North South University

Department of Electrical & Computer Engineering

WEEKLY REPORT

Course: CSE 299 (Junior Design Course**)**

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Appendix:

1. Data-Set

Question: What is the difference between hardware and software in computer science? Provide a brief example of each.

Level 1 (Mark 1): Identifies hardware and software as different computer parts.

Sample answer: A computer has two main parts: hardware and software.

Level 2 (Mark 3): Explains that hardware is physical and software provides instructions.

Sample answer: Hardware is the physical stuff like the monitor and keyboard you can touch. Software is like the games or programs you use on the computer.

Level 3 (Mark 4): Explains the interdependence of hardware and software with specific examples.

Sample answer: Hardware consists of the physical components, like the CPU and memory, that comprise the computer itself. Software is the set of instructions, like operating systems and applications, that tells the hardware what to do. You need both to use a computer. For example, you cannot see anything on the monitor (hardware) without software instructions to display an image. Similarly, software like a game needs computer hardware to run calculations.

Question: Computers use the binary system for processing information. Explain what the binary system is and why it is essential.

Level 1 (Mark1): Computers use the binary system for processing information. Explain what the binary system is and why it is essential.

Sample answer: To understand information, computers use a unique language with only two numbers, 0 and 1.

Level 2 (Mark3): The binary system uses 0s and 1s to represent on/off states.

Sample answer: Computers use electricity to understand things as on or off. The binary system uses 0 for off and 1 for on to store information like text, pictures, and videos.

Level 3 (Mark4): Explains the efficiency of binary for computers and how it relates to electronic circuits.

Sample answer: Computers are made of circuits with tiny switches that can be either on or off. The binary system perfectly matches this, with zeros representing off and ones representing on. This makes it efficient for computers to process and store information because they can quickly turn switches on and off to represent the 0s and 1s.

Question: What are algorithms, and how do they play a role in computer programs? Give a simple example of an everyday task that can be represented as an algorithm.

Level 1 (Mark 1): Introduces algorithms as instructions for computers.

Sample answer: An algorithm is a set of instructions a computer uses to accomplish something.

Level 2 (Mark 3): Explains algorithms as problem-solving steps and relates them to programs.

Sample answer: An algorithm is a step-by-step plan that breaks down problems into instructions a computer can understand. These instructions are used in computer programs to perform tasks.

Level 3 (Mark 4): Provides a real-world example of an algorithm and connects it to computer programs.

Sample answer: An algorithm is like a recipe with instructions to solve a problem. In computers, programs use algorithms to follow steps. For instance, a recipe is like an algorithm for baking cookies - you follow steps like mixing ingredients in a specific order. Similarly, a program sorting numbers might follow an algorithm that breaks down the steps to compare each number and arrange them in order.

Question: Programmers use different types of languages to communicate with computers. Briefly distinguish between high-level and low-level programming languages.

Level 1 (Mark 1): Introduces two types of programming languages.

Sample answer: Programmers use two main types of languages: easy-to-understand and complex ones for computers.

Level 2 (Mark 3): Explains that high-level languages are easier to read and write. In contrast, low-level languages provide more control over the hardware.

Sample answer: High-level languages are more straightforward to talk to computers, while low-level languages are more complex but give more control.

Level 3 (Mark 4): Explains the trade-off between readability and control, with examples of each type of language.

Sample answer: Programmers have two main language choices. High-level languages like Python are easy to read and write, focusing on solving problems rather than computer details. Low-level languages like assembly language are closer to how machines work, offering more control but being harder to use.

Question: The terms "Internet" and "World Wide Web" are often used interchangeably, but there is a subtle difference. Explain what each term refers to.

Level 1 (Mark 1): Identifies the internet as a network and the web as a way to access information.

Sample answer: The internet is an extensive network of computers, and the web is a way to use that network to look at information.

Level 2 (Mark 3): Explains the internet as the infrastructure and the web as a service built on it.

Sample answer: Think of the internet like a giant highway system that connects computers everywhere. The web is like a specific service on those roads that use web pages and browsers to deliver information.

Level 3 (Mark 4): Provides analogies and additional details about what the internet and web can be used for.

Sample answer: Imagine the internet as a massive network of roads connecting cities and towns. It can carry all traffic, like mail trucks, cars, and buses. The World Wide Web is like a specific delivery service that uses these roads to bring packages to your door - you access information through websites like addresses on those roads. The internet can also be used for many other things besides the web, like email and online games.

Question: What is socialisation, and how does it shape our identities throughout life? Briefly explain two main agents of socialisation.

Level 1 (Mark 1): Introduces socialisation as learning social norms and behaviours and how they shape identity.

Sample answer: Socialization is how we learn the rules and behaviours of society, and it helps us figure out who we are.

Level 2 (Mark 3): Socialisation is a lifelong process influenced by family and peers, shaping our values and sense of self.

Sample answer: Socialization is a lifelong process in which we learn how to act in society. Our family teaches us basic rules, and our friends influence us as we grow up. This shapes who we are and what we believe in.

Level 3 (Mark 4): Explains socialisation as enculturation and acculturation, mentioning additional agents like media and social institutions.

Sample answer: Socialization is a continuous process of learning our culture (enculturation) and adapting to new ones (acculturation). It shapes our identity through many influences, including family, friends, media, schools, and religion. These all teach us values, beliefs, and how to behave, which shapes our personality and who we see ourselves as.

Question: Briefly define culture and society, and mention one element that differentiates them.

Level 1 (Mark 1): Introduces culture as traditions and beliefs and society as groups living together.

Sample answer: Culture is about what we do and believe in, like traditions and holidays. Society is the people living in a place together.

Level 2 (Mark 3): Explains culture as shared beliefs, values, and practices and society as a group with structure and organisation.

Sample answer: A culture is a group of people's shared beliefs, customs, and way of life. Society is a group of people living in a specific place, often with a government and organised way of life. Culture is one thing that shapes a society.

Level 3 (Mark 4): Provides an analogy and highlights that societies can have subcultures.

Sample answer: Culture is the software that runs society. The shared ideas, traditions, and values guide how people behave. Society is like hardware, and the structure comprises people and their organisations. Societies can even have subcultures, smaller groups with their own cultural identities.

Question: Explain the concept of social stratification and give an example of a social hierarchy.

Level 1 (Mark 1): Introduces social stratification as different social classes.

Sample answer: Social stratification means different social classes, like rich and poor.

Level 2 (Mark 3): Explains social stratification as a hierarchy based on socioeconomic factors.

Sample answer: Social stratification is like a ladder in society, with the upper classes having more money, education, and opportunities than the lower classes.

Level 3 (Mark 4): Explains social stratification with mobility and provides an example.

Sample answer: Social stratification is the layered structure of society where different classes have different social positions. These classes are ranked based on wealth, income, education, and power. This ranking affects people's access to resources and opportunities throughout their lives. How easily someone can move between classes can also vary. For instance, the caste system in India is a historical example of a rigid social hierarchy where people are born into a particular caste and have limited social mobility.

Question: Briefly define social norms and laws, and mention one way they differ in enforcement.

Level 1 (Mark 1): Introduces social norms and laws as rules.

Sample answer: Social norms and laws are rules that tell us how to act in society.

Level 2 (Mark 3): Explains social norms as unwritten rules enforced by social pressure and laws as written rules enforced by authorities.

Sample answer: Social norms are like unwritten rules about what is okay and not okay, enforced by how others might judge you. Laws are written rules set by the government, and you can get in trouble if you break them.

Level 3 (Mark 4): Provides an analogy and highlights the focus of enforcement.

Sample answer: Consider social norms as manners or etiquette. They are unwritten expectations about behaviour; people might look down on you if you break them. Laws, on the other hand, are formal rules set by authorities. They focus on preventing harmful actions and are enforced with punishments like fines or jail time.

Question: How has globalisation impacted societies around the world? Briefly explain one positive and one negative consequence of globalisation on social structures

Level 1 (Mark 1): Mentions globalisation connects societies and can change cultures.

Sample answer: Globalisation connects countries and can influence how people live and act.

Level 2 (Mark 3): Explains globalisation's positive impact (increased cultural exchange) and negative impact (weakening traditions) on social structures.

Sample answer: Globalization has positive and negative effects on societies. On the positive side, it allows people to learn about different cultures and ways of life. On the negative side, it can weaken traditional customs and values.

Level 3 (Mark 4): Explain the positive impact (cultural exchange) with an analogy and the negative impact (weakening traditions) with an example.

Sample answer: Globalisation, like opening windows to different cultures, allows for exchanging ideas, food, and customs. People can experience new things and broaden their horizons. However, it can also be like a strong wind that weakens traditional ways of life. For example, globally promoted holidays and events may overshadow local celebrations and traditions.

Question: Briefly define the difference between power and energy, and provide the units used to measure each.

Level 1 (Mark 1): Introduces power and energy differences.

Sample answer: Energy is how much work you can do, and power is how fast you can do it.

Level 2 (Mark 3): Explains power as the rate of energy transfer and provides the unit (watts).

Sample answer: Energy is like the total fuel you have, and power is how quickly you use that fuel. Power, measured in watts, is the rate at which energy is transferred.

Level 3 (Mark 4): Explain the difference with an analogy and mention the unit for energy (joules).

Sample answer: Imagine the energy, like the total water in a tank. Power is how fast that water flows out. Energy is the complete resource measured in joules. Power, measured in watts (joules per second), is the resource use rate.

Question: Explain how a current-carrying conductor generates a magnetic field, and mention one practical application of this phenomenon.

Level 1 (Mark 1): Explains that electricity flowing through a wire creates a magnetic field around it.

Sample answer: Electricity flowing through a wire makes a magnetic field around it, like an invisible force.

Level 2 (Mark 3): Explains that moving electric charges (current) generate a magnetic field and mentions the right-hand rule. You can imagine tiny compasses spinning around the wire.

Sample answer: When you turn on the electricity in a wire, the moving electric charges create a magnetic field that circles the wire. Imagine tiny compasses spinning around the wire to show this field.

Level 3 (Mark 4): Explains the scientific basis (electromagnetism) and a practical application (electromagnets).

Sample answer: Electricity and magnetism are linked. Electric current flows through a wire and generates a magnetic field around it. This is called electromagnetism. One application of this is the electromagnet. It uses wire coils to create a strong magnetic field when electricity runs through them, acting like temporary magnets. Electromagnets are used in many things, like electric motors, power appliances, and MRI machines in hospitals.

Question: Briefly define KCL and KVL, and mention what they tell us about current and voltage in circuits.

Level 1 (Mark 1): Introduces KCL and KVL as circuit laws.

Sample answer: KCL and KVL are rules for understanding how electricity works in circuits.

Level 2 (Mark 3): Explains KCL as the law of current balancing at junctions and KVL as the law of voltage balancing in loops.

Sample answer: KCL says that the total current going into a connection point in a circuit must equal the total current coming out. KVL says the total voltage used up going around a loop in a circuit must be zero.

Level 3 (Mark 4): Provides an analogy and explains how KCL and KVL help analyse circuits.

Sample answer: Imagine water flowing in pipes. KCL is like saying all the water entering a junction (where pipes branch) must also come out. KVL is like saying the total pressure used up going around a closed loop (circular pipe) must be zero. These laws help us analyse electrical circuits to find unknown currents and voltages.

Question: Briefly define capacitors and inductors, and mention their essential functions in circuits.

Level 1 (Mark 1): Introduces capacitors and inductors as electronic components that store energy.

Sample answer: Capacitors and inductors are electronic parts that store energy in circuits, like tiny batteries.

Level 2 (Mark 3): Explains that capacitors store energy in electric fields and inductors store energy in magnetic fields. They oppose changes in voltage and current, respectively.

Sample answer: Capacitors store energy in an electric field, like a spring, and oppose changes in voltage. Inductors store energy in a magnetic field and resist changes in current.

Level 3 (Mark 4): Provides an analogy and mentions applications of capacitors and inductors in circuits.

Sample answer: Think of a capacitor as a spring for electricity. It stores energy in an electric field and can release it quickly. Inductors are like flywheels that store energy in a magnetic field and resist changes in current flow. Capacitors are found in circuits for filtering signals and storing energy, while inductors are used for smoothing current flow and in transformers.

Question: Explain what makes a material a semiconductor, and mention two common types of

Level 1 (Mark 1): Introduces semiconductors as materials with conductivity between conductors and insulators.

Sample answer: Semiconductors are unique materials that conduct electricity a little bit, not like perfect conductors like metal wires, but also not like complete stoppers like rubber.

Level 2 (Mark 3): Explains that semiconductors have conductivity influenced by adding impurities (doping) and introduces n-type and p-type.

Sample answer: Semiconductors conduct electricity somewhat, but we can control this by adding impurities. This is called doping. Doping creates two types: n-type with more electrons for negative charge flow and p-type with electron vacancies for positive charge flow.

Level 3 (Mark 4): Explains how the atomic structure of semiconductors allows for controlled conductivity through doping and mentions silicon as a typical example.

Sample answer: Semiconductors are unique because their atomic structure lets them conduct electricity a little. By carefully adding tiny amounts of impurities (doping), we can significantly change this conductivity in a controlled way. This creates two main types of semiconductors: n-type and p-type, which are essential building blocks for many electronic devices like transistors and integrated circuits. Silicon is a prevalent type of semiconductor material.

Question: What is the difference between a drug and a medication? Can all drugs be considered medications? Briefly explain.

Level 1 (Mark 1): Introduces the difference between a drug and medication based on use.

Sample answer: A drug is any substance you take that affects your body, while medication is specifically used to make you better when you are sick.

Level 2 (Mark 3): Explains medications are a specific type of drug and clarifies how they are typically obtained.

Sample answer: A drug is any substance that can cause a change in the body, like caffeine or aspirin. Medication is a drug used to treat or prevent diseases and is typically prescribed by a doctor.

Level 3 (Mark 4): Provides additional details on drug classifications and highlights the legality aspect.

Sample answer: Drugs can be legal or illegal and include substances like caffeine or marijuana that can have various effects. Medications are legal drugs tested for safety and effectiveness to treat specific diseases. So, not all drugs are medications.

Question: Medications come in various forms, like tablets, capsules, and syrups. What are dosage forms, and why are there different types?

Level 1 (Mark 1): Introduces dosage forms as different ways to take medication.

Sample answer: Dosage forms are the different ways medicines come in, like pills, capsules, and liquids.

Level 2 (Mark 3): Explains that dosage forms are chosen based on factors like ease of use and how quickly the body needs the medication.

Sample answer: Dosage forms are the different ways medications can be taken, like tablets or syrups. Doctors choose the form depending on how easily you can take it or how quickly your body needs it.

Level 3 (Mark 4): Provides additional details on examples of different dosage forms and their purposes.

Sample answer: Dosage forms are the different presentations of medication, such as tablets, capsules, liquids, creams, and injections. The choice of form depends on several factors, including how fast the medication needs to act, how easy it is to swallow, and whether it is meant to have local or systemic effects. For instance, injections are used for fast-acting medications, while slow-release tablets might be better for long-term treatment.

Question: How medications enter the body can significantly impact their effect. Briefly explain the concept of the route of administration and give two common examples.

Level 1 (Mark 1): Introduces the route of administration and how medicine gets into the body.

Sample answer: The route of administration is how medicine gets into your body. There are different ways, like swallowing pills or getting a shot.

Level 2 (Mark 3): Explain how the administration route affects how quickly and how much medication reaches the bloodstream.

Sample answer: The route of administration is the way medicine enters the body, affecting how fast it works. For instance, swallowing a pill takes time to digest, while a shot gets medicine directly into the bloodstream and works quicker.

Level 3 (Mark 4): Provide specific examples of common routes of administration and their uses.

Sample answer: The route of administration is the pathway for medication to enter the body. This can significantly impact how fast and how much medication reaches the bloodstream. Two common routes are oral, which takes time for digestion, and injection, which delivers medicine directly into the bloodstream and works faster.

Question: Briefly define pharmacokinetics and pharmacodynamics, and mention what each focuses on.

Level 1 (Mark 1): Introduces pharmacokinetics and pharmacodynamics as two aspects of medication action.

Sample answer: Pharmacokinetics and pharmacodynamics are two areas of study related to how medications work. Pharmacokinetics looks at what the body does to a medication, and pharmacodynamics looks at what the medication does to the body.

Level 2 (Mark 3): Explains pharmacokinetics as the study of drug movement and pharmacodynamics as the study of drug effects.

Sample answer: Pharmacokinetics is like studying the journey of a medication in the body. It looks at how the body absorbs the medication, carries it around, breaks it down, and gets rid of it. Pharmacodynamics focuses on what happens when the medication reaches its target in the body, how it interacts with cells, and the effects.

Level 3 (Mark 4): Provide a metaphor or analogy to illustrate the difference between pharmacokinetics and pharmacodynamics.

Sample answer: Imagine a medication is a guest at a party. Pharmacokinetics studies how guests get to the party (absorption), travel throughout the venue, and eventually leave (excretion). Pharmacodynamics, however, is like studying how the guest interacts with other people at the party.

Question: Explain the critical difference between prescription and OTC drugs and when you might choose one.

Level 1 (Mark 1): Identifies that prescription drugs need a doctor's approval and OTC drugs do not.

Sample answer: You need a doctor's prescription to get prescription drugs, but you can buy OTC drugs without a visit.

Level 2 (Mark 3): Explains prescription drugs are stronger and for more severe conditions, while OTC drugs are for minor ailments.

Sample answer: Prescription drugs are stronger and need a doctor's approval for severe conditions. OTC drugs are milder for minor problems like headaches and can be bought at stores.

Level 3 (Mark 4): Explains the difference in regulation and highlights the importance of consulting a doctor for any medication use.

Sample answer: Prescription drugs are tightly controlled and require a doctor's diagnosis to ensure they are safe and effective for your specific health issue. OTC drugs are regulated but less strictly. While convenient, it is essential to talk to your doctor before using any medication, including OTC drugs, to avoid potential risks or interactions with other medications you might be taking.

Question: What is sovereignty, and why is it crucial to understanding political power?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: Sovereignty concerns countries and power, but I need to figure out what exactly.

Level 2 (Mark 3): It provides a partially accurate definition or explanation but may need more details.

Sample answer: Sovereignty is how independent a country is. Sovereign countries can make their laws and do not have to answer to other countries. This is important to understand how governments work.

Level 3 (Mark 4): Provides a clear and concise definition of sovereignty and explains its importance in understanding political power.

Sample answer: Sovereignty refers to the supreme legal authority within a territory. A sovereign state can make laws, manage foreign affairs, and control its land. Understanding sovereignty is crucial because it defines governments' legitimacy and power dynamics. It clarifies who has the ultimate authority to make decisions and rule within a nation's borders.

Question: What is civil society, and how does it play a role in a healthy democracy?

Level 1 (Mark 1): Definition or explanation contains significant errors or irrelevant information.

Sample answer: Civil society is like different social clubs. I am not sure how they relate to democracy.

Level 2 (Mark 3): Offers a mostly accurate definition of civil society, but the explanation of roles might be limited.

Sample answer: Civil society refers to non-governmental groups that play a societal role. They can help citizens engage with the government and promote social issues.

Level 3 (Mark 4): Provides a clear and concise definition of civil society and explains its critical roles in a healthy democracy (e.g., participation, accountability).

Sample answer: Civil society is the network of organisations outside of government and business (NGOs, charities, etc.). It strengthens democracy by fostering citizen participation, promoting democratic values, and holding the government accountable.

Question: Distinguish between a monarchy and a democracy, mentioning a key feature of each.

Level 1 (Mark 1): Contains significant errors or irrelevant information about monarchies and democracies.

Sample answer: Monarchies and democracies are both ways to run a country. I do not know what the difference is.

Level 2 (Mark 3): It identifies some system characteristics but may need more clarity or critical details.

Sample answer: A monarchy has a king or queen, while a democracy lets people choose their leaders. Monarchies are more traditional, while democracies focus on giving people a say in government.

Level 3 (Mark 4): Provides a clear and concise distinction between monarchy and democracy, highlighting a key feature (e.g., hereditary rule vs. electing leaders).

Sample answer: In a monarchy, power is passed down through heredity, with a king, queen, or emperor as ruler. They may hold significant authority. Democracies, in contrast, empower the people. Citizens either directly vote on laws (direct democracy) or elect representatives to make decisions (representative democracy).

Question: Briefly define the core principles of liberalism and conservatism, and mention one way they differ in their approach to government.

Level 1 (Mark 1): Contains significant errors or irrelevant information about liberalism and conservatism. Fails to mention how they differ in government approach.

Sample answer: Liberals and conservatives have different views, but I am unsure precisely what.

Level 2 (Mark 3): It identifies some core principles of each ideology but may need more detail or clarification. The difference in government approach might be partially addressed.

Sample answer: Liberals are for equality and social programs, while conservatives are more traditional. In government, liberals might be more likely to regulate businesses.

Level 3 (Mark 4): It clearly defines the core principles of liberalism (individual liberty, social justice) and conservatism (tradition, stability). Identifies a key difference in their approach to government (liberals favour more intervention, conservatives favour less).

Sample answer: Liberals prioritise individual liberty and social justice and often support a mixed economy with some government intervention for social programs. Conversely, conservatives emphasise tradition, social order, and stability. They generally favour limited government intervention and a robust free market.

Question: What is democracy? Briefly explain it.

Level 1 (Mark 1): Provides a simple definition of democracy.

Sample answer: Democracy is a way of governing where the people have the power.

Level 2 (Mark 3): Explains the key aspects of democracy, such as elections and citizen participation.

Sample answer: Democracy is a system where citizens choose their leaders through elections and have a say in how the country is run. This might involve voting on laws or policies or participating in public forums.

Level 3 (Mark 4): Discusses different forms of democracy (direct vs. representative) and touches on challenges or complexities of democracies.

Sample answer: Democracy is a government system giving people power. There are two main types: direct democracy, where citizens directly vote on laws, and representative democracy, where elected officials decide on the people's behalf. Democracies can be messy, balancing the will of the majority with protecting the rights of minorities.

Question: Briefly explain the religious and political motivations behind the Crusades.

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: The Crusades were long ago, and I wonder why they happened.

Level 2 (Mark 3): It provides a partially accurate explanation but may need more details on one aspect (religious or political).

Sample answer: The Crusades were holy wars fought by Christians to take back Jerusalem. There were also political reasons, such as kings wanting more land and power.

Level 3 (Mark 4): Provides a clear and concise explanation of religious and political motivations behind the Crusades.

Sample answer: The Crusades were fueled by religious fervour and political ambitions. On the spiritual side, Christians aimed to reclaim Jerusalem and the Holy Land from Muslim control. This was seen as a sacred duty and a way to secure salvation. Politically, European leaders saw the Crusades as an opportunity to expand their territories, gain wealth through plunder, and consolidate their power.

Question: Describe the core ideas of the Enlightenment and its impact on European thought.

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: The Enlightenment was a European movement, but I need clarification on its focus.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details or use imprecise language.

Sample answer: The Enlightenment was a time in Europe when people started using reason and science more to figure things out instead of relying on religion. This led to more scientific discoveries and a focus on individual rights.

Level 3 (Mark 4): Provides a clear and concise explanation of the core Enlightenment ideas (reason, logic, scepticism) and their impact on European thought (focusing on secularism, science, and individualism).

Sample answer: The Enlightenment championed reason, logic, and scientific observation as the keys to understanding the universe. This challenged traditional religious authority and fueled a rise in secularism. Science flourished as a means of discovery, and individual rights and freedoms gained greater emphasis

Question: What were the major causes that led to the outbreak of World War I?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: World War I was long ago, but I am unsure what caused it.

Level 2 (Mark 3): Provides a partially accurate explanation but may lack details on some causes or use generic terms.

Sample answer: There were a few reasons why World War I started. Countries made alliances that pulled them into fights, and they were building their armies. Also, everyone wanted colonies and was very proud of their own countries.

Level 3 (Mark 4): Provides a clear and concise explanation of several major causes that led to World War I, including Alliances: A complex web of alliances entangled European nations, drawing them into conflict. Militarism: Glorification of military power and arms race fueled tensions. Imperialism: Competition for colonies and resources increased rivalry between nations. Nationalism: Strong nationalistic pride and desire for expansion fostered animosity.

Sample answer: The outbreak of World War, a single event, did not cause me, but a tinderbox of tensions. Alliances like the Triple Alliance and Triple Entente drew nations into conflict when one member was attacked. An arms race fueled anxieties as countries stockpiled weapons. Competition for colonies in Africa and Asia created rivalries. Rising nationalism across Europe fostered a sense of superiority and a desire for expansion, leading to friction between nations. These factors all played a role in pushing Europe over the brink of war.

Question: Define the Cold War and its main characteristics.

Level 1 (Mark 1): Provide an inaccurate or irrelevant explanation

Sample answer: The Cold War was about war and the US vs. the Soviets, but I am not sure what the details are.

Level 2 (Mark 3): Provides a partially accurate definition or explanation but may need more details or use imprecise language.

Sample answer: The Cold War was long after World War II when the US and the USSR did not fight each other directly but were still rivals. They had different ideas about government and competed for power around the world.

Level 3 (Mark 4): Provides a clear and concise definition of the Cold War and its main characteristics.

Sample answer: The Cold War was a period of intense tension between the United States and the Soviet Union following World War II. Although no direct military conflict occurred between them, they competed fiercely over ideology and influence. Proxy wars fueled disputes around the world, and a nuclear arms race heightened anxieties. The Iron Curtain symbolised the division of Europe between the two spheres of influence.

Question: Briefly explain how the Industrial Revolution transformed societies.

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: The Industrial Revolution was about changes in how things were made, but I need to figure out the impact.

Level 2 (Mark 3): It provides a partially accurate explanation but may need more details or mention more than three changes.

Sample answer: The Industrial Revolution changed things a lot. Machines started working, and factories were built to make more stuff. People moved to cities to work in the factories, and there were more social changes.

Level 3 (Mark 4): Provides a clear and concise explanation of 2-3 fundamental changes brought about by the Industrial Revolution, focusing on the rise of factories and mass production: Increased efficiency and output of goods. Urbanisation: Shift of population from rural areas to cities to work in factories. Social change: The emergence of the working class and the rise of labour movements.

Sample answer: The Industrial Revolution fundamentally reshaped societies. Factories with machines replaced manual labour, dramatically increasing production. This demand for labour drew people from farms to cities, fueling rapid urbanisation. The concentration of workers led to the working class and social movements advocating for better working conditions and rights.

Question: How does specialisation benefit the economy?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: Specialization concerns jobs and the economy, but I must determine the benefits.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details or use imprecise language.

Sample answer: Specialization is like being good at one thing in a job. If everyone focuses on what they are best at, things get done faster, and we end up with more stuff. Various things are also available because people can specialise in making different things.

Level 3 (Mark 4): Provides a clear and concise explanation of the benefits of specialisation in the economy, mentioning increased efficiency, productivity, and access to a wider variety of goods and services.

Sample answer: Specialization, where people and businesses focus on specific tasks, benefits the economy in three key ways: Efficiency Boost: Specialization allows workers to become experts, completing tasks faster and with fewer errors, ultimately producing more with the same effort. Productivity on Autopilot: Think of a well-oiled machine. The economic system becomes more productive when everyone specialises, generating more goods and services. Variety Explosion: Specialization fosters a broader range of expertise. Imagine only having one type of shoe! It encourages innovation and the creation of new products and services, offering consumers a wider variety of choices.

Question: What is the difference between positive and normative economics?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: Positive and normative economics sound similar. I do not know what the difference is.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details or clarification.

Sample answer: Positive economics is like looking at economic data and explaining why things happen, while normative economics is more about opinions on what economic policies would be best.

Level 3 (Mark 4): Provides a clear and concise explanation of the key difference between positive and normative economics.

Sample answer: Positive and normative economics are two sides of the economic coin but deal with different things. Positive economics is about "what is" – describing and explaining economic phenomena based on data and analysis. It asks questions like "How does inflation affect consumer spending?" and uses evidence to find answers. Normative economics, on the other hand, focuses on "what ought to be" –making value judgments and recommendations. It considers "Should the government raise taxes?" and proposes policies based on specific values or goals.

Question: What factors can cause a stock market crash?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: Stock market crashes are when the stock market goes down a lot, but I'm not sure why it happens.

Level 2 (Mark 3): It provides a partially accurate explanation but may lack details or mention only a few factors.

Sample answer: Stock market crashes can happen when there is a bad economy or investors get scared and sell their stocks simultaneously. Also, if the government changes taxes or regulations, it can affect the market.

Level 3 (Mark 4): Provides a clear and concise explanation of several factors that can cause a stock market crash, including economic downturns, excessive speculation, changes in government policies, and unforeseen events.

Sample answer: Stock market crashes can be triggered by several factors: Economic weakness: When companies profit less, stock prices can fall as investors lose confidence. Excessive speculation: Unrealistic buying can inflate stock prices beyond their actual value, leading to a potential crash if the bubble bursts. Policy shifts: Unexpected government policy changes can create uncertainty, prompting investors to sell their stocks. Unforeseen events: Black swan events like pandemics or wars can disrupt markets and cause panic selling.

Question: What is marginal utility, and how does it influence consumer behaviour?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: Marginal utility sounds like something about taxes, I'm curious to know how it relates to consumers.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details or use imprecise language.

Sample answer: Marginal utility is about how much you enjoy something and how it affects what you buy. The first slice of pizza might be unique, but the more you eat, the less unique each slice feels. So, people tend to buy things that give them the most enjoyment for their money.

Level 3 (Mark 4): Provides a clear and concise explanation of marginal utility and its influence on consumer behaviour.

Sample answer: Marginal utility is a consumer's added satisfaction from having one more unit of a good or service. Consumers make decisions based on maximising their marginal utility per dollar spent. So, you might buy that first glass of lemonade. Still, as you get increasingly thirsty, the additional satisfaction you get from each extra glass decreases. This is why you would not keep buying glasses of lemonade forever – at some point, the extra satisfaction would not be worth the price.

Question: Define unemployment and categorise its different types.

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: Unemployment is something about the economy, but I am not sure what it means.

Level 2 (Mark 3): It provides a partially accurate definition of unemployment but may lack details on types or explanations.

Sample answer: Unemployment is when people do not have a job but want one. There are different reasons why this might happen, like people looking for a new job or the economy being slow.

Level 3 (Mark 4): Provides a clear and concise definition of unemployment and categorises its different types with explanations.

Sample answer: Unemployment describes individuals out of work but actively looking for jobs. It has several categories: Frictional: Temporary job search or transition between jobs. Structural: Skill mismatch between job requirements and worker skills. Cyclical: Tied to economic downturns, leading to layoffs. Underemployment: Working part-time when desiring full-time or being overqualified for current work.

Question: How do gases differ from liquids?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: Gases and liquids are fluids, but I need clarification on the main difference. They can both flow and move around.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details or clarification on specific properties.

Sample answer: Gases are like free spirits; they do not have a specific shape and can fill any container. You can easily squeeze them into a smaller space. Liquids are more like a chameleons; they take the shape of their container but have a set amount of volume. It is hard to squish them much.

Level 3 (Mark 4): Provides a clear, concise, and scientifically accurate explanation of the critical differences between gases and liquids, addressing properties like shape, volume, compressibility, and intermolecular forces.

Sample answer: Gases and liquids, despite seeming similar, have distinct properties. Unlike liquids with a fixed volume conforming to their container, gases have no set shape or volume, expanding freely to fill their container. This difference arises from intermolecular forces. Weak gas forces allow them to move freely with ample space between molecules. Liquids, with more vital intermolecular forces, have their molecules packed closer, resulting in a definite volume and resistance to shape change.

Question: What is the distinction between gas and vapour?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: Gas and vapour are the same. They are both just different types of air.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details or clarification.

Sample answer: Could you think about steam, like water vapour? Gas is just any kind of air, like oxygen or nitrogen. Vapour is like the gas version of something, usually liquid or solid, like steam from water.

Level 3 (Mark 4): Provides a clear and concise explanation of the critical distinction between gas and vapour, addressing the role of temperature and phase transitions.

Sample answer: Gas and vapour seem interchangeable, but a subtle distinction exists. Gas refers to any substance in a gaseous state, regardless of origin. Oxygen, for example, is always a gas at room temperature. Conversely, vapour refers explicitly to the gaseous phase of a substance, usually a liquid or solid at room temperature. Water vapour, for instance, is the gaseous form of water, typically a liquid at room temperature. The key here is the concept of equilibrium. Vapour exists in equilibrium with its liquid/solid phase at a given temperature and pressure. This means vapour molecules constantly transition between the gaseous and liquid/solid phases.

Question: What is the Heisenberg uncertainty principle? Does it place limits on what can be known?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: The Heisenberg uncertainty principle is a physics concept, but I need clarification on its meaning.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details or use imprecise language.

Sample answer: The Heisenberg uncertainty principle is something in quantum mechanics that says you cannot know everything perfectly about a tiny particle, like its exact location and speed, at the same time. The more precisely you measure one, the less you know about the other. It is like trying to catch a butterfly – the tighter you squeeze your hand, the harder it is to tell which way it is flying.

Level 3 (Mark 4): Provides a clear and concise explanation of the Heisenberg uncertainty principle, including wave-particle duality and its impact on measuring properties like position and momentum. Explains how it places a fundamental limit on what can be known simultaneously.

Sample answer: The Heisenberg uncertainty principle, a cornerstone of quantum mechanics, states that there is a fundamental limit to how precisely we can know specific properties of a quantum particle simultaneously. It is like trying to measure a blurry object's movement – the fuzzier the object (uncertain position), the less precise you are about its speed and direction. This limitation arises because quantum mechanics describes particles with wave-like properties. The wave nature introduces an inherent fuzziness in precise measurement. The most prominent example involves a particle's position and momentum. The more accurately you pinpoint its location, the less you can know about its momentum, and vice versa.

Question: What is Pascal's law? Briefly describe it.

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: Pascal's Law is a scientific principle, but I need clarification on what it does.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details

Sample answer: Pascal's Law relates to how pressure works in fluids. If you push on a liquid in a closed container, the pressure goes everywhere in the liquid, not just where you push.

Level 3 (Mark 4): Provides a clear, concise, and scientifically accurate explanation of Pascal's Law.

Sample answer: Pascal's Law, named after Blaise Pascal, is a fundamental principle in fluid mechanics. It states that when pressure is applied to a confined fluid, it is

transmitted equally throughout it in all directions. Imagine pressing down on a closed balloon filled with water. The pressure you exert does not just push down; it gets transmitted evenly throughout the water, pushing outwards on the balloon walls in all directions.

Question: What is Coulomb's Law? Briefly describe it.

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: Coulomb's Law is a physics concept, but I need to figure out what it does.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details.

Sample answer: Coulomb's Law describes how electric forces work between charged objects. The more charge something has, the stronger the force; if you move the objects farther apart, the force gets weaker.

Level 3 (Mark 4): Provides a clear, concise, and scientifically accurate explanation of Coulomb's Law.

Sample answer: Coulomb's Law governs electrical interactions between charged objects. It tells us the magnitude of the electrostatic force between two stationary point charges. This force is directly proportional to the product of the charges on the objects (meaning the stronger the charges, the greater the force) and inversely proportional to the square of the distance separating them (meaning the farther apart the objects, the weaker the force). Imagine two magnets – opposite charges attract with a more vital force when closer, while like charges repel with a weaker force when farther apart.

Question: What is the difference between organic and inorganic compounds?

Level 1 (Mark 1): Provides an explanation that needs to be more accurate.

Sample answer: Organic and inorganic are just different types of chemicals. I do not know what the main difference is.

Level 2 (Mark 3): Provides a partially accurate explanation but may lack some details or contain minor inaccuracies (e.g., not all organic compounds come from living things).

Sample answer: Organic compounds usually have carbon in them and come from living things like plants and animals. Inorganic compounds do not necessarily have carbon and can be things like water or rocks.

Level 3 (Mark 4): Provides a clear, concise, and scientifically accurate explanation of the key difference between organic and inorganic compounds, addressing carbon content and origin.

Sample answer: The primary distinction between organic and inorganic compounds is their carbon content and origin. Organic compounds generally contain carbon atoms as a central building block, often associated with living organisms or processes derived from them. Examples include carbohydrates, proteins, and DNA. Inorganic compounds, on the other hand, can encompass a wider variety of substances and may not necessarily contain carbon. This category includes water, salts, and many minerals.

Question: Why do covalent compounds generally have lower melting points than ionic compounds?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: The melting point depends on the type of compound, but I do not know why covalent compounds would melt more quickly.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details or contain minor inaccuracies.

Sample answer: Covalent compounds have weaker bonds than ionic compounds, so it takes less heat to melt them. Ionic compounds have strong bonds between positive and negative ions, making them harder to melt.

Level 3 (Mark 4): Provides a clear, concise, and scientifically accurate explanation of why covalent compounds have lower melting points than ionic compounds, addressing intermolecular forces.

Sample answer: The critical difference in melting points lies in the forces holding the molecules together. Weaker intermolecular forces hold covalent compounds, primarily van der Waal's forces, arising from temporary attraction between molecules. These quick attractions are significantly more vulnerable than the strong ionic bonds in ionic compounds formed by the electrostatic attraction between oppositely charged ions. As a result, overcoming the intermolecular forces in covalent compounds takes less energy, leading to lower melting points than ionic compounds.

Question: Why is it impossible to measure the absolute magnitude of the enthalpy of an object or a compound?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: Enthalpy is how hot or cold something is, and it can be high or low depending on the material. I do not know why you cannot just measure it directly.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details or use imprecise language.

Sample answer: Enthalpy is like the total energy in a system, but you cannot measure it precisely. It depends on where you start and where you end up, not the exact path you take. Scientists set a starting point at 0 for some elements, but that is just a reference point, not the actual absolute value.

Level 3 (Mark 4): Provides a clear and accurate explanation of why absolute enthalpy cannot be measured. Explains the concept of a reference state and how enthalpy changes are measured.

Sample answer: Enthalpy, a system's total energy, depends on its final state, not its path. Scientists set a reference state to address this, arbitrarily assigning zero enthalpies to specific elements under defined conditions, such as 1 atm pressure and 25°C temperature. Consequently, only enthalpy changes (ΔH) can be measured, representing the difference in enthalpy between a process's final and initial states.

Question: Explain the effect of nonzero atomic volume on the ideal gas law at high pressure.

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: The ideal gas law is just a formula that doesn't consider everything about natural gases.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details or use imprecise language.

Sample answer: The ideal gas law works well for gases at low pressure, but things get slightly cramped at high pressure. Gas molecules have some size, and when you push them together a lot, it affects how much space they have to move around. This can make the pressure slightly higher than the ideal gas law predicts.

Level 3 (Mark 4): Provides a clear, concise, and scientifically accurate explanation of how nonzero atomic volume affects the ideal gas law at high pressure. Discusses the concepts of reduced available volume and increased intermolecular interactions.

Sample answer: The ideal gas law assumes negligible atomic volume and no interactions between gas molecules. At high pressure, these assumptions become less valid. Gas molecules have a non-zero volume, and when squeezed closer together at high pressure, the available space for movement within the container (V) is effectively reduced. This is because the volume occupied by the molecules becomes more significant than the total container volume. Additionally, increased intermolecular interactions, neglected in the ideal gas law, can come into play at high pressure. While not as substantial as the excluded volume effect, these interactions can slightly influence the pressure-volume relationship.

Question: What is the main difference between intramolecular interactions and intermolecular interactions?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: There are different chemical forces, but I do not know how they are categorised based on whether they are within or between molecules.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details or use imprecise language.

Sample answer: The forces between atoms can differ depending on whether they are in the same molecule. Intramolecular forces hold the atoms together within a molecule, while intermolecular forces act between separate molecules.

Level 3 (Mark 4): Provides a clear and concise explanation of the difference between intramolecular and intermolecular interactions, specifying the types of forces involved and their targets.

Sample answer: Intramolecular forces, the sturdy scaffolding within molecules, dictate a molecule's shape and stability. These forces come in three main types: Covalent bonds act like molecular glue, sharing electrons between atoms to form solid and directional bonds. Imagine two atoms holding hands tightly, sharing their possessions. Ionic bonds create a powerful attraction between oppositely charged partners; like an ionic couple, an invisible force draws the positive and negative ions together. These bonds create highly stable crystalline structures, like the orderly arrangement of ions in salt. Metallic bonds involve a sea of delocalised electrons shared by metal atoms throughout the structure. This electron sea is like a communal pool, accessible to all the metal atoms, and it gives metals their strength, malleability, and conductivity.

Question: How do arteries differ from veins?

Level 1 (Mark 1): Provide an accurate, complete, or superficial explanation.

Sample answer: Arteries and veins are like highways for blood. Arteries take blood out of the heart, and veins bring it back.

Level 2 (Mark 3): Provides a mostly accurate explanation of the differences but may need more details or contain minor inaccuracies.

Sample answer: Arteries and veins are different types of blood vessels. Arteries carry blood away from the heart, while veins carry blood back to the heart. Arteries are thicker and stronger than veins.

Level 3 (Mark 4): Provides a clear, concise, and scientifically accurate explanation of the critical differences between arteries and veins, including their structure, function, and blood flow.

Sample answer: Arteries carry oxygen-rich blood away from the heart, while veins return deoxygenated blood. Arteries have thicker, muscular walls to handle high pressure, while veins have thinner walls and valves to prevent backflow.

Question: Describe the cause of different blood type groups.

Level 1 (Mark 1): Provide an accurate, complete, or superficial explanation.

Sample answer: Blood types are different colours. You get them from your parents, and they affect how your blood works.

Level 2 (Mark 3): Provides a mostly accurate explanation but may need more details or contain minor inaccuracies.

Sample answer: Blood types are determined by proteins in red blood cells. These proteins come from our genes, and different types can be inherited from our parents. The combination of these proteins determines your blood type, such as A, B, or O.

Level 3 (Mark 4): Provides a clear, concise, and scientifically accurate explanation of the cause of different blood type groups, including the role of genes and antigens on red blood cells.

Sample answer: Blood types are determined by specific molecules called antigens on the surface of red blood cells. These antigens are controlled by genes, with different versions (alleles) named A, B, and O. The combination of inherited alleles from parents determines an individual's blood type, resulting in four possible types: A, B, AB, and O.

Question: Why is a fever a “good thing” during a bacterial infection?

Level 1 (Mark 1): Provides an inaccurate or irrelevant explanation.

Sample answer: Fever is a sign of sickness. It makes you feel hot and uncomfortable.

Level 2 (Mark 3): Provides a partially accurate explanation but may need more details or contain minor inaccuracies.

Sample answer: Our body temperature rises after a bacterial infection. This is called a fever; while it can feel uncomfortable, it is good! The higher temperature makes it harder for bacteria to grow and reproduce. It is like turning up the heat in their environment and making them less comfortable.

Level 3 (Mark 4): Provides a clear and scientifically accurate explanation of why a fever can be beneficial during a bacterial infection.

Sample answer: When bacteria invade our bodies, our internal thermostat kicks in, raising our temperature. This creates a hostile environment for the bacteria, making it harder for them to grow and reproduce. The increased temperature also stimulates our immune system, enhancing its ability to fight off the infection. A fever is the body's natural defence mechanism against bacterial invaders.

Question: Describe the structure and complementary base pairing of DNA.

Level 1 (Mark 1): Provides an inaccurate, incomplete, or superficial explanation.

Sample answer: DNA is the genetic material that looks like a spiral. It has different parts that connect.

Level 2 (Mark 3): Provides a mostly accurate explanation but may need more details or contain minor inaccuracies.

Sample answer: DNA is like a twisted ladder with instructions for building an organism. It has two sides of sugar and phosphate molecules; rungs connect them. These rungs are made of unique molecules that connect in a specific way.

Level 3 (Mark 4): Provides a clear, concise, and scientifically accurate explanation of DNA structure and complementary base pairing.

Sample answer: DNA, the molecule of life, takes the shape of a twisted ladder called a double helix. Two sugar-phosphate backbones form the ladder's sides, connected by rungs made of nitrogenous bases. There are four types of bases: adenine (A), guanine (G), cytosine (C), and thymine (T). The crucial concept here is complementary base pairing: A always pairs with T, and C always pairs with G. This specific pairing ensures accurate copying of genetic information during cell division.

Question: What is the relationship between a genome, chromosomes, and genes?

Level 1 (Mark 1): Provides an inaccurate, incomplete, or superficial explanation.

Sample answer: DNA and genes are the same thing, making up the chromosomes.

Level 2 (Mark 3): Provides a mostly accurate explanation but may lack some details or contain minor inaccuracies.

Sample answer: The genome is all the genetic information in an organism, like a code. Chromosomes are parts of the code, and genes are smaller parts that tell the body how to do things.

Level 3 (Mark 4): Provides a clear, concise, and scientifically accurate explanation of the relationship between genomes, chromosomes, and genes.

Sample answer: Think of the genome as an organism's entire instruction manual. It is made up of DNA, containing all the genetic information. This information is organised into chromosomes, like separate chapters in the manual. Each chromosome is a long strand of DNA tightly coiled with proteins. Genes are the individual instructions within these chapters, specific stretches of DNA that code for particular traits or functions.