



SCIENCE-TECH & INTERNAL SECURITY

Time Allowed: 3 hrs.

Max. Marks: 250

Q.	Marks	Instructions to Candidate
1.		<ul style="list-style-type: none">• There are 20 questions.• All questions are compulsory• The number of marks carried by a question is indicated against it.• Answer the questions in NOT MORE THAN 200 words each. Contents of the answer is more important than its length.• Answers must be written within the space provided. <p>Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.</p> <p><i>Retotal</i></p>
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1. Invigilator Signature

2. Invigilator Signature

Name Pooja Ranawat

Roll No. 17133

Mobile No. [REDACTED]

Date 5/09/17

Signature P. Ranawat

REMARKS

GS SCORE

GS MAINS TEST SERIES 2017

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Q1. With rising vulnerability to cyber threats and electronic voting machines being proved to be vulnerable there is a demand for defaulting back to offline paper based systems, but Blockchain technology is gaining importance that it would fight electoral fraud. Critically discuss. (12.5 Marks)

A1. The recent data by NCRB suggests a 350% increase in cyber crime incidents reported under IT Act 2000. Another recent case highlights the 'booth hacking' threat that EVM machines are posing. In the above scenario, there is a debate of reverting back to old paper based voting. The Blockchain technology also, understood as the one employed by Bitcoin is gaining importance. Blockchain technology works through virtual chain of blocks each separated yet interlinked with the other. It provides anonymity and ease of access at the virtual level.

→ Advantages of this technology:

- i) It provides anonymity and hence the identity of voters can be protected.
- ii) due to its crypted code, it is not easily possible to hacking by professionals.
- iii) it does away with EVM machine software to incorporate advanced blockchain technique to protect confidentiality of data.
- iv) without reverting back to paper based systems it provides protection under the cyber world of cyber systems.

(5.2)

Remarks

→ Challenges to use of Blockchain technology:

- i) although ensured protection by use of encrypted codes, it is difficult to verify votes in case of conflict. as proposed the VVPAT system.
- ii) the use of this technology is still nascent and not technologically feasible on a such a wide scale as all the polling booths of India.
- iii) digital and cyber literacy also pose a challenge.

In conclusion, voting patterns and methods are mere tools to enrich democracy. The real public faith in electoral machinery is of key concern.

It is therefore necessary to restore trust in the process and machinery before upgrading mechanisms.

Remarks

Q2. In a country, where suicide among young women rivals maternal disorders as the leading cause of death, the importance of neuroscience research cannot be overemphasized. Briefly explain the recent developments of the brain research and role of Indian scientists in it (12.5 Marks)

A2. The female and maternal mortality ratio in India has worsened and is far away from the target of 28 per thousand population. These suicides and maternal disorders indicate a problem far more severe than inadequate primary healthcare. Neurological distress is one of the major factors behind such stress disorders and suicides.

Neuroscience research provides important insights into how the mind and brain assign tasks, carry out functions, interpret and express emotion and so on. Some of the recent developments include:

i) Higher emotional quotient prevalent in women than man - they have a greater capacity to deal with stress, mood management, empathetic roles of nursing, care etc.

-ii) Women brains - tendency to multi task as compared to men.

Even historically, women have played multiple roles within the four walls of a house - leading to stress, anxiety and other disorders.

iii) ~~obesity~~ Sleep deprivation affects brain cells much faster in women due to the increased work.

Focus on what is asked.

12

Remarks

- demand of que. not addressed

load in the Indian household.

Various scientists have contributed to understanding of the brain, the human mind and its relation with left or right hemispheres in the performance of an action.

These researches have highlighted the spatial, mathematical, verbal and graphical intelligence that characterise the two hemispheres in the brain.

Thus, brain research has contributed to the understanding of how women have different patterns of work and emotion which affect their life cycle and expectancy.

Remarks

Q3. What are gravitational waves? What does the discovery of it hold for the world? How is LIGO detecting and what is the contribution of India towards this project?

(12.5 Marks)

Ans.

Gravitational waves are simply defined as ripples in the fabric of space time. They were a result of the intense collision that happened called Big Bang which continued to emit radiation in the form of these gravitational waves.

The theory was hypothesised by Einstein but had no conclusive proof until recently. The discovery throws light on the cosmic origin of the universe, mysteries of dark matter and other astronomical phenomena relating to how the earth and the planets formed about 4.56 years ago.

It is thus an important step forward in the astronomical and scientific discovery of the origin of the universe.

→ The Role of LIGO: The Laser Interferometer Gravitational Wave Observatory (LIGO) is the largest particle detector located in Louisiana, Washington. The gravitational waves were detected by these two detectors at Louisiana and Hanford.

Remarks

India's role :

India proposed and supported help towards this grant project with joint collaboration to LIGO. Thus, INDIGO was formed to help with research and detection of these waves.

The experimental observatory has contributions from Indian scientists and also the vast academic scientific research from this area.

India has lent full fledged support to the project.

It is thus a journey towards decoding the fundamentals of the universe.

Q4. How antibiotic resistance became one of the burdens of Indian healthcare system? What are the steps taken by India recently to combat this menace? What is the significance of the list of antibiotic resistant "priority pathogens" prepared by WHO? (12.5 Marks)

A4. The menace of antibiotic resistance has come into limelight with instances of failure of carbapenems and other last line of drugs to treat infectious diseases.

The NDM 1 superbug (New Delhi metallo beta lactase) and instances of mass deaths due to resistance are other examples.

Antibiotic resistance is mainly the failure of the impact of a drug due to gene resistance expressed by the bacteria.

Steps taken by India to control this menace are:

- i) Red line TB campaign to stop the sale of over the counter drugs without prescription
- ii) bringing out a list of essential drugs to be sold only with prior verification of a prescription
- iii) cancelling the 344 (FDC) Fixed dose combination drug license which are unsafe and have no therapeutic justification.
- iv) strict regulations banning sale of OTC drugs etc.

The WHO has come out with a list of

Why such condition arise?
Specifically in India

4 1/2

Remarks

"priority pathogens" to alert health and medical practitioners, professionals and researchers against the harmful impact and resistance created by these bacteria for first line, second line treatment. These include pseudomonas, azotobacter etc.

This list not only creates awareness, but alerts citizens and patients alike about the gene mutation which may manifest due to these pathogens.

Thus, anti biotic resistance needs to be plugged against these pathogens by following medical courses completely, avoiding indiscriminate use of drugs etc.

Remarks

Q5. Why is there is lack of communication between the scientific community and the public when it comes to acceptance of science projects like INO? Give your opinion. By writing a short note on India based neutrino observatory, mention its significance and why is it not gaining public support? (12.5 Marks)

A5. The Indian neutrino observatory was poised to come up in Bodi hills, Tamil Nadu district of Tamil Nadu. It deals with neutrino research - one of the fundamental particles which have negligible mass and energy. Significance:

This observatory, to be located underground with a 1200 m rock cavern was supposed to carry out experiments related to neutrino research and other aspects of nuclear physics research.

It would thus promote understanding about the basic elements that make up one atom and how they can be utilised for upgrading technology and finding newer solutions to problems.

Recently, an NAT order cancelled the Environmental Clearance granted to the Neutrino observatory.

- The contentious points were as follows:
- i) its location near the Madikettu - Shola National park, thus impacting ecosystems and wildlife.
 - ii) Government order that no new project to come up within 5km radius of a National Park/ Sanctuary and thus requires clearance from National Board of Wildlife.

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Remarks

The major issue however is lack of communication between the scientific community and the local population. The reasons can be:

- i) bureaucratic top down approach of projects makes the public wary of new projects.
- ii) the opposition is mainly due to unawareness of importance of the project, its scientific potential etc. by the people.
- iii) the fears and apprehensions of the people have not been addressed.

The lack of communication is the reflective of the absence of a will to create a "scientific temper" in the country, involve the people as stakeholders etc.

Thus, the scientific community needs to look at projects out of narrow prism of research and involve and cater to public curiosity to make great strides with support.

Remarks

Q6. To what extent is India a Knowledge based economy? What are the measures taken to make it so? What alternate suggestions are needed to make it a knowledge based economy? (12.5 Marks)

A6. 'Data is the new oil' - said a quip by a local newspaper. This holds true for the new transition worldwide towards a 'knowledge based economy'.

Although India has made great strides as an information and service sector based economy, the knowledge economy is not fully developed.

A knowledge economy comes under the quinary sector where data and information help to drive trade and services in the economy.

India has a repository of knowledge, however it has not been translated to a medium to cater to world demand and global trade.

Measures taken by India:

- i) The National IPR policy focusses on protection of products through patents, trademarks etc to prevent issues of piracy.
- ii) Initiative of Traditional Knowledge Digital Library - to document medical wisdom of traditional systems.
- iii) Shodhganga repository - document and collate academic research and thesis.

4/3

Remarks

- Refer link -

- i) National Digital Mission on preservation of manuscripts, monuments and antiquities. —
preserve historic and cultural heritage.
- ii) National Academic Depository - electronic record of documents.

Alternative measures to be taken:

Knowledge needs to be differentiated from traditional wisdom.

- i) documenting of Indian indigenous practices & traditions of farming, water conservation etc.
 - ii) preservation of biodiversity knowledge extracted from our sacred forests etc.
- iii) Thus, a knowledge economy can thrive with not only collation but digital preservation of the indigenous practices —

Remarks

Q7. Do you think opposition to GM crops is driven by irrational fears of harm to human health? Critically examine by analyzing the GM mustard issue. (12.5 Marks)

A7. The introduction of Genetically modified mustard faced severe opposition, thus being limited to field trials by the Genetic engineering appraisal committee.

The issue concerns introduction of GM mustard which is perceived to be harmful to human health. The rationale for its introduction includes the following:

- i) India has a substantial import bill running into import of many mt of mustard.
- ii) newer forms are required to feed and sustain the ever-growing population.

The arguments against the GM mustard are:

- i) impact on human health due to gene mutation as no credible field trials carried out.
- ii) unsustainable in the long run with its impact on environment and the ecosystem.
- iii) GM mustard is a food crop and previously the only acceptance awarded was to a plantation crop of Bt cotton. Thus, dangers on human health are higher.

87
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Remarks

- underline all key words -

While GM mustard is new and its introduction is necessary to increase production, this cannot be achieved with mere scientific trials.

The concerns of human health, its impact must be widely debated and deliberated upon. The people must be taken into confidence by assuaging their fears and carrying out substantive field trials for credible assessment.

Thus, ~~un~~ unfamiliarity breeds suspicion and must be dispelled to promote GM crops in India.

Remarks

Q8. Why is cryogenic technology very important for space crafts? Why is GSLV-MK III termed as the India's most powerful rocket? Mention it's significance as well. (12.5 Marks)

A8. Cryogenic technology is the technology which utilises liquids at freezing, very low temperatures to perform a process. In context of spacecrafts, it is an advance on the previous two stage liquid fuel process where the liquid had to be carried for combustion.

The cryogenic technology provides for freezing of liquid to extremely low temperatures thus reducing the space and capacity required for travel during flight.

Remarks

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Remarks.

Q9. What do you understand by Smart city Grids? What benefits do they provide over the traditional grids? Also discuss potential challenges in development of these grids?
(12.5 Marks)

A9. Smart city grids are networks that automatically detect the user needs and adjust electricity supply accordingly.

The traditional grids continue to provide power without any response of demand by the end user.

In comparison in a smart grid, the demand supply match is detected and electricity is varied according to on peak and off peak demands. This helps in conservation of more electricity as also energy.

→ multiple benefits

Potential challenges to these grids:

i) Ensuring universal connectivity to these grids is an arduous task.

3

ii) The cost and infrastructure requirements also pose a challenge.

iii) Political will and bureaucratic initiative is a must to link up all households to these grids in a time bound manner.

↳ is a specific issue of cyber security

In conclusion, smart grids form an important component of the 'Smart city' - to be developed

Remarks

for a 'New India'

Remarks

Q10. While cybersecurity is a pressing concern for India, vulnerability of technology is also evident in terms of financial frauds involving the ATM cards. Discuss the importance of adopting smart credit cards in this context? (12.5 Marks)

A10. The recent NCRB report highlights a 350% increase in crimes especially cyber crimes registered under IT Act 2008.

Cyber security is thus an emerging new concern along with instances of spamming, phishing, frauds involving ATM's etc.

The smart cards are proposed as an alternative to such incidents where personal information is hacked and used for illegal or private gains.

The smart credit cards are certainly a step forward. They are equipped with advanced security features and factor authentication to protect privacy of identity.

These cards allow for portability and seamless connection on multiple platforms.

The additional security features of biometric authentication act as another layer of security towards attempts by hacking etc.

However, the risk of these digital tools remains. The biometrics may fade with time,

write specific job exp. imp.

32

Remarks

- Ref. hit -

and the process may become cumbersome. . . .
The technical glitches and availability of
widespread resource are the other challenges
towards adopting a smart card.

Remarks

Q11. What is reusable launch vehicle? Why is it considered an important milestone for Indian space program? (12.5 Marks)

Ans. A reusable launch vehicle is a technology designed to launch vehicles into space by re-using the launch vehicle that was initially set off into space.

It marks India's entry on the global platform amongst countries who have developed such launch vehicles.

It will significantly reduce the space debris that accumulates after the rockets are fired and launch vehicles remain redundantly in space.

It saves cost and time in the building of launchers for every new flight or flight testing.

The development of this reusable vehicle stands to credit of India's scientific community, intense research and hardwork. It makes the space program more inclusive, smooth and targeted with significant cost reduction in the process of building launchers.

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Min words

Q12. What do you understand by Rubella? Discuss the steps taken by India to control the Rubella outbreak? (12.5 Marks)

Rubella is another name for German Measles. It has recently been inducted into the Universal Immunisation programme under the title of MR (Measles Rubella - vaccine).

The introduction of the pneumococcal conjugate paves way for discontinuation of monoclonal pneumonia vaccine for Measles.

The German rubella is characterised by high fever, rashes, drowsiness, pain in the neck and joints which may even transfer as haemorrhagic fever affecting the brain.

Rubella is one of the leading cause of death in infants. It may prove fatal in cases of extreme damage to brain.

India has introduced the MR vaccine to combat the spread of this disease right from young age. It is one of the 7 vaccines of the Indradhanush plan.

- add more words

Remarks

Q13. What is the role of science and technology in improving the disaster management?

(12.5 Marks)

A13.

The National Disaster Management plan focuses on how scientific and technological improvements can help prevent disaster and cater to resilience, recovery and rehabilitation

Science and technology play the role of bringing in upgradations in service delivery, improving response time, accurate predictions etc

The emphatic role of S & T is seen in the following:

i) Weather forecast stations which accurately predict temperature and other weather based phenomena

ii) Indian Ocean Tsunami Early warning system

iii) Community radio which help establish connectivity in disaster affected regions

iv) role of digital communication devices - from mobile phones to web services for seeking help

v) scientific research helps in design and construction of buildings in a way that minimises impact in case of a disaster like an earthquake, fire etc.

4

Remarks

To add more content & structural consistency
write → Stage of D.M - Role of S&T
Prevention - - -
Mitigation - - -

Science thus helps to find solutions while technology acts as an efficient medium to upgrade the delivery of services.

Remarks

Q14. In a multi-ethnic and multi-religious country like India with a dualistic society and economy, most of the violence arises due to conflict of interest. Comment.

(12.5 Marks)

Ans. Indian society is characterised by diversity, a heterogeneous composition of different castes, classes, religion, cultures working together. Due to its diverse, plural nature and multiplicity of interests, conflicts are bound to arise.

The conflicts manifest as incidents of communal riots, lynchings, mob violence, protests, hartals, strikes, agitations, lockdowns etc.

The Dabri mob lynching was a case of conflict of interest due to religious and cultural affiliations.

Similarly, the Jat protests, farmers agitations reflect a conflict of interest of certain sectors pitted against other sectors.

- Incomplete

12

Remarks

Q. 25-10/2017

Remarks

Q15. Communal violence has been a major concern for the internal security of India. Give reasons for the same and suggest effective measures to check it. (12.5 Marks)

A15.

Recent incidents of communal violence in the country reflect the disharmony between the multi religious and multi-ethnic communities of India.

These conflicts manifest as persistent discontent in the long run leading to internal security issues. This has been seen in form of insurgency (Naxalites), secessionist movements, demand for a separate state (Bodoland, Gorkhaland) etc.

Reasons for the communal violence: - historical - Radical (social) needs

i) Economic backwardness of certain sections
 eg:- Missions leads to competition for resources and dissatisfaction with present trade services structure

ii) Social tensions - issues of social status, caste discrimination, inclusion, exclusion create rifts.
 eg:- Beating up of Dalit teacher in schools.

iii) Political reasons - vote bank politics and criminalisation of political scenario has lead to rifts between people based on party ideology and clashes.

4/2

Remarks

Effective measures to check it:

- i) Communal sensitisation of the people by promoting Bharat Paur events, National Integration towns etc.
- ii) Rationalisation of any discrimination, favouritism towards any sections. Election Commission to strictly monitor use of caste for vote appeal.
- iii) The Government to promote impartial and objective economic policies, not favouring any section.

Thus, communal violence can be best addressed by communal harmony by focus on development agenda ~~away~~ narrow caste and ethnic identities.

Remarks

Q16. Multitude of authorities and confusion in mandate of agencies involved in intelligence and enforcement is described as a major gap in maintaining internal security. What measures have been undertaken by the government in recent times to overcome this problem? (12.5 Marks)

A16. Internal security is best ensured by a robust domestic intelligence architecture inter-linked and connected at all levels.

The Intelligence Bureau is mainly involved with the responsibility of domestic intelligence. This role is further supplemented by agencies like Central Bureau of Investigation, Central Vigilance Commission, local and state level agencies etc.

This creates an overlapping of functions and multiple mandates.

Measures taken by Government:

i) The Government has proposed the development of NATGRID (National Intelligence Grid) which would have access to 22 other agencies and their data; thus ensuring swift coordination.

ii) The CCTNS (Crime and Criminal Tracking Network) system is proposed as another network to link central and state intelligence services and have a comprehensive data grid.

iii) Various other steps like reforming the Inland Vessel Act, Admiralty jurisdiction classify

5 1/2

Remarks

separate functions, avoid confusions and help prevent maritime security breaches inside the country. eg:- 26/11 terror attack through Mumbai harbour.

Thus, internal and external security systems need to be ^{inter}connected on a real time basis to enable tracking of possible threats and ~~create~~ ^{mount} an effective response.

Remarks

Q17. It is important to keep armed forces busy and well-mobilized to maintain them battle-ready, thus, their peace-time functions also have a strategic dimension. Elaborate.

(12.5 Marks)

A17.

eg. Dis. Hong, Border Inf.

The Armed forces perform the important functions of protecting territorial sovereignty in times of war. Hence, their battle and combat readiness has major implications.

By nature of their work, armed forces do not have any significant task to accomplish during peacetime. However, this perception is not correct.

The battle readiness must be refined and criselled every even during peacetime to mount an effective attack when required.

Their mobilisation acts as a supplement to the central paramilitary forces and may help in avoiding internal disturbances, armed aggression etc.

The Army's work during peacetime has a strategic dimension in the form of developing a credible deterrence through strong hard power. Armoury, armaments and their upgradations must be ensured along with

12

Remarks

- demand of que. not addressed

significant backup of research and intelligence of the area.

Thus, the role of the Army has a strategic dimension towards creating a deterrence for foreign countries and creating a signal of strong state within the borders of the country.

Remarks

Q18. While giving connectivity to North-East of India should be priority and is necessary for well-being, there are some challenges too emerging from the new projects which connects the region to multinational highways. Critically analyze. (12.5 Marks)

A18. The North Eastern region is India's Ashtalakshmi providing a further gateway to South and South East Asia.

The Indian Government has tried to ensure physical and social connectivity to these states with projects like development of roads, railways component of Bharatmala etc.

The new inter-regional projects and the challenges they pose are as follows:

i) The Kaladan multi modal transport link connects Kolkata and Myanmar through road, rail and sea route.

ii) The India Myanmar Thailand trilateral highway connects the three regions leaving scope for security threats.

iii) BBIN network (Bangladesh Bhutan India Nepal) network, Motor Vehicles Agreement.

The above multi-national highways provide inter-regional connectivity and are aimed at promoting cross border trade and services.

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Remarks

The risks associated with these projects include:

- i) the influx of Rohingya muslims from Myanmar
- ii) Bangladeshi immigrants
- iii) insurgency issues due to presence of ULFA, NSCN & other such groups on both sides of borders of neighbouring countries.
- iv) fake currency note issue - Nepal, Bhutan
- v) illegal drug, human trafficking through these routes including smuggling.
- vi) opium and other trade through the connectivity to Golden Triangle.

thus, adequate safeguards must be put in place to restrict illegal flow and enhance connectivity for greater good.

conclude with way forward

Q19. Elaborate on the components of Border Infrastructure? Examine what is the state of border infrastructure in India? (12.5 Marks)

A19. Border Infrastructure comprises of the necessary apparatuses to safeguard territorial integrity at borders.

It includes borders, outposts, checkpoints, fencing, wiring, demarcation points etc.

India shares its longest border with Bangladesh of 4096 km. This is safeguarded by wiring and other fencing structure.

The India Nepal border is left porous without any restriction on movement of people, cattle or traders.

The border with Pakistan stands at the Line of Control - marked during ceasefire.

The Chinese border is known as Line of Actual Control - marked after the 1962 war.

The Aksai Chin area and Pak occupied Kashmir are two important checkpoints of border infrastructure.

Recent incidents of cross border infiltration, attacks and standoffs have pointed to the inadequacies in border management and set up of appropriate infrastructure.

Remarks

Refer link - It also includes ability to dispatch & deploy soldiers & war machines quickly. There are also count towards that.

Incomplete

3 1/2

Smart fencing is proposed as a new alternative along with effective use of technology to guard against threat. as also real time monitoring and communication to the ground station.

Incomplete as perspective is incomplete.

Also include border roads & new air strips in Arunachal Pradesh, North East etc.

Remarks

Q20. What is media's role in ensuring internal security? Why it has come in negative light of late, due to irresponsible reporting? (12.5 Marks)

A20. The media plays the important role of disseminating information and forming public opinion. In context of internal security the role becomes all the more important due to impact on domestic security, threats, conflicts and their effects. State response to these.

The 26/11 Mumbai attack was one of the lowest points of media reportage where terrorists got live update about the havoc and security preparation outside. Besides, lately the attack has been on insensitive reporting bias towards particular groups - like Naxals and being influenced by politics, instances of paid news etc.

Media must thus formulate a code of conduct and ensure self-regulation to remain the 4th pillar of democracy.

- i) Media forms a critical interface between government & society.
- ii) Media reporting plays a role in awareness, awakening of citizens.

Remarks

- broader aspect missing -- TRP rare
- sensational
- fake news

iii) Media evokes citizen responses and promotes a standard of ethic amongst citizens-

thus, the focus of media must be on fair, ethical, transparent reporting keeping in mind concerns of domestic security and territorial integrity of the state.

Remarks