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- About PA-100AST
- The Truenat platform
- **Artificial intelligence act**
- Grey Zone Warfare
- Mains



By saurabh Pandey





Saurabh Pandey CSE

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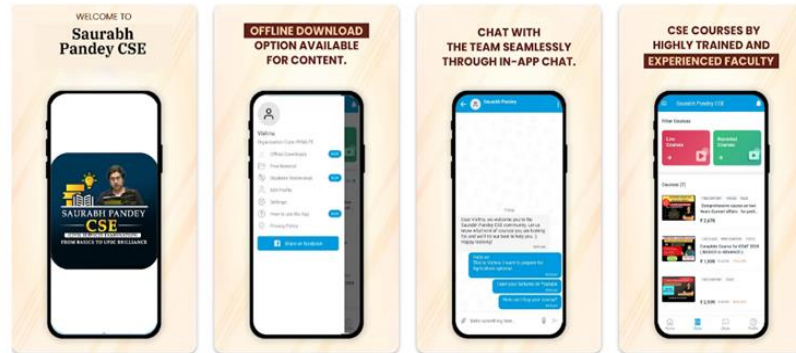
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Target Mains -2024/25 -

Q " For India Grey zone warfare is the biggest challenge in modern era " Discuss

प्रश्न "भारत के लिए ग्रे जोन युद्ध आधुनिक युग की सबसे बड़ी चुनौती है" चर्चा करें

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Rapid, diagnostic test for UTIs may help stem super bug crisis

The Longitude Prize-winning device offers an affordable, quick, point-of-care test for urinary tract infections, which promises to revolutionise infection management and global efforts to tackle antimicrobial resistance

Abdul Ghafur

This week, a prize was announced that is likely to have far-reaching implications in the world of health care. Despite its importance, most of the community is unaware of the event. The winner of the Longitude Prize is poised to spearhead a revolution in the field of infection management and global efforts to tackle antimicrobial resistance. The \$3 million (£ 85 crore) Longitude Prize on Antimicrobial Resistance (AMR), first announced in 2014, revealed its winner at an event in London's Science Museum. The PA-100 AST System from Sysmex Astrego is a high-tech, transformative, rapid, point-of-care test for UTIs (Urinary Tract Infection).

Rational use of antibiotics – choosing the appropriate antibiotic for the correct patient at the optimal time – is fundamental to saving lives and combating the superbug crisis. Rapid diagnostics are poised to be crucial in this effort. The winner of the Longitude Prize is set to spearhead the list of emerging rapid diagnostic technologies in a transformative manner. The applications for the Longitude Prize bring hope, suggesting that through collective action, we can look forward to a future protected from the threats of antimicrobial resistance.

The crisis is imminent: Antibiotic-resistant infections killed nearly 1.3 million people globally in 2019 and are on course to cause 10 million deaths a year by 2050, outstripping cancer. The global economy may lose \$ 4 trillion by 2050 and up to \$ 100 trillion by 2050 due to the AMR crisis.

What does the prize mean?

Most advanced tests in medical practice today are PCR-based, but the PA-100 AST System from Sysmex Astrego has developed a transformative technology based on a phenotypic test. This test identifies the bacteria causing the urinary tract infection and performs antibiotic susceptibility testing (AST) to determine the effective antibiotic for the specific patient in under 45 minutes.

The test uses a single-use cartridge, the size of a smart phone. Less than half a millilitre of the urine is added to this cartridge. Bacteria in the urine are trapped in over 10,000 microfluidic traps in parallel arrays and exposed to five different antibiotics at five different concentrations. The cartridge is inserted into a reader instrument the size of a shoe box, where bacterial growth is monitored by phase-contrast imaging. The reader provides a report, "sensitive" or "resistant" for each antibiotic in 30-45 minutes. This supports doctors and health workers in their clinical decision making at the point of care, and opens up a significant possibility of previously "retired" first-line antibiotics coming back



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The test represents a huge advance over the current turnaround time of 2-3 days. The test will help doctors prescribe the right antibiotic at the right time, rather than waiting for 3 days and resorting to an empirical antibiotic prescription. The test can be performed in a doctor's clinic rather than sending the urine sample to a laboratory. When a patient with symptoms of a urinary infection visits a doctor, if the new technology is used, the doctor will know within 45 minutes whether the patient has urinary infection or not and if there is an infection for which antibiotics will work. The test is transformative, accurate, and affordable for patients worldwide.

Currently, there are two types of tests available to diagnose urinary infections. The first one is the urine dipstick test that can be done as a point-of-care test. Point-of-care diagnostic tests are tests that can be performed in the clinic, emergency departments, hospital wards, or pharmacy counters, without the need to send the sample to a laboratory. The advantage of the dipstick is that results are available in a couple of minutes, which helps doctors decide whether to start antibiotics or not. Unfortunately, accuracy is not more than 50-60%. Even if the doctor carries out a dipstick despite its limitations, the test doesn't help the doctor choose the right antibiotic.

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In India, every year, millions of patients with urinary tract infections visit doctors or pharmacies seeking treatment. These infections result in significant loss of life, burden the healthcare system, and have a socio-economic impact.

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The goal is to replace the 2-3-day lab test process that doctors and patients must currently endure, and end "just in case" prescribing that is prevalent as a result, which promotes the development of antibiotic resistance.

(Dr. Abdul Ghafur, Consultant in Infectious Diseases, Apollo Hospitals, Chennai, and a member of the Longitude Prize jury from its inception. drghafur@hotmail.com)



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CONCEPT: LIGHT MICROSCOPES THAT INCREASE CONTRAST

Phase-Contrast Microscopy

- Phase -Contrast Microscopes: makes cells & their dense structures appear darker than the gray background.
 - Special optic devices increase the differences in how different substances/surroundings refract light differently.
 - Excellent for enhancing contrast of _____ details in unstained, living cells.

EXAMPLE: Images from a Phase-Contrast Microscope.



Phase - _____ Microscopy



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(Dr. Abdul Ghafur, Consultant in Infectious Diseases, Apollo Hospitals, Chennai, and a member of the Longitude Prize jury from its inception. drghafur@hotmail.com)

The Truenat platform

- **The Truenat platform, a rapid molecular test for the diagnosis of pulmonary, extrapulmonary, and rifampicin-resistant tuberculosis, that was developed in India, has been hailed for its role in combating TB and as a possible component of global healthcare solutions at the recently held 77th World Health Assembly in Geneva.**
- **Developed by Goa-based Molbio, a point-of-care molecular diagnostics company, Truenat was first launched in 2017 and is a real-time quantitative micro-PCR system.**

- **It is a portable, battery-operated machine that can be deployed at labs, health centres, and in the field.**
- **Truenat delivers results from samples in less than an hour and can test for over 40 diseases.**

DNA



Denaturation

5'

3'

Annealing

5'

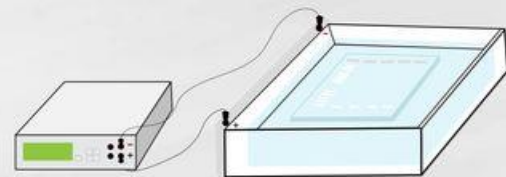
3'

Extension

5'

3'

End-point Analysis



DNA template



Primers



dNTPs

China's 'grey-zone' warfare tactics against Taiwan

What are the coercive measures China has imposed on Taiwan?

Anushka Saxena

The story so far:

Since the new Taiwanese president Lai Ching-te has assumed office, all eyes have been on the rocky start to his tenure. While China's belligerent response to Mr. Lai's "pro-independence" and "secessionist" statements was striking, it has now resorted to a sophisticated ploy to respond to Mr. Lai's Democratic Progressive Party (DPP). This is often referred to as 'grey-zone' warfare, which comprises elements that frustrate Taiwan in a sustained manner.

What has China done?

China's preparedness to invade Taiwan and fight a high-intensity war over the island is a much debated subject. Training drills in the People's Liberation Army Eastern Theater Command (PLA ETC) are targeted precisely at demonstrating China's ability to fight and win. However, a more cognitive tool that Beijing is

deploying to demonstrate this ability is simulated audiovisuals. On May 24, for example, the PLA ETC Weibo account released a 3D animation video depicting how in an invasion scenario, land- and warship-based ballistic missile launchers would fire tens of missiles at one go, striking areas in Taipei and Kaohsiung.

Moreover, since 2020, the X account of the Taiwanese Ministry of National Defence has turned into a repository of reportage on daily sorties conducted by PLA fighter jets, unmanned aerial vehicles (UAVs), strategic fighters and early warning aircraft. While such sorties do not engage the island's defence forces directly, they exert sustained pressure on them. Further, these UAVs also conduct intelligence work in the areas surrounding the island. The long term presence of such mobilisation induces wear-out within Taiwanese forces, even before there is kinetic combat.

What about ideology?

To build a favourable image for itself,

Beijing often deploys narratives within Taiwanese territory that thrust ideological choices upon its citizens. For example, sometime on May 25, just under a week after Mr. Lai assumed office, internet users in Taiwan observed a Youtube video of a Chinese citizen operating a drone to drop cardboard boxes on Kinmen island. When investigated by the Kinmen Defence Command on May 26, the boxes unveiled fliers written in simplified Chinese, stating "Both sides of the Taiwan Strait belong to one China, one Chinese nation. Taiwan independence is a dead end. Lai's Taiwan independence is a dead end." Some other fliers warned, "Don't sacrifice your life for Taiwan independence, do you understand?"

The Kinmen Command stated that this was "a typical cognitive warfare tactic" deployed by China, because it initiates public discussions on social media, and garners attention for the Chinese cause.

What are political tactics China uses?

In its 'carrots and sticks' approach

towards Taiwan, Beijing deploys sticks for the DPP and carrots for its primary opposition party, the Kuomintang (KMT). Well known for its relatively pro-mainland views, the KMT continues to engage with Communist Party (CPC) officials, even as any meaningful communication between the DPP and the CPC has stalled since Ms. Tsai became President of Taiwan in 2016. DPP legislators have often described these engagements as KMT's "collusion" with the CPC. In fact, KMT officials have, in the past, been investigated by the Tsai administration under the 'anti-infiltration law' after their visits to China.

China's 'sticks' against the DPP entail coercive economic measures, which leverage the cross-strait trade and business interdependence to seek concessions. One such example is China's unilateral suspension of preferential tax rates for chemical imports from Taiwan, granted under the only trade agreement to exist between the two sides – the Economic Cooperation Framework Agreement (ECFA). Beijing announced that such a suspension, applicable to 134 items imported from Taiwan, is retaliation against Mr. Lai's propagation of "separatist" sentiments in his inaugural speech, as well as Taipei's own restrictions against imports of over 2,000 goods made in China.

As 'grey-zone' warfare tactics become a subject of deliberation, Mr. Lai will have much to grapple with during his tenure.

Anushka Saxena is a Research Analyst at Takshashila Institution, Bengaluru.

THE GIST

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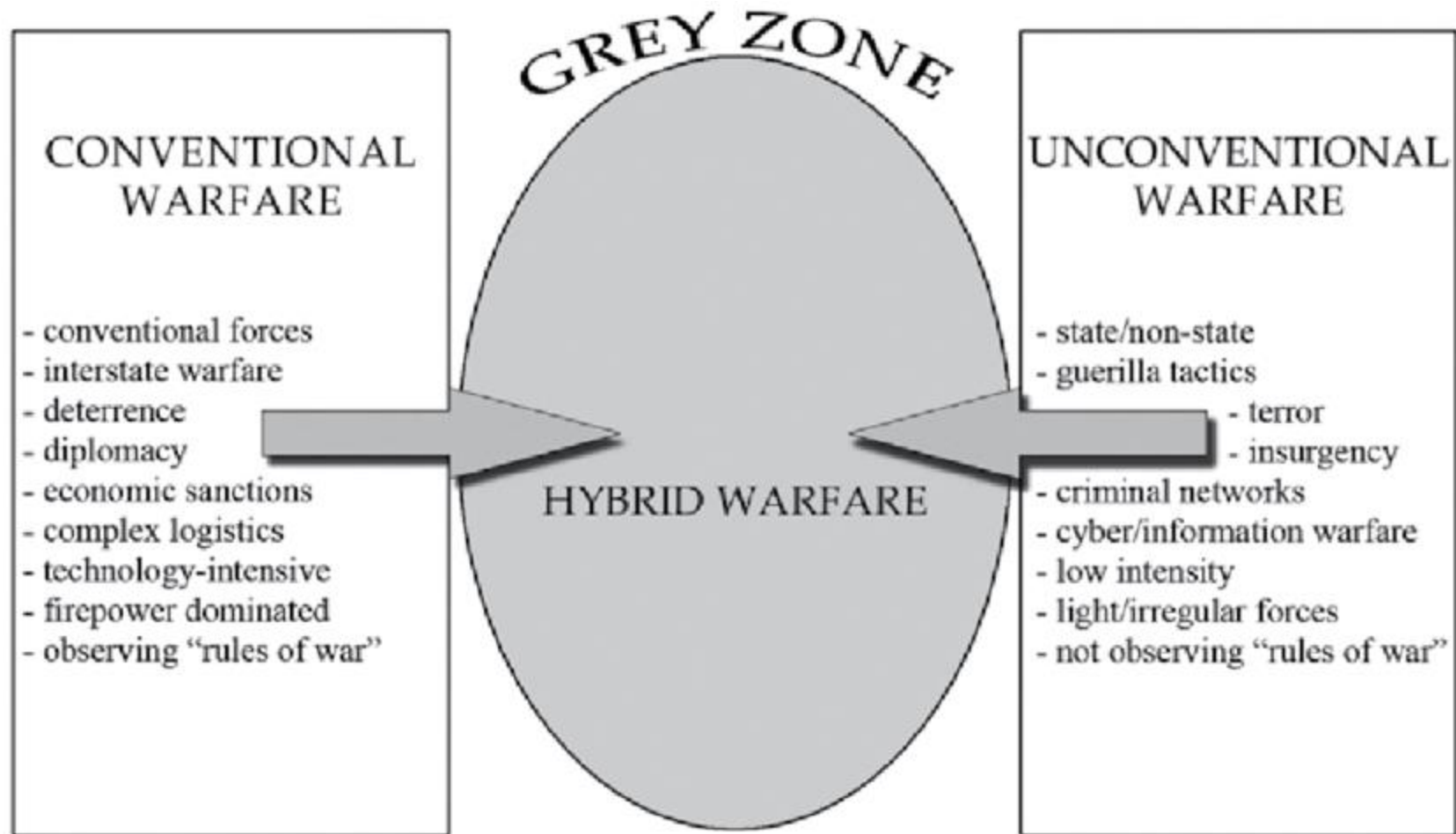
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Additionally, to build a favourable image for itself, Beijing often deploys narratives within Taiwanese territory that thrust ideological choices upon its citizens.

What is Grey Zone Warfare ?

- Grey zone tactics, confrontation, and conflict relates to the use of non-military means – below the threshold of armed conflict – to achieve political objectives.
- Grey zone confrontation is the dangerous ‘grey’ area between peace and war.
- Activities can include political and election meddling, cyber threats and attacks, economic coercion, use of proxies, and many other measures – including military action.
- According to [Andrew Dowse and Sascha-Dominik Bachmann](#), it uses the ambiguity of international law, the ambiguity of actions and attribution, or because the impact of the activities does not justify a response by governments.
- Left unchecked, grey zone activities can undermine governments. Grey zone activities are generally unseen and insidious.
- There are no rules and the front line is everywhere. Miscalculations in the grey zone can also inadvertently lead to armed conflict.

Characteristic	Grey-Zone Conflict	Hybrid Warfare
Level	Tactical, operational, strategic	Tactical and operational
Use of conventional military operations	Used alongside non-conventional operations.	Used alongside non-conventional operations. Usually the dominant element.
Use of non-conventional military operations	May be used standalone or alongside conventional operations.	Used alongside conventional operations as auxiliary tactics.
Protracted engagement	One of the dominant characteristics.	May be protracted or short



Special
forces

Regular
military
forces

Irregular
forces

Economic
warfare



**Hybrid
Warfare =**

Combination of multiple conventional
and unconventional tools of warfare

Support
of local
unrest

Cyber
attacks

Information
warfare
propaganda

Diplomacy

European Union's new AI rules ignite battle over data transparency



Questions have been raised over how AI companies obtain the data used to train their models; AI companies are highly resistant to revealing what their models have been trained on, describing the information as a trade secret that would give competitors an unfair advantage were it made public

NEWS ANALYSIS

Reuters
LONDON

A new set of laws governing the use of artificial intelligence (AI) in the European Union will force companies to be more transparent about the data used to train their systems, prying open one of the industry's most closely guarded secrets.

In the 18 months since Microsoft-backed OpenAI unveiled ChatGPT to the public, there has been a surge of public engagement and investment in generative AI, a set of applications that can be used to rapidly produce text, images, and audio content.

But as the industry booms, questions have been raised over how AI companies obtain the data used to train their models, and whether feeding them bestselling books and Hollywood movies without their creators' permission amounts to a breach of copyright.

The EU's recently-passed AI Act is being rolled out in phases over the next two years, giving regulators time to implement the new laws while businesses grapple with a new set of obligations. But how exactly some of these rules will work in practice is still unknown.



Looming concern: Some fear the new rules may hinder European AI startups' competitiveness. REUTERS

One of the more contentious sections of the Act states that organisations deploying general-purpose AI models, such as ChatGPT, will have to provide "detailed summaries" of the content used to train them. The newly established AI Office said it plans to release a template for organizations to follow in early 2025.

While the details have yet to be hammered out, AI companies are highly resistant to revealing what their models have been trained on, describing the information as a trade secret that would give competitors an unfair advantage were it made public.

"It would be a dream come true to see my competitors' datasets, and like-



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MATTHIEU RIOUF
CEO, Photogram

wise for them to see ours," said Matthieu Riouf, CEO of Photogram.

"It's like cooking," he added. "There's a secret part of the recipe that the best chefs wouldn't share, the 'je ne sais quoi' that makes it different."

How granular these transparency reports end up being will have big implications for smaller AI

startups and big tech companies like Google and Meta, which have put the technology at the centre of their future operations.

Sharing trade secrets

Over the past year, a number of prominent tech companies, including Google, OpenAI, and Stability AI have faced lawsuits from creators claiming their content was improperly used to train their models.

While U.S. President Joe Biden has passed a number of executive orders focused on the security risks of AI, questions over copyright have not been fully tested. Calls for tech companies to pay rights holders for data have received bipartisan support in Congress.

Amid growing scrutiny, tech companies have signed a flurry of content-licensing deals with media outlets and websites. Among others, OpenAI signed deals with the Financial Times and The Atlantic, while Google struck deals with NewsCorp social media site Reddit.

Despite such moves, OpenAI drew criticism in March when CTO Mira Murati declined to answer a question from the Wall Street Journal on whether YouTube videos had been used to train its video-generating tool Sora, which the company said would breach its terms and conditions.

Last month, OpenAI faced further backlash for featuring an AI-generated voice described as "eerily similar" to her own by actress Scarlett Johansson in a public demonstration of the newest version of ChatGPT.

Thomas Wolf, co-founder of Hugging Face, said he supported greater transparency, but that sentiment was not shared across the industry. "It's hard to know how it will work out. There is still a lot to be decided," he said.

Senior lawmakers across the continent remain divided.

Dragos Tudorache, one of the lawmakers who oversaw the drafting of the AI Act in the European parliament, said that AI com-

panies should be compelled to make their datasets public.

"They have to be detailed enough for Scarlett Johansson, Beyonce, or for whoever to know if their work, their songs, their voice, their art, or their science were used in training the algorithm," he said.

A Commission official said: "The AI Act acknowledges the need to ensure an appropriate balance between the legitimate need to protect trade secrets and, on the other hand, the need to facilitate the ability of parties with legitimate interests, including copyright holders, to exercise their rights under Union law."

Under President Emmanuel Macron, the French government has privately opposed introducing rules that could hinder European AI startups' competitiveness.

French finance minister Bruno Le Maire said he wanted Europe to be a world leader in AI, and not only a consumer of American and Chinese products.

"For once, Europe, which has created controls and standards, needs to understand that you have to innovate before regulating," he said. "Otherwise, you run the risk of regulating technologies that you haven't mastered, or regulating them badly because you haven't mastered them."

Artificial intelligence act

- **ground-breaking law aiming to harmonise rules on artificial intelligence, the so-called artificial intelligence act.**
- **The flagship legislation follows a ‘risk-based’ approach, which means the higher the risk to cause harm to society, the stricter the rules.**

- **The new law aims to foster the development and uptake of safe and trustworthy AI systems across the EU's single market by both private and public actors.**
- **At the same time, it aims to ensure respect of fundamental rights of EU citizens and stimulate investment and innovation on artificial intelligence in Europe.**

- **The AI act applies only to areas within EU law and provides exemptions such as for systems used exclusively for military and defence as well as for research purposes.**
- **GPAI models not posing systemic risks will be subject to some limited requirements, for example with regard to transparency, but those with systemic risks will have to comply with stricter rules.**

To ensure proper enforcement, several governing bodies are set up:

- **An AI Office within the Commission to enforce the common rules across the EU**
- **A scientific panel of independent experts to support the enforcement activities**
- **An AI Board with member states' representatives to advise and assist the Commission and member states on consistent and effective application of the AI Act**
- **An advisory forum for stakeholders to provide technical expertise to the AI Board and the Commission**

- **But as the industry booms, questions have been raised over how AI companies obtain the data used to train their models, and whether feeding them bestselling books and Hollywood movies without their creators' permission amounts to a breach of copyright**

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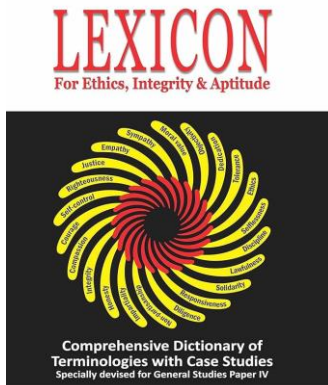
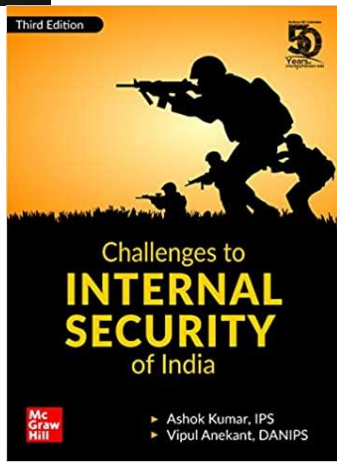
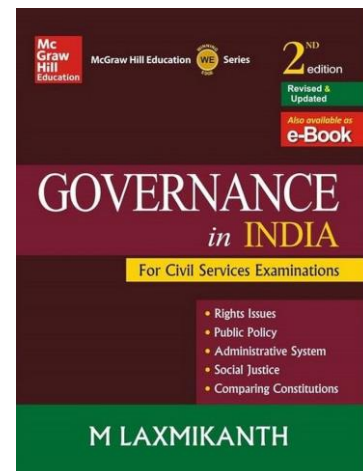
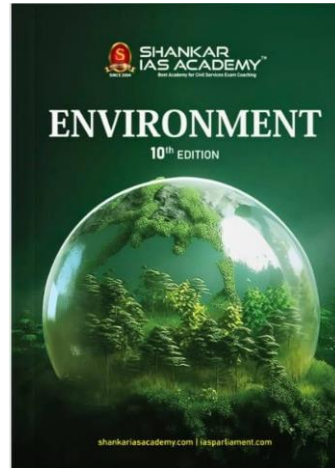
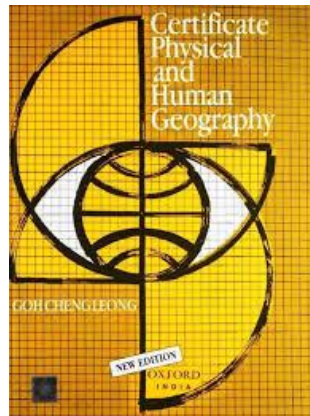
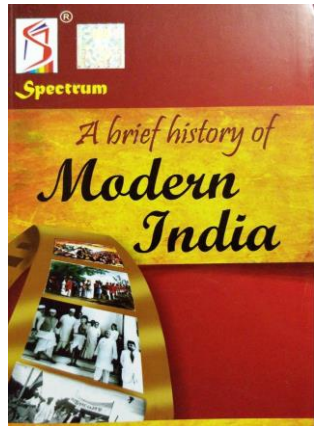
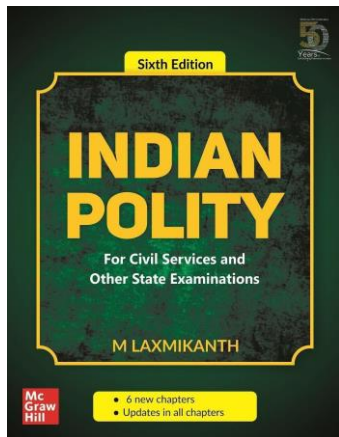
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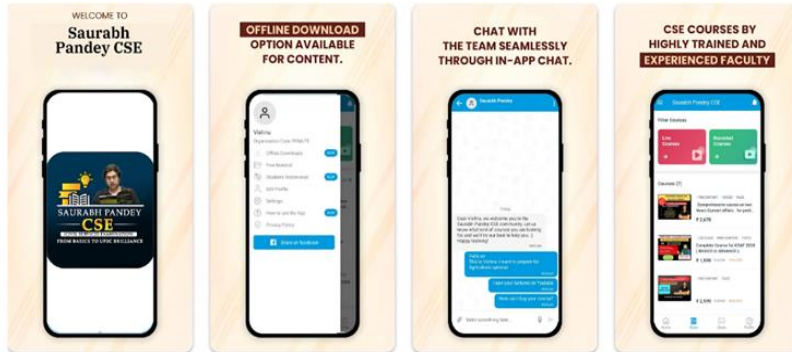
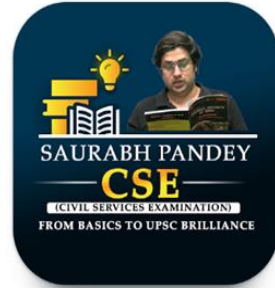
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Essay

Self-knowledge turns to ash all actions of dualities on your mind and brings you inner peace.

"If you know yourself, you know the world"

This line shows the importance of having self-knowledge about oneself. If we don't know ourselves, we will always be in a confusion or our mind will never be at peace. Because the reason behind this is that if we do not know about what we are, what are we upto, likes, dislikes, we will never be able to choose and will always have dualities in our body. Self-knowledge or "Atma Gyan" is very important in order to live a peaceful and thankful life, because when we do not know what is good for ourselves, what is bad for ourselves, we will always be fooled by the other people and we will live a life that is formed by the thinking of the other people.

Self-knowledge is important in every aspect whether it is a personal life or professional life, whether it is choosing a career or pursuing education or even opting a profession, because we truly know about ourselves, it becomes easier to identify the opportunities that are being suitable for us and going in a direction that is giving satisfaction or giving peace to oneself. For instance, if we do not know what are demands, thinking

then we will rely on other thinking to live a life on another one's basis. Also, it is not easy to know about one self or to have self-knowledge, it comes with the experiences that happens in our life. Good experiences teaches us what we are capable of and strength of a person comes out, that ultimately gives the knowledge about one self, whereas, bad experiences also teaches us about ourselves, our weak areas, that also contributes to the process of knowing about oneself or self-knowledge.

Self-knowledge even eliminates the dualities or the dual opinions because when you truly know about yourself, you will never be at the stage of confusion. Self-knowledge also eliminates the confusion and it gives us the one path or power of having one decision that is true about ourselves. Self-knowledge also gives us the peace of mind, because if we truly know ourselves, we do not have to hide anything not from the world and not from ourselves even it gives you the strength and power and confidence and ability to accept everything about ourselves, and when the process of acceptance starts, it ultimately gives the peace. When you do not have anything to deny, or have complete self-knowledge, it eradicates all dualities and gives a clear path and the understanding of one's self and provides you inner peace. And if you have peace, means you the most expensive thing in this whole world. So, it is very important for a person to know and have self-knowledge.

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