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Topics Covered

-
    - What is the news?
    - Initiative by whom?
    - Unveiling the Benefits:
    - Challenges and Considerations:
    - How will it work?
    - Overall System Integration:
    - Road Ahead:
    - QuizTime:
    - Are you Ready!
- Read the Below Instructions Carefully:
    - Please Rate!
- Mains Questions:
    - Question 1:
    - Model Answer:
    - Question 2:
    - Model Answer:
    - Relevance to the UPSC Prelims and Mains syllabus under the following topics:

What is the news?

- Bengaluru, India’s IT hub, is poised for a significant leap forward in urban transportation

with the introduction of **India’s first driverless metro train.**

Initiative by whom?

- Bengaluru Metro Rail Corporation Limited (BMRCL)’s pioneering initiative shows India’s expanding automation and smart city ambitions.

Unveiling the Benefits:

Driverless metro trains have many benefits:

- Enhanced Efficiency: Driverless trains have pre-programmed arrival and departure timings, which may reduce passenger wait times and improve network efficiency.
- Automated systems can be programmed with advanced safety features to reduce human error and improve passenger safety.
- Since driverless trains eliminate the need for human drivers, they may save operational expenses over time.
- Urban Mobility Advancement: India is modernising urban transport networks with this project. It can inspire other cities to automate public transport.

Challenges and Considerations:

Driverless metro presents amazing possibilities, yet there are challenges:

- Technological Integration: The autonomous train technology must integrate seamlessly with metro infrastructure for smooth operations.
- Cybersecurity: The system needs strong cybersecurity to prevent cyberattacks.
- Skilling the Workforce: Driverless trains may require metro workers to learn new skills.
- Public Perception: Passenger adoption requires public trust and addressing driverless technology safety and dependability issues.

How will it work?

Bengaluru's driverless metro will use multiple technologies to navigate tracks safely and effectively. Here are some possible technologies:

- **Communication-Based Train Control (CBTC):** This system connects trains with trackside equipment. CBTC controls train speed and positioning for safe operation without a driver.
- **Automatic Train Operation (ATO):** Based on pre-

programmed timetables and real-time CBTC data, ATO automates train functions like acceleration, braking, and door opening/closing.

- **LiDAR (Light Detection and Ranging):** Train-mounted LiDAR sensors build a 3D map of the surroundings to detect impediments and ensure safe navigation.
- **Cameras and Vision Systems:** High-resolution cameras can detect platform edges, risks, and passenger movement.
  Additional sensors in the train can monitor speed, temperature, and door status for safe operation.

Overall System Integration:

- Centralised control centres will incorporate these technologies. The control centre will track trains, manage schedules, and respond remotely to crises.
- Note that Bengaluru's driverless metro's technologies may not be confirmed. The technology above are employed in driverless metro systems worldwide, so Bengaluru may follow suit.

Road Ahead:

- The Bengaluru inauguration of India's first autonomous metro train is important. UPSC applicants can learn about technical advances and urban development by analysing its achievements and problems. Indian cities are becoming smarter

and more sustainable, and the Bengaluru driverless metro project is a step towards innovation and automation.

QuizTime:

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Are you Ready!

Thank you, Time Out !

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General Studies

CURRENT AFFAIRS QUIZ

Read the Below Instructions Carefully:

- Click on - Start Quiz
- Attempt all questions (You can attempt or leave)
- After Attempting Last Question.
- Enter Name & Email
- Click on - Check Result
- Scroll down - Check out Solutions too.

Thank you.

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Category: **General Studies**

The upcoming driverless metro project in Bengaluru is a significant development in the context of India's urban transportation sector. What is the PRIMARY benefit expected from this project?

- ○ Reduced cost of construction
- ○ Increased passenger capacity per train
- ○ Improved safety and reduced human error
- ○ Generation of additional employment opportunities

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Category: **General Studies**

Communication-Based Train Control (CBTC) plays a crucial role in the functioning of Bengaluru's driverless metro. What is the MAIN function of CBTC?

○ Automate door opening and closing

○ Monitor passenger movement within the train

○ Provide real-time information on track conditions and train location

○ Control acceleration and braking of the train

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Category: **General Studies**

The success of Bengaluru's driverless metro project can have implications for which of the following aspects mentioned in the UPSC syllabus?

○ Conservation of natural resources and environmental protection

○ Social impact of development projects on urban populations

○ Ethical considerations in the development and use of new technologies

○ All of the above

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Category: **General Studies**

Bengaluru's driverless metro project can be seen as an example of advancements in which area of science and technology, as highlighted in the UPSC

syllabus?

○ Biotechnology and its applications in healthcare

○ Information and Communication Technology (ICT)

○ Space technology and its applications

○ Nuclear science and its applications

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Category: **General Studies**

A potential challenge associated with implementing a driverless metro system in Indian cities, as mentioned in the editorial, is:

○ Development of user-friendly mobile apps for ticketing

○ Availability of sufficient power supply for train operations

○ Public apprehension regarding the safety of driverless technology

○ Shortage of skilled personnel for system maintenance

Prev Finish

Check Rank, Result Now and enter correct email as you will get Solutions in the email as well for future use!

Check the Result

Your score is

0%

Restart quiz

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Mains Questions:

Question 1:

The upcoming driverless metro project in Bengaluru signifies India's growing focus on technological advancements in urban transportation. Discuss the potential benefits and challenges associated with implementing a driverless metro system in Indian cities.(250 words)

Model Answer:

Benefits of Driverless Metro Systems:

- Enhanced Efficiency: Driverless trains operate on a pre-programmed schedule, leading to more precise arrival and departure times, potentially reducing passenger wait times and improving overall network efficiency.
- Improved Safety: Automated systems can be programmed with advanced safety features, minimizing human error and enhancing passenger safety.
- Reduced Operational Costs: Driverless trains might lead to lower operational costs in the long run as they eliminate the need for human drivers.
- Urban Mobility Advancement: This project signifies India's commitment to modernizing urban transportation systems. It can serve as a model for other cities looking to embrace automation for improved public transport.

Challenges of Implementing Driverless Metro Systems:

- Technological Integration: Seamless integration of the driverless train system with the existing metro infrastructure is crucial for smooth operations.
- Cybersecurity Concerns: Robust cybersecurity measures need to be implemented to safeguard the system from potential cyberattacks.
- Skilling the Workforce: The transition to driverless trains might necessitate skill development programs for the existing metro workforce.
- Public Perception: Building public trust and

addressing concerns regarding safety and reliability of driverless technology is vital for passenger adoption.

Question 2:

The Bengaluru driverless metro project is expected to utilize various technologies for safe and efficient operation. Explain the role of Communication-Based Train Control (CBTC) and Automatic Train Operation (ATO) in driverless metro systems.(250 words)

Model Answer:

Communication-Based Train Control (CBTC):

- CBTC is a key technology that enables continuous communication between the train and trackside equipment.
- It provides real-time information on track conditions, location of other trains, and speed limits.
- Based on this data, the CBTC system automatically calculates the optimal speed and stopping points for the train, ensuring safe and precise movement without a driver on board.

Automatic Train Operation (ATO):

- ATO builds upon CBTC and automates various train functions like acceleration, braking, and door opening/closing.
- It leverages real-time data from CBTC and pre-programmed schedules to control these functions, maintaining a safe and efficient journey.
- Passengers won’t experience any difference compared to a driver-operated train in terms of acceleration, braking, or stopping.

Combined Role:

- CBTC and ATO work together to create a seamless and automated train operation. CBTC provides the real-time data and situational awareness, while ATO translates that data into automated actions for safe and efficient train movement.

Remember: These are just sample answers. It’s important to further research and refine your responses based on your own understanding and perspective.

Relevance to the UPSC Prelims and Mains syllabus under the following topics:

Prelims:

- **General Science and Technology:** Recent developments in science and technology. (The driverless metro system represents a recent advancement in urban transportation technology.)

Mains:

- **GS Paper III – Science, Technology, and Development and Security:**Science and Technology – developments and their applications and impact on society. (Here, you can analyze the project's potential impact on urban mobility, efficiency, and safety.)
  Infrastructure: Its impact on the economy and its roles in the development process. (The driverless metro can be discussed as an example of modern infrastructure development and its potential role in urban development.)
- **GS Paper IV – Ethics, Integrity and Aptitude:**Issues related to technology and development. (The ethical considerations of using driverless technology, including public trust, safety concerns, and potential impact on the workforce, can be explored here.)

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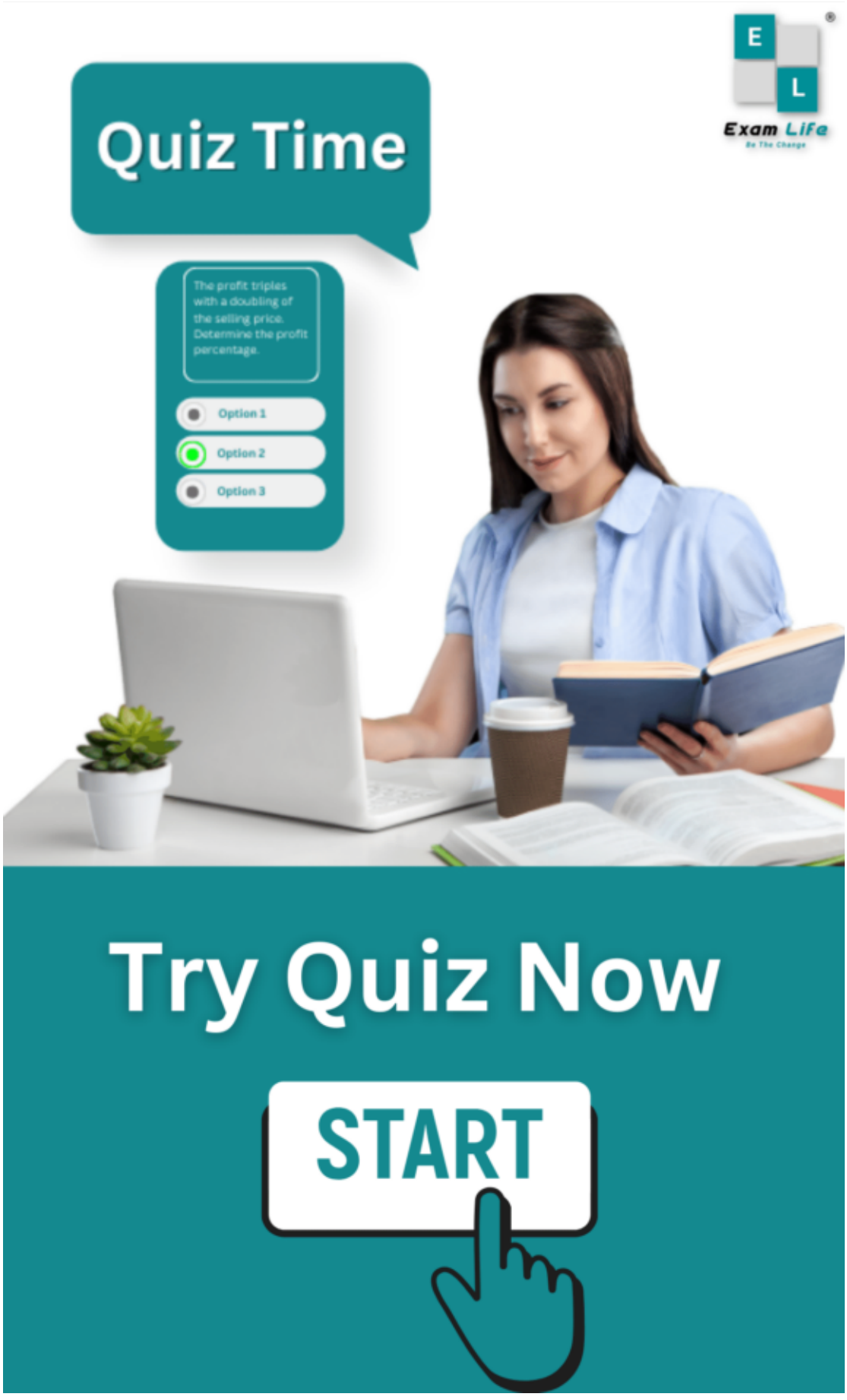
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Option 1
Option 2
Option 3
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