IBE505 Exam

1.

a)

Solving both the delivery speed and tracking problems would require the use of several technologies. Starting with live-tracking, a RFID tag can be placed on every package and scanned at every point of the supply-chain where it changes mode of transportation. Barcode or QR-codes, along with machine vision, can be used in the same way. Each time a package is scanned, a web page can display where the package is to the customer.
A system like this would require collaboration and sharing of data with the other vendors in the supply-chain and already exists in many places of the world.

When it comes to delivery speed, drones are a possible solution. By having drones deliver from a central hub within a city, it can reduce the time taken to deliver as well as the carbon footprint of the last mile section of transport. This has been attempted by large corporations like Amazon already, to various success. Flying anything above the heads of people is heavily regulated and while the technology itself is already here, the major challenges are mostly related to legalities and logistics of implementing such a system in a city.

b)

RFID
Radio-frequency identification (RFID) is a technology where a tag is identified by energizing it with a magnetic field. When the tag is energized, it transmits a digital signal containing information. Widely used in touch-less payment cards.

Machine vision
Machine vision is a system where a camera is used to gather information about an object. These systems can often scan for barcodes or QR-codes very quickly and are well suited for looking at packages in f.ex a sorting facility.

Drones
Drones are semi-autonomous or fully autonomous flying vehicles. They can be made in many sizes and for different purposes. In this case, the drones would be powered by electricity and made to carry packages from a central hub to the customer location.

c)

With my role as CIO I would be tasked with identifying new opportunities for UPS to deliver digital services to their community.

d)

There are two main solutions to bridging a skill gap within a business. The first is to hire people with the required skills, either by hiring individuals or by acquiring a company that provides a solution within the field. The second is to outsource the required tasks to another company. Which one you choose depends on the situation, but a larger company like UPS will usually have the resources to establish their own department by mass hire or acquiring a company. Smaller companies are often better served by outsourcing the required tasks.

e)

Goal 9: Industry, Innovation and Infrastructure
Utilizing new technology and succeeding at it promotes competitors to also innovate, thus leading to a positive feedback-cycle of innovation.

Goal 11: Sustainable cities and Communities
Delivering by drone reduces the carbon footprint as well as reducing pollution locally in the city, thus making the city more sustainable.

Goal 13: Climate Action
Much the same as goal 11. By switching to electric transport, emissions are reduced.

2.

a)

In recent years, virtual reality (VR) technology has become affordable and advanced enough to be used for solving real-life problems. Providing the students with their own VR-headset and creating a virtual lab they can all connect to regardless of their location, would create an environment that allows for both collaboration and the “real” feeling of objects used.

Should the virtual lab be insufficient for the required experiments, for example due to technical limitations of physics simulations, the next step would be a real lab with remote controlled robots. The robots would be controlled by the students and be used to manipulate objects in the real lab. This technology already exists within the world of remote surgery technology, and while currently very expensive,it will eventually become affordable enough to be used within education.

b)
In other parts of the world there are already technologies in place for monitoring students during home exams. These systems are usually very invasive and take full control of the computer the student is performing the exam on. This includes recording the screen, the webcam and the microphone, of which is monitored by school staff at a remote location. While it is not impossible to cheat on such a system, it makes it way harder as there are actual people looking at you and what you are doing.

I don’t condone such a system as it breaches my borders of preferred privacy, but I find it hard to come up with a fool-proof system for remote exams that doesn’t invade in this way.

c)

Virtual reality (VR)
VR technology is a system where the user has a headset with screens in it. Sensors on the headset translate the motion of the user's head to the virtual environment, allowing the user to look around. Hand-held controllers, also translating their motion to the virtual world, allows the user to manipulate objects within it.

Robotics
Although we've had robots for a while, robots designed to be controlled remotely through a VR solution are somewhat new. By connecting robots to the internet, a user can control its motion remotely. This solution also requires a camera to let the user see what is going on at the location of the robot.

d)

One of the major challenges to online learning is the digital divide. Not everyone has access to broadband internet. This can be solved from a governmental level by adding broadband to the list of utilities everyone should have access to, like electricity and water, regardless of their location.

e)

Goal 4: Quality Education
My solution would allow for access to lab experiments regardless of the location of the student, which would allow more people access to quality education.

Goal 5: Gender equality
When working in a virtual environment, the gender of each person is less visible, which can reduce both unconscious and conscious gender bias by both teachers and students.

Goal 9: Industry, Innovation and Infrastructure
By utilizing new technology such as VR and robotics, more students can be inspired to continue to innovate in the future.

Goal 10: Reduced inequality
Like with goal 5, the anonymous nature of virtual environments reduces the visibility of skin color, disabilities and other factors someone might be discriminated against over. This can then, hopefully, lead to less inequality by having everyone being treated the same.

Goal 13: Climate Action
By attending a lab virtually, a person does not need to travel. This in turn reduces carbon emissions.

3.

a)

I would propose a strategy of implementing AI systems for evaluating patient needs as well as for resource management. There are already machine learning systems that can diagnose cancer from MRI-scans with higher accuracy than trained medical staff. For resource management, machine learning algorithms can be used to optimize the shifts of workers to better fit the current workload at the hospital. While these systems can create optimized results, there are often many other considerations to take into account. Due to this, the systems should be used as advisors with the actual decisions being made by humans.

b)

AI
AI is a broad definition of technologies that allows machines or devices to sense their environment and generate actions to successfully achieve design goals.

Machine learning
Machine learning uses huge amounts of data to train a model. This model can then complete tasks like classification and detection. In this case, the model can be trained on patient data to give a prediction of their future needs.

Deep learning
Deep learning is a subfield of machine learning. It uses artificial neural networks to perform tasks like computer vision and medical image analysis.

c)

There are many advantages of cloud systems. A major one is not having to purchase and maintain the hardware yourself. This reduces the need for specialized personnel and reduces costs dramatically. Another one is the ease of scalability. Most cloud platforms offer seamless up-and-down-scaling, meaning you pay for what you need at any given time.

Disadvantages include less control of your systems as well as reliability on other companies for systems and infrastructure critical to your operation.

1. Public cloud
2. Private cloud
3. Hybrid cloud
4. Multicloud

d)

Here in Norway, digital transformation of healthcare systems are almost always huge projects financed by the government. Other than governmental financing, the only other solution I can think of is going private for-profit, like many organisations in the USA.

e)

Goal 3: Good health and well-being
Successfully implementing these technologies will ultimately lead to better health and well-being for both patients and staff by reducing overworking and thus errors made. Better management of staff hours can also lead to patients getting the attention they need.

Goal 8: Decent work and Economic Growth
As with Goal 3, the work environment can be improved by these technologies and thus providing staff with a better work/life balance.

4.

a)

Defensive strategy
The business attempts to protect itself from competitors and disrupters.

Offensive strategy
The business attempts to disrupt the industry.

A good example of these two strategies can be found in the car industry. Most car manufacturers have been using the defensive strategy, investing continuously in their own platforms and technologies to remain competitive. Tesla is an odd one out and uses an offensive strategy. By investing heavily in brand new EV technology and production methods, they attempted to, and widely succeeded, in disrupting the whole industry, forcing the other manufacturers to also focus on EV-technology.

b)

One of the most noticeable technological adaptations that has happened during COVID-19 have been within the virtual meeting space. Although we did have video chatting services before, the use of such software skyrocketed during the pandemic. Examples are Zoom and Microsoft Teams.

As both education and work was forced to move online, these services have been widely adopted to every corner of society. While online education has some challenges with quality and engaging students, the world has opened its eyes for how successful working from home has been.

c)

*The exam paper says "Define technical **debit**", but I'm going to assume this is a typo and will be answering what technical **debt** is.*

Technical debt is understood as a term for poorly designed code and using obsolete software and hardware. By taking shortcuts now, this debt will require time and resources to be dealt with in the future.

d)

Some of the leading indicators of failure in an industrial digital transformation are:

- Lack of top-down support
- Lack of a IDT strategy
- Mismatch of planning vs doing
- Too much focus on technology rather than a cultural shift

e)

Lights-out manufacturing
A way of manufacturing where the entire production line is fully automated. The only role of people is maintenance and repair.

IDT drives this type of manufacturing by promoting automation and the adaptation of new technology to achieve our goals.