologies.

Prompt 1:

List all names mentioned in the text.

Answer: Here are all the names mentioned in the text:

- Arjun
- Meera
- Rohit
- Sana
- Prof. Kavitha

Prompt 2:

Extract only student names involved in the project, ignore teachers.

Answer:

The students involved in the project are: Arjun, Meera, Rohit, Sana

Prompt 3:

Extract all project team members and list them in bullet points under: (a) Hardware (b) Software

Answer:

- (a) Hardware
 - Rohit – Built the prototype using a lightweight neural network for gesture recognition.
- (b) Software
 - Arjun – Studied edge AI and its impact on latency in smart devices.
 - Meera – Researched AI-powered medical diagnostic systems.
 - Sana – Integrated findings and prepared the project presentation.
 - Prof. Kavitha – Provided guidance, suggested research papers, and conducted a workshop on model optimization.

Analysis:

- Prompt 1 collected all names, including professors and authors.
- Prompt 2 correctly filtered only students.
- Prompt 3 provided perfectly organized output and even grouped names accurately.

C. Paraphrasing Prompts

The hydrological cycle is a closed-loop planetary water redistribution system driven by solar irradiance and atmospheric thermodynamics. Water undergoes evapotranspiration, transferring mass from terrestrial surfaces into the troposphere through latent-heat absorption. Atmospheric water vapor is transported via advection and undergoes adiabatic cooling, triggering condensation on aerosolized nuclei. Cloud microphysics—through coalescence, accretion, and riming—leads to the formation of hydrometeors. Precipitation occurs once particles surpass drag-limited terminal velocities. On the surface, water partitions into runoff, interception, and infiltration governed by hydraulic conductivity and soil porosity. Subsurface flow follows Darcy's law, recharging aquifers. Groundwater contributes to stream baseflow and eventually returns to evaporative surfaces. Continuous solar energy input ensures long-term massbalance stability of the global system.

Prompt 1:

Paraphrase the above text.

Answer:

The water cycle functions as a global, self-sustaining system that redistributes water using solar energy and atmospheric processes. Liquid water and moisture from land surfaces rise into the lower atmosphere through evapotranspiration, which relies on latent-heat uptake. Once airborne, water vapor moves through advective airflow and cools adiabatically, causing it to condense around tiny aerosol particles. Through cloud physics mechanisms such as coalescence, accretion, and riming, these droplets develop into hydrometeors. Precipitation begins when these particles grow heavy enough to exceed aerodynamic drag limits. At the Earth's surface, incoming water is divided into surface runoff, vegetation interception, and soil infiltration, processes controlled by soil structure and hydraulic conductivity. Beneath the ground, movement of water follows Darcy's law, replenishing aquifer systems. This groundwater then feeds streams and eventually cycles back to areas where evaporation occurs. The constant input of solar radiation keeps the entire hydrological system in long-term mass-balance equilibrium.

Prompt 2:

Paraphrase the text using simpler engineering vocabulary while keeping all technical accuracy

Answer:

The water cycle is a continuous global system that moves water around the planet using energy from the Sun and basic atmospheric processes. Water from the ground and plants turns into vapor through evapotranspiration, which happens when heat causes it to rise into the atmosphere. This vapor is carried by air currents and cools as it moves upward, causing it to condense on tiny dust-like particles in the air. Inside clouds, droplets grow by merging and sticking together until they form larger particles. When these particles become heavy enough, they fall as precipitation. After reaching the ground, water is divided into runoff, water caught by plants, and water absorbed into the soil, depending on how easily the soil allows water to pass through it. Below the surface, water moves according to Darcy's law, filling underground aquifers. This groundwater then flows into rivers and eventually returns to areas where evaporation occurs again. The Sun provides constant energy, allowing the entire system to stay stable over long periods.

Prompt 3:

Rewrite the text in a fresh way suitable for a formal engineering lab report, keeping the meaning unchanged

Answer:

The hydrological cycle functions as a closed and self-regulating system responsible for the global redistribution of water, powered primarily by solar radiation and atmospheric thermodynamic processes. Water is transferred from land surfaces to the lower atmosphere through evapotranspiration, a mechanism involving latent heat uptake. Once in vapor form, moisture is transported horizontally by advection and undergoes cooling due to decreasing atmospheric pressure with altitude, resulting in condensation around suspended aerosol particles. Within clouds, microphysical interactions such as droplet merging and particle growth lead to the development of hydrometeors. When these particles exceed their terminal velocity limits, they are released as precipitation. After reaching the surface, water divides into surface runoff, vegetation interception, or soil infiltration, depending on soil properties such as porosity and hydraulic conductivity. Subsurface movement occurs according to Darcy's law, enabling the recharge of groundwater reservoirs. This groundwater eventually contributes to streamflow and reenters zones where evaporation can occur. The continuous supply of solar energy

maintains overall mass-balance equilibrium, ensuring long-term stability of the global hydrological system.

Analysis:

- Prompt 1 created a basic paraphrase but sometimes sounded informal.
- Prompt 2 worked well for simpler language but occasionally oversimplified technical parts.
- Prompt 3 produced the most professional, accurate output suitable for submission

11. Choose a real engineering challenge or societal problem relevant to your field (e.g., “Reducing plastic waste in campus cafeterias” or “Optimizing solar panel placement on campus rooftops”). Draft an initial prompt that asks an AI to propose practical solutions. Share the AI’s (or peer’s) answer in small groups and identify aspects that are missing, vague, or not actionable. Refine your prompt based on feedback (e.g., specify constraints, ask for step-by-step solutions, or require a list of pros and cons). Repeat the process one more time, refining again for further clarity or specificity. Document the entire prompt-refinement process and share the best solution generated, along with a brief analysis of how prompt improvements led to better responses.

Challenge:

Improving energy efficiency in campus hostels to reduce electricity consumption, lower operational costs, and promote sustainable campus practices.

Prompt 1:

Give me some easy ideas to save electricity in our hostel

Answer:

1. Switch all common-area bulbs to LEDs.
2. Install motion sensors in hallways so lights turn off automatically.
3. Encourage students to unplug chargers when not in use.
4. Reduce fan/AC usage by improving ventilation in rooms.
5. Set specific quiet hours where lights in common rooms turn off.

Prompt 2:

Give me cheap and practical ways to cut electricity use in hostels, including one electrical fix, one building fix, and one behaviour fix, with a short explanation.

Answer:

- Electrical fix: Replace old tube lights with LED bulbs, which use less power and last longer.
- Building fix: Add reflective film on windows to reduce heat, so fans and ACs run less.
- Behaviour fix: Start a “switch-off rule” where students must turn off lights and fans when leaving rooms. Each of these cuts down unnecessary power usage and lowers monthly electricity bills.

Prompt 3:

Give me a detailed plan with steps, energy savings, pros/cons, and limits for three ways (electrical, building, behaviour) to make hostels more energy efficient.

Answer:

- Electrical Solution – LED + Motion Sensors
 - Steps: Audit bulbs → replace with LEDs → install sensors in hallways. Energy Savings: 40–55% reduction in lighting load. Pros: Low cost, fast installation.
 - Cons: Sensors need calibration.
 - Limits: Initial buying cost; wiring compatibility.
- Building Solution – Cool Roof + Window Film
 - Steps: Apply cool-roof coating → add window films → improve airflow. Energy Savings: 10–20% reduction in fan/AC usage.
 - Pros: Long-term effect, no electricity needed. Cons: Depends on climate. Limits: Needs admin approval for building changes.
- Behaviour Solution – Energy Monitoring Challenge
 - Steps: Track each block's energy use → set monthly goals → reward best-performing block.
 - Energy Savings: Around 5–10% based on student cooperation.
 - Pros: Very cheap; encourages awareness.
 - Cons: Only works if students participate. Limits: Requires basic monitoring and coordination.

Analysis:

The prompt was too simple, so the answer came out basic and vague. Nothing technical or creative showed up. It wasn't useful for real engineering work. The answer became more organised and slightly more technical. Still lacked depth, steps, and detailed reasoning. Better than V1 but not fully strong. This version gave the clearest and most complete response. The answer had steps, estimates, pros and cons, making it practical. The specific instructions improved the quality a lot.