Gabarito
1-D
2-C
3-B
4-A
5-C
6-B
7-D
8-B
9-C
10-B

English Test for Master and PMG Candidates – 2023.2

Part 1 - Questions 1 to 4

Question 1 - Which phrase uses 'neither' correctly?

    A) Neither wallet are mine.

    B) Neither of these wallets aren't mine.

    C) Neither of these wallets is mine.

    D) There is no correct answer.

Question 2 - "In 1982, I started studying Portuguese. In 1984, I visited Brazil for the first time." Which sentence correctly describes these events?

    A) I have been studying Portuguese for two years before I first visited Brazil.

    B) Before I first visited Brazil, I have been studying Portuguese for two years.

    C) I had been studying Portuguese for two years before I first visited Brazil.

    D) Both B and C are correct.

Question 3 - Fill the gaps with the correct choice:

The prime minister _____ his resignation tomorrow.

    A) is expected to have announced

    B) is expected that he will

    C) is expected to will announce

    D) is expected to announce

Question 4 - Fill the gaps with the correct choice:

Hundreds of people _____ killed in the earthquake.

    A) are reported that they were

    B) are reported to have been

    C) are reported that they are

    D) are reported to be

Part 2 - Read the article "*US aims for electric-car revolution — will it work?"* and answer the questions 5 to 7:

Question 5 - Mark the **correct** sentence according to the provided text.

A) The US government is going to reduce greenhouse-gas emissions by 67% in the next decade or so.

B) The US history of innovation in industry will suffice for an electric vehicle revolution.

C) Dependence on foreign technology is not of concern for the US regarding electric vehicles.

D) Charging infrastructure will be needed to attend the demand of growing electric vehicles fleets.

Question 6 - According to the provided text, what can be said about electric vehicles?

A) Electric vehicles use batteries that need special materials which the US government prefers to buy from countries under specific agreements.

B) Electric vehicles can be used to reduce greenhouse-gas emissions, and this is the reason why the US government wants to only allow sales of electric vehicles in the future.

C) Electric vehicles use batteries with special materials that must be recycled to not harm the environment.

D) None of the above sentences.

Question 7 - Mark the **incorrect** sentence according to the provided text.

A) In the US, pollution regulations can be legally questioned at courts.

B) Modern electric vehicles' batteries need specific raw materials that need to be imported into the US.

C) The EPA has proposed a new set of pollution regulations that is based on technological change that disfavours electric vehicles.

D) Sales of electric passenger vehicles in the US are expected to rise in the near future, even without new emissions regulations.

Part 3 - Read the article "*5G enables automated control of train traffic*", and answer the questions 8 to 10:

Question 8 - Mark the **correct** sentence according to the provided text.

A) With recent advances, safety key tasks in railway networks are based on 5G mobile networks in Europe.

B) 5G mobile networks have potential at developing autonomous driving in very specific controlled environments.

C) From the trials of Corujo et al., it is possible to conclude that low data package loss was important for successful traffic control tests.

D) The results from Corujo et al. showed that the solutions tested in a controlled environment can be promptly implemented in railway networks.

Question 9 - Mark the **correct** sentence according to the provided text.

A) The results of Curujo et al. do not provide valuable information for research on autonomous driving of aeroplanes and ships.

B) Coverage of 5G networks is not of concern for railway traffic applications in Europe.

C) Nowadays in Europe, the automation of railway level crossings often rely on sensors connected by cables.

D) In order to set up 5G 'living labs', the European Commission has made investments in several cities like Aveiro in Portugal.

Question 10 - The conclusion of the paper is that the railway operation can be promptly automated with a 5G network?

A) in a controlled environment

B) in all environments

C) just in the laboratory

D) only a) and c)

US aims for electric-car revolution — will it work?

The Environmental Protection Agency has released draft regulations that set the stage for a huge transition to electric vehicles.

The US Environmental Protection Agency (EPA) has proposed a landmark set of pollution regulations that could spark an electric-vehicle revolution and drive down greenhouse-gas emissions.

Under the rules, electric vehicles could account for an estimated 67% of new US passenger-car sales by 2032 and additional gains for larger vehicles — a major feat for a country where transportation is the largest source of greenhouse-gas emissions.

"These actions will accelerate the ongoing transition to a clean-vehicle future, tackle the climate crisis and improve our air quality for communities across the country," EPA administrator Michael Regan said during a press conference.

The rules, which are currently in draft form pending public comments, apply to automobiles sold between 2027 and 2032. They would reduce average emissions from new passenger vehicles by more than half compared to the existing standard. But will the proposal succeed and how might it affect climate change?

Can the United States make enough electric vehicles in time?

The country has one of the largest vehicle fleets in the world, so one question is whether it's possible to scale up to so many more electric vehicles in just a few years. Challenges include the need to roll out charging infrastructure, ramp up manufacturing capacity for electric cars and convince people to change their habits.

However, the rules are arriving in an economy that is already primed for innovation and change, says Margo Oge, who led the development of similar vehicle regulations as head of the EPA's Office of Transportation and Air Quality under former president Barack Obama.

In particular, an infrastructure bill enacted by Congress in 2021 and a massive spending bill known as the Inflation Reduction Act, passed in 2022, are funnelling federal money into charging infrastructure and tax credits for consumers and for automobile or battery manufacturers that upgrade or build new facilities.

Electric cars could account for more than half of new US passenger-vehicle sales in ten years.

Even without the EPA's rules, electric vehicles could account for more than 50% of new US passenger-vehicle sales by 2030, according to a January study (see go.nature.com/3gjhj3b) by the International Council on Clean Transportation, a non-profit research group in Washington DC, and the consultancy Energy Innovation Policy and Technology in San Francisco, California.

What about securing raw materials?

Lithium and cobalt are needed to manufacture modern batteries, and the administration of US President Joe Biden is encouraging companies to purchase these and other materials through countries that have free-trade agreements with the United States. The administration is also encouraging domestic manufacturing, to secure supply chains and dial back dependence on China. Some tax credits are available only if the manufacturing of batteries and vehicles takes place in the United States, or if key minerals are sourced from free-trade partners such as Chile, Australia, Canada or Mexico. But so far, there are no obvious showstoppers when it comes to supplies of crucial minerals for electric-car batteries, according to the energy consultancy BloombergNEF.

"The investments are there, and these nations can theoretically provide sufficient supplies," says Evelina Stoikou, an energy-storage analyst at BloombergNEF in New York City. But she warns that demand from Europe and other regions will rise, so it will be important for the United States to strengthen its international partnerships.

What impact would the rules have on climate change?

The EPA's initial estimate is that the rules would reduce carbon emissions by around ten billion tonnes over three decades. That is more than double the United States' emissions last year, or more than one-quarter of the global total. "The administration is going to make history if indeed, at the end of the day, they finalized these new standards," says Oge. "I'm really hopeful."

Could the courts challenge the rules?

US courts have overturned environmental rules in the past. One thing in favour of the latest EPA proposal is that it follows procedures that the agency has long used to control pollutants. Rather than dictating technological change, the agency is setting pollution limits for car manufacturers. Those limits can be met with existing technologies, and it's up to the automobile industry to decide how to comply, says Chester France, a former EPA official who is now a consultant for the Environmental Defense Fund, an advocacy group based in New York City. "I would fully expect those standards to be legally durable."

By Jeff Tollefson

News & views

5G enables automated control of train traffic

Toktam Mahmoodi

Key tasks for ensuring railway safety have been performed automatically using fifth-generation (5G) mobile networks. The trial forms part of a Europe-wide scheme to test the feasibility of automating transport.

The ability to drive a car can be useful when travelling abroad, but it doesn't necessarily equip a driver with the knowledge required to navigate foreign roads and follow regulations. Autonomous vehicles suffer no such culture shock, and could make it easier to get around in a foreign country. The fifth generation of mobile networks (5G) provides the sort of connectivity and flexibility needed for safe autonomous driving. Writing in *IEEE Access*, Corujo *et al.*[1] put 5G to the test of managing the control signals used in railway operations — a step towards 5G-run automation in the broader transport sector.

Connected automated transport is a focus of European research investment, as is the role that 5G will have in realizing it (see go.nature.com/3hvnnnp). 5G networks hold promise because they can be tailored to provide specialized services for a given infrastructure. This is known as network slicing[2],

and widespread use of this technique was not possible with previous generations of mobile networks. The 5G infrastructure is multi-plexed, which means that each network 'slice' constitutes a potentially isolated network that can be customized for a particular task. Because of this, 5G can adjust its performance dynamically, depending on the application: for example, one task might need high bandwidth, rather than fast data transfer.

Researchers have started to test the capabilities of 5G for autonomous transportation — not only in terms of cars on roads[3], but also of public-transport vehicles, such as trains. As part of this initiative, the European Commission has established several cities as 'living labs', in which it has set up 5G networks in strategic areas, such as harbours. One such project is based in Aveiro, Portugal (see go.nature.com/41hjk), where Corujo *et al.* conducted their investigation of how 5G could

be used to automate the operation of railway networks. The team examined two specific use cases: controlling the barriers at railway level crossings, and providing drivers (either human or algorithmic) with crucial safety information from the crossing as a train approaches it (Fig. 1).

In the first case, the authors used the 5G network to detect incoming trains automatically and to lower barriers to stop road traffic and pedestrians, with timing aligned with global regulations. The test was done on a railway track in Aveiro that is used infrequently and only by heavy freight trains. Corujo *et al.* placed sensors on the track a few kilometres from a level crossing. When these sensors detected an incoming train, the information was transmitted to a level-crossing controller that lowered the barriers to separate the road from the tracks.

The crucial safety decisions involved in this process required the reliable, fast communication provided by 5G. Conventional level crossings are controlled and monitored by various means, including manually by station staff, and automatically through sensors that are connected to the level-crossing controller by cable. Wireless connections, such as 5G, offer fast and reliable connectivity without the maintenance required for cable-based signalling.

The second test was designed to assess whether transmission of live video footage from the level crossing could improve conductors' decision-making as the train approached the crossing. Using this information, a human driver or an automated engine could assess the state of the level crossing before reaching it, and make a safe stop if necessary. Although
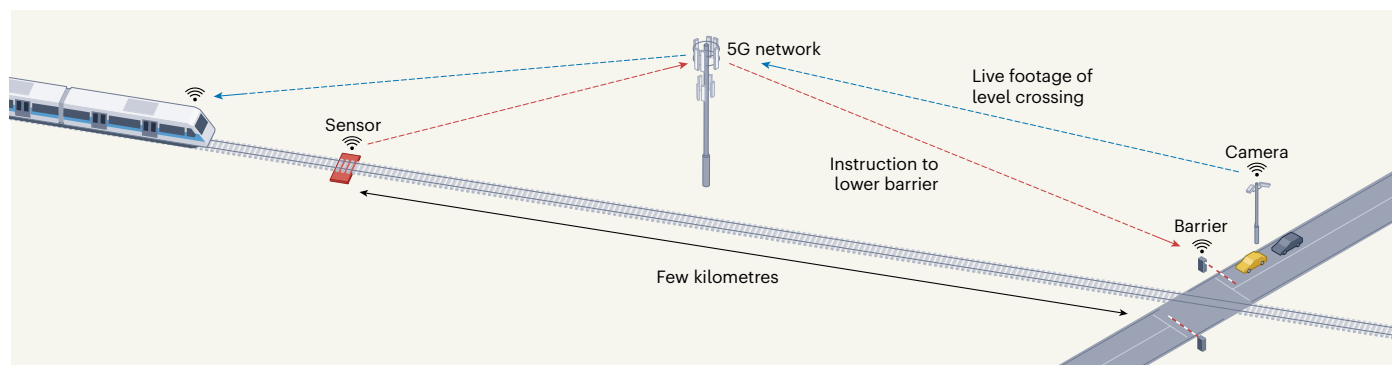
Figure 1 | Testing automation of a railway level crossing using 5G networks. Corujo *et al.*[1] tested two ways of using fifth-generation (5G) mobile networks to automate control of a level crossing on a train track in Aveiro, Portugal. In the first test, the authors detected a train using track sensors located a few kilometres from the level crossing, and transmitted the information (red arrows) to a level-crossing controller that then lowered the barriers, preventing road traffic from crossing the track. In the second test, live video footage of a level crossing was transmitted (blue arrows) to the driver as the train approached the crossing. The 5G network provided the speed and bandwidth necessary for safe automation in preliminary tests conducted in a controlled laboratory environment, and showed potential for similar success in the real-world setting.

this is not as time-sensitive as the first test, live (and real-time) video transmission requires substantial bandwidth, which is not provided by the radio communication systems that are currently used by railway operations.

The authors used key metrics to establish the success of each test. Their first use case required low latency, which is the time it takes for data to pass from one point on a network to another; low jitter, which is the variation in the amount of latency; and relatively low packet loss, which is a measure of data loss during transmission. The second use case needed high bandwidth, low packet loss and relatively low latency. Corujo *et al.* conducted both tests first in a controlled laboratory environment, and then in the Aveiro living lab, using two 5G networks. The networks achieved the minimal performance requirements for all four metrics in the standard lab setting, but packet loss was a problem at high transmission rates in the living lab. One of the networks also failed to achieve the required latency and jitter, but the other succeeded.

The test environment has a key role in ensuring the success of such trials. Standard labs offer controlled conditions that aid the reproducibility of results, but these conditions can be unrealistic and therefore ultimately unhelpful. By contrast, on-site tests are more informative, but can involve certain real-world challenges. For example, when it comes to wireless communication, coverage is always a major obstacle, and test environments that are not fully controlled must overcome this problem.

Corujo *et al.* used existing technology to improve the coverage by better distributing the part of a mobile telecommunication system known as the radio access network. The set-up that they used is typically referred to as a cloud radio access network or a decomposed radio access network. In this approach, the processor undertaking heavy computation is located centrally, close to the power supply, and is separated from the radio transmission unit, so that this unit can be placed close to the user[4]. Aside from improving distribution, this set-up has numerous advantages, including low communication latency (through proximity to the user) and improved coordination of radio resources — all contributing to performance enhancements.

The authors' results show that connected railway operation can be automated with a 5G network in a controlled environment. The tests performed in the Aveiro living lab were not as successful as those in the standard lab, but they still show 5G's tremendous potential for delivering automated railway services. Corujo and colleagues' experiments also pave the way for exploration of how 5G could automate other types of transport, including air or sea transportation. These cases would require greater network coverage and more diverse radio technologies, as well as integration of several wireless communication systems. However, the approach adopted by Corujo *et al.* could assist in these endeavours.

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