## Topics

- L'Hoest's monkeys
- Major Radhika Sen
- SASS6
- Solar Dynamics Observatory
- Why are planets formed in a spherical shape?
- India's fire safety rules

## Mains

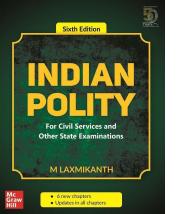


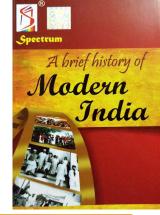


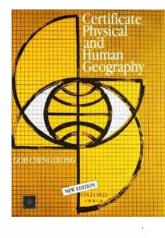


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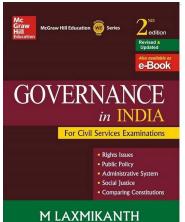


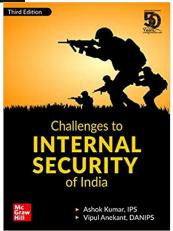
















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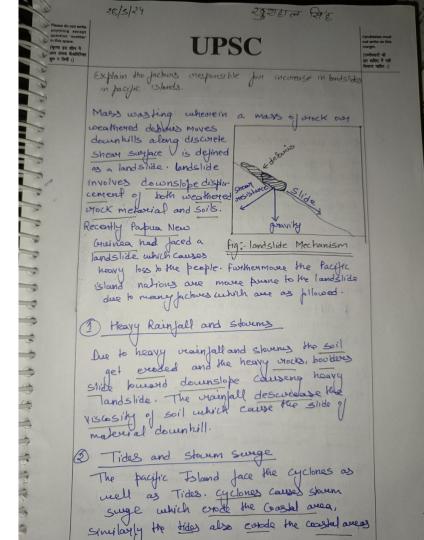
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## Target Mains -2024/25

Q Explain the factors responsible for ineffective fire safety governance in india . प्रश्न भारत में अप्रभावी अग्नि सुरक्षा प्रशासन के लिए जिम्मेदार कारकों की व्याख्या करें

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leading to the landslide near coast. Farexample: In Ngoraad, Palar there was a Slide in coastal area which cause destruction of habitat and the courtal oregs. 3 Sersmic activities and Active Vokanoes The pacific island are situated in the convergent place boundary as well as pacific vering of fine. The shock weave coreated by earthquake and Active Volcannes Cause the loosen up of soil and work material coursing V landslide. Due to change in Ysosdacy the sersmic manes get generaded which also cause the land slide. forreg: - The recent landslide in philippines is caused due to eastinguake. Similarly Fig: pacific very of five a landslide Caused in 2020 due to volcanic eruption. (G) Mining activity and construction The pacific island are with in mineral like gold, silver, looper and cobalt and due to heavy wineng activity and heavy construction and settlement Cause the landslides in the valley areas. In the mean time Climate change itself exacerbated by deputestation is making extinence weather events movie likely as well as contributing to higher files as global sea level vise, which make Pacific island movie prone to landslides.

कुम न लिखे।)

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### **Crowd pullers**



In a safe place: A pair of L'Hoest's monkeys at the Indira Gandhi Zoological Park in Visakhapatnam on Tuesday. The zoo has reported more visitors coming in to see the monkeys from Uganda that were recently rescued from animal traffickers in Srikakulam. K.R DEEPAK





### L'Hoest's monkeys

• L'Hoest's monkeys (*Cercopithecus Ihoesti*) are found in montane forests of the Albertine Rift, including southwestern Uganda, Rwanda, Burundi, and Democratic Republic of the Congo.



#### Habitat

L'Hoest's monkeys reside in montane tropical rainforests, including both primary and secondary forests. In secondary forests, they occupy the thick underbrush that grows where trees have fallen. L'Hoest's monkeys can be found at altitudes ranging from 900 to 2,500 m. The species is typically more terrestrial than other guenons. (Tolo, et al., 2008; "L'Hoest's monkey (Cercopithecus lhoesti)", 2007)

Habitat Regions: tropical Terrestrial Biomes: forest ; rainforest ; mountains





### L'HOEST'S MONKEY

Allochrocebus lhoesti

#### **CONSERVATION STATUS: VULNERABLE**

- Also called mountain monkeys
- Endemic to eastern DR Congo, Burundi, Rwanda, and western Uganda
- Reclassified from the Cercopithecus genus to Allochrocebus in 2013
- Mostly ground-dwelling, they sleep in trees sitting upright, holding onto tree limbs or each other
- Threatened by regional human conflicts, deforestation, and bushmeat hunting; populations are rapidly decreasing









### Major Radhika Sen to receive UN gender advocacy award

Major Radhika Sen, an Indian woman peacekeeper for the United Nations, will be honoured with a prestigious military gender advocate award, with UN Secretary-General Antonio Guterres describing her as a "true leader and role model." Major Sen, who served with the United Nations Organisation Stabilisation Mission in the Democratic Republic of the Congo as the Engagement Platoon Commander with the Indian Rapis Deployment Battalion, will receive the prestigious '2023 United Nations Military Gender Advocate of the Year Award' from Mr. Guterres during a ceremony at the world body's headquarters on May 30, the International Day of UN Peacekeepers. PTI

## Major Radhika Sen



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### An altered protein and fussy neurons conspire to cause microcephaly

The SASS6 gene and its variants have been implicated in a developmental process that leads to microcephaly. A new study has found that if one copy of this gene is non-functional, the other retains some function. So if both copies are non-functional, a human embryo dies before it becomes a foetus

#### D.P. Kasbekar

icrocephaly is a condition in which a baby's head is much smaller than normal. Most children with microcephaly also have a small brain, poor motor function, poor speech, and abnormal facial features, and are intellectually disabled.

Researchers believe the roots of the condition lie in the peak phase of brain development in the embryo - when the cells that eventually become neurons fail to divide normally. Clinicians can diagnose microcephaly before the baby is born using foetal ultrasound and magnetic resonance imaging.

#### The SASS6 gene

In particular, since 2014, a gene called SASS6 and its variants have been implicated in this developmental process. On March 19, researchers at the Affiliated Maternity and Child Health Care Hospital of Nantong University, China, presented "the genetic findings of members of a nonconsanguineous Chinese couple with a history of microcephaly and foetal growth restriction during their first pregnancy"

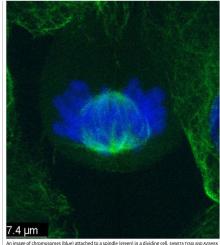
The team's findings reinforced the SASS6 gene's role in causing microcephaly. But more importantly, the team also found that if one copy of the SASS6 gene was non-functional, the other retained at least some function. The implication was that if both copies are non-functional, the human embryo dies before it becomes a foetus.

"[Our] findings confirm the pivotal role of SASS6 in microcephaly pathogenesis and reveal an expanded view of the phenotype and mutation spectrum associated with this gene," the researchers wrote in their paper. published in the American Journal of Medical Genetics.

Similarly, in a February 2024 study, researchers at the University of Cologne, Germany, reported that they modified mouse embryo-derived cells to remove all functional SASS6 genes. These genes contain instructions for cells to make structures called centrioles. But even after the genes were removed, the cells were able to make passable, if also abnormal, centrioles.

The problem arose when the cells were nudged to develop into neurons: at this point, all the centrioles made without using the gene's recipe disappeared, and the cells couldn't differentiate into neurons

#### Consanguinity and genetic risk According to Ashwin Dalal, a



KATARIA/CDED

paediatrician turned medical geneticist at the Centre for DNA Fingerprinting and Diagnostics, Hyderabad, 70% or more of cases of congenital microcephaly seen in the clinic come from consanguineous marriages. These are marriages between closely related individuals, such as between uncle and niece or between first cousins

Consanguinity increases the risk of an individual inheriting a mutated copy of a gene from both parents. The risk is greater if the mutated gene is rarer in the general population. Microcephaly is caused by mutations in

30 genes. Cells use 10 of these genes to encode proteins that are required to assemble the centrioles and for their subsequent function. When a cell divides, its centrioles help form another structure called the spindle.

During cell division, the old and new cells need to take a series of careful steps. The spindle is like the handrail along this staircase, helping the cells form and maintain their structure. For example, once the old cell makes two copies of its chromosomes, each copy sticks to the

Most children with microcephaly have a small brain, poor motor facial features, and are intellectually

centre of the spindle, which is an elongated structure. From there, the spindle moves each copy to its two ends. Each of these ends then becomes the nucleus of a new cell. If a cell creates centriole proteins from mutated genes, however, cell division is affected as well.

#### The Ile62Thr mutation

In 2004, researchers discovered the SASS6 gene in the roundworm Caenorhabditis elegans. They also found that the protein that cells made using this gene was conserved across animals. meaning natural selection allowed this

protein to exist in all members of the animal kingdom.

When the researchers suppressed the SASS6 gene in C. elegans embryos, they found that the cells failed to assemble new centrioles, resulting in arrested development.

In 2014, other researchers studied a consanguineous Pakistani family of which four members had microcephaly. All the affected individuals were found to carry a mutated version of the human SASS6 gene on both their copies of chromosome 1: one inherited from the father and the other from the mother

The SASS6 gene encodes a protein that has 657 amino acids. This protein assembles new centrioles during the cell division process. In the study of the Pakistani family, the researchers were able to describe the mutation correlated with microcephaly: the amino acid isoleucine at position 62 had been replaced by threonine. Thus its name: Ile62Thr.

Last year, researchers at the University of Tulsa, in the U.S., introduced the Ile62Thr mutation into the C. elegans SASS6 gene. Their experiment, reported in the journal Genetics, revealed that this change didn't detectably impair centriole assembly and function in C. elegans. But when the worm's genome had another mutation that affected a different centriolar protein, the Ile62Thr mutation significantly increased centriole replication failure and embryo death. Evidently, a protein made using a SASS6 gene with the Ile62Thr mutation is functional enough to allow individuals with other unaffected organs to be born and grow into adulthood. In C. elegans, it becomes deadlier when the second mutation is also present. At the same time, humans with just the Ile62Thr mutation don't escape unscathed: the mutation's mild impairment of centriole function still dysregulates cell division enough to cause microcephaly. Scientists conducted three studies since then, including the March study, and found six more SASS6 gene variants.

#### Neurons are finicky

As the February 2024 paper indicated, different cell types have different tolerances to a range of deficits in centriole composition and function In particular, the cells fated to become neurons are finicky and have the least tolerance for imperfect centrioles. This is why, while an individual with a slightly defective SASS6 gene can survive to birth and adulthood, he/she also suffers serious brain and head deficits and intellectual disability. (D.P. Kasbekar is a retired scientist)

Most cases of congenital microcephaly come from consanguineous marriages. Consanguinity increases the risk of inheriting a mutated copy of a gene from both parents. The risk is greater if the mutated gene is rarer in the general population

THE GIST

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lle62Th



function, poor speech, and abnormal disabled

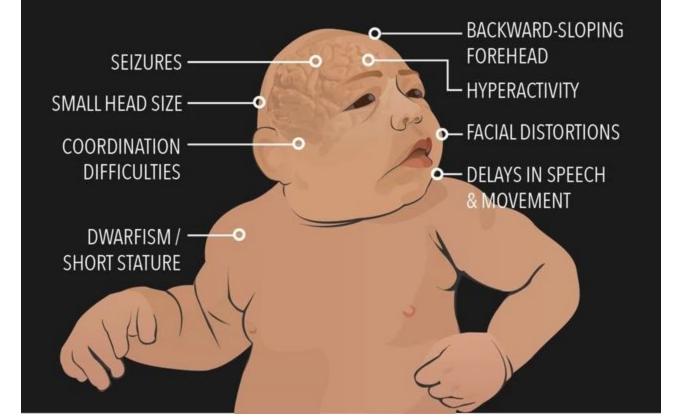


## SASS6

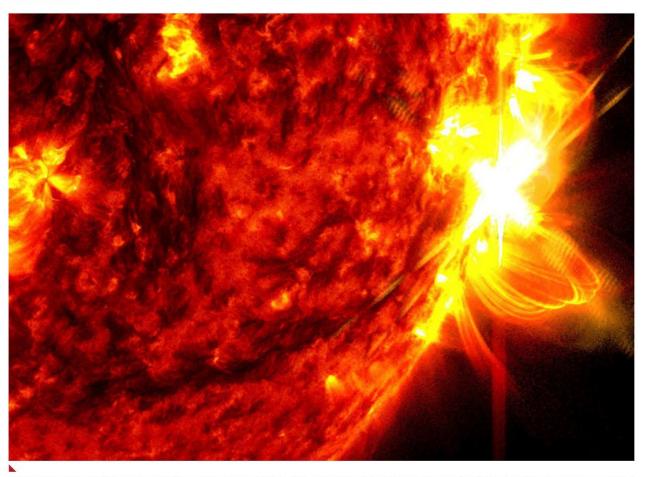
- SASS6 gene's role in causing microcephaly. But more importantly, the team also found that if one copy of the SASS6 gene was non-functional, the other retained at least some function.
- The implication was that if both copies are non-functional, the human embryo dies before it becomes a foetus.



## SYMPTOMS OF MICROCEPHALY



#### **BIG SHOT**



This image provided by NASA's Solar Dynamics Observatory shows a solar flare, right, on May 14, captured in the extreme ultraviolet light portion of the spectrum colorised in red and yellow. An international team of mathematicians and scientists reported on May 22 that the Sun's magnetic field originates much closer to the surface than previously thought. NASA/AP





## On Feb. 11, 2010, NASA launched the Solar Dynamics Observatory, also known as SDO.

SDO keeps a constant eye on the sun, helping us track everything

from sunspots to solar flares to other types of space weather that

can have an impact on Earth. For instance, solar activity is behind

the aurora, one of Earth's most dazzling natural events.



- SDO's goal is to understand, driving towards a predictive capability, the solar variations that influence life on Earth and humanity's technological systems by determining:
  - how the Sun's magnetic field is generated and structured
  - how this stored magnetic energy is converted and released into the heliosphere and geospace in the form of solar wind, energetic particles, and variations in the solar irradiance.

#### **QUESTION CORNER**

### Gravity: shaping celestial bodies

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#### Karthik Vinod



Q: Why are planets formed in a spherical shape?

- Hemant Sardesai A: The short answer is gravity.

This 'force', by virtue of the large masses of planets and stars, forces them into a spherical shape.

Part of the answer is also geometry: a sphere is the most compact three-dimensional shape. To be more accurate, for a given volume, a sphere is the shape with the lowest surface area.

If stars and planets had any other shape, gravity would force them to become spherical. Bodies that are less massive also experience less of a 'force' due to gravity and thus will be less compelled to enter into a spherical shape. The electromagnetic forces between the atoms in these bodies will be able to better resist gravity's attempts to sculpt it. This is why comets, most asteroids, and even us humans aren't spherical.

But let's get even more accurate: nothing in the universe is truly spherical. Stars and planets are actually oblate



An artist's illustration of a protoplanetary disc around a star. Planets form when gravity causes parts of the disc to clump together and coalesce. NASA

spheroids. Since they both rotate around a central axis, they create a centrifugal force that pushes mass outwards. So the oblate spheroid shape is a sphere that appears to bulge at the equator.

As a result, gravity is weakest at the equator and strongest at the poles. This is why, on the earth, objects fall to the ground down a teeny-tiny bit faster at the poles than at the equator. (Karthik Vinod is interning with The

Hindu)

Have science questions The Hindu can answer? Please send them to science@thehindu.co.in with the subject 'Question Corner'



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### **On fire safety regulations in India**

What happened at the Rajkot gaming centre and at the New Born Baby Care Hospital in New Delhi? What are the various laws and guidelines which stipulate rules around fire safety in buildings? How have courts responded to negligence over public safety?

#### EXPLAINER

#### G. Ananthakrishnan

The story so far: deadly fire at a gaming centre in Rajkot, Gujarat on May 25 killed at least 32 people. bringing focus back on the safety of public buildings and venues. The TRP Game Zone carnage unfolded in the evening as fire spread inside the structure built with a metal frame and sheets, trapping the victims including several children. Two inquiries have been set up to go into the disaster, one a Special Investigation Team (SIT) by the State government and another by the Rajkot police. The Gujarat High Court suo motu took up the incident and made critical observations on the functioning of the State administration, following which the Police Commissioner, Raju Bhargava, Additional Commissioner Vidhi Choudhary, and Municipal Commissioner Anand Patel were transferred, Raikot municipal officials including town planning officers responsible for the prevention of illegal constructions were suspended, and four people including the operator of the game zone, Dhaval Thakkar, were arrested.

#### What was the other incident?

On May 25, seven babies died in a fire in a hospital for newborns in Vivek Vibar Delhi, leading to the arrest of Naveen Khichi, owner of the New Born Baby Care Hospital, along with the doctor on duty. Preliminary reports suggested that a large number of oxygen cylinders stored in the facility aggravated the impact of the blaze. In both incidents, the focus is on fire certification by the authorities, issue of No Objection Certificates (NOC), and the failure of authorities to take cognisance of illegalities that were happening in full public view

What fire regulations govern safety? The Union of India's position on fire safety is that the Model Building Bye-Laws, 2016 and its component Chapter 11 on "Fire Protection and Fire Safety Requirements" provides the necessary framework for State governments, which bear responsibility for fire safety under law. Ensuring adherence to fire safety norms and standards laid down in Part 4 of the National Building Code (NBC) and incorporating mandatory provisions in the process is left to the States. A structure such as the Raikot game zone would fall under assembly buildings of the bye-laws, since it is a venue without permanent seating arrangements where 300 or more persons would gather. The definition of assembly buildings is broad under the regulations. They include any building or part of a building where "not less than 50 gather for amusement. recreation, social, religious, patriotic, civil, travel and similar purposes, for example, theatres, motion picture houses, assembly halls, museums, skating, rinks, gymnasiums, restaurants, places of worship, dance halls, club rooms, passenger stations and terminals of air, surface and marine public transportation services, recreation piers and stadia." Hospitals, custodial and penal or mental health institutions are institutional buildings, while educational, business, industry and specialised uses are covered separately. During the pandemic, amidst a spate of fires, the Health Ministry circulated guidelines on September 28, 2020, stipulating third party accreditation for

ire safety and putting a fire response plan case was prosecuted with the charge of

act (337, 338) by the owners of the

electricity authority that was placed

bear responsibility for the wilful

without sanction and allowed without

In ruins: A view of the burned down TRP Game Zone in Raikot. AN

in place. Chapter 11 of the Bye-Laws clearly lays down fire safety and infrastructure requirements for buildings which are 49 feet in height or more, and those with low occupancies in various categories, for issue of NOC. In addition, Gujarat's Comprehensive Development Control Regulations 2017 also make it mandatory to get the Chief Fire Officer's opinion even for a temporary structure. The same regulations stipulate that all structures for whatever use must meet fire prevention and safety provisions specified by the Fire Authority, in terms of the Fire Prevention and Life Safety Measures Act, 2013. In the case of the Rajkot game zone, it was built apparently as a non-standard structure to evade regulatory requirements, and the inquiry would reveal whether it was qualified to be used as an assembly building offering leisure and entertainment services.

#### How have the courts viewed neglect of fire safety?

Among the most high-profile deadly fire accidents that have led to the loss of life, the Uphaar cinema tragedy of 1997 in Delhi resulted in the conviction of the owners of the venue. Sushil Ansal and Gopal Ansal among others for negligence and tampering of evidence. The death of 59 people who were trapped in the balcony of the hall because of illegally installed seats and a blocked exit resulted in a protracted legal battle, with the families of the victims forming an association to seek justice. The Uphaar

structural deviations. Essentially, the court held the owners of the property, employees and staff from the electricity agency liable for the devastating toll in the Uphaar tragedy for violating the law and later for payment of compensation. On June 13 last year, the anniversary of the blaze, the Association of Victims of Uphaar Tragedy blamed the judiciary for allowing the Ansal brothers to walk out of jail on a reduced sentence. In the wake of the Rajkot fire, the Guiarat High Court taking suo motu cognisance has led to scrutiny of the enforcement of fire and building laws on the one hand, and the identification of several unauthorised venues in the State hosting leisure and entertainment services. The court was told by the Ahmedabad Municipal Corporation that a recent law, the Guiarat Regularisation of Unauthorised Development Act, 2022 (in force since Ian 2, 2023) was used by an unauthorised game zone to apply for regularisation. Guiarat has witnessed more than one terrible fire in recent years. The 2019 fire in a tuition centre in Surat's Takshashila

#### THE GIST

#### On May 25, seven babies died

in a fire in a hospital for newborns in Vivek Vihar, Delh leading to the arrest of Navee Khichi, owner of New Born Baby Care Hospital, along with the doctor on duty.

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Given that there were 241 fires in commercial buildings and 42 in government buildings in 2022, killing a total of 257 people (NCRB data), tighteni the implementation of the provisions of the building code and the Model Building Bye-Laws is imperative

causing death by negligence (IPC 304A), Arcade killed over 20 students and led to hurt or grievous hurt by rash or negligent cinema, and culpable homicide (304) and Court took note of the Public Interest other sections in the case of theatre staff and public agency employees, such as the "insult [had been] added to injury" electricity authority. A transformer of the

#### safeguards was thought to have triggered the inferno. The owners had to directly enforced?

The suo motu notice issued by the Gujarat High Court extends its directions on fire safety and calls for a government report on action to comply with the Comprehensive Development Control Regulations, fire NOCs, periodic checks under the Fire Safety Act and issue of licences under various Acts, Earlier, the State government had informed the court that 163 hospitals and 348 schools in municipality jurisdictions did not have a valid fire NOC. It cited practical difficulties and lack of trained manpower and infrastructure to achieve full compliance. Given that there were 241 fires in commercial buildings and 42 in government buildings in 2022, killing a total of 257 people (NCRB data), tightening the implementation of the provisions of the building code and the Model Building Bye-Laws is imperative Full accountability by the State and enforcement agencies is vital. Temporary and ramshackle structures allowed to come up in urban and rural areas, attracting unwary leisure seekers, run the risk of setting off deadly fires. They need



calls for tightening of fire safety in public buildings. After Rajkot, the Gujarat High Litigation (PIL) before it, and noted that because its earlier orders had not been complied with by the State government What can be done to get the law

to be tightly regulated for safety. The writer is a Chennai-hased io

## India's fire safety rules



- According to the XII Schedule of the Constitution under Article 243(W), the fire services in India are under the purview of the state and are listed as a municipal function.
- The National Building Code (NBC), published by the Bureau of Indian Standards (BIS), serves as the central standard for fire safety in the country. Published in 1970, it was last updated in 2016.
- The NBC provides guidelines on the construction, maintenance and fire safety of buildings. It is a "mandatory requirement" for all states to incorporate the recommendations in their local building bylaws.



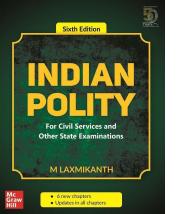
- The Code specifies the demarcation and restrictions of buildings in fire zones to ensure that industrial and hazardous structures do not co-exist with residential, business and institutional buildings.
- Buildings are classified into nine groups residential buildings are in Group A, hospitals in Group C and marriage halls, nightclubs, and multiplexes in Group D.
- The NBC mentions the material to be used in construction to reduce the threat in case of a fire and minimise danger before evacuation. It also provides guidelines on height for buildings, floor area ratio, open spaces and provision of openings in walls and floors to prevent the spread of fire

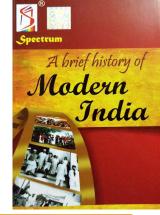


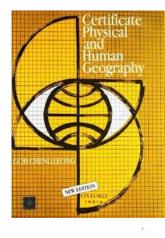
- The National Disaster Management Authority (NDMA) has also chalked out fire safety requirements for public buildings like hospitals.
- They recommend having a minimum open safety space, exit mechanisms, dedicated staircases and essential evacuation drills

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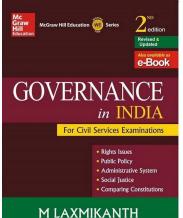


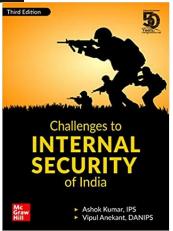
















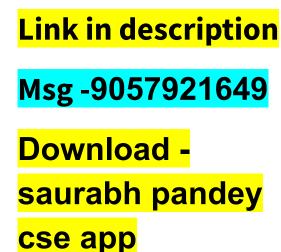
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