



SHUBHRA RANJAN

Always Ahead

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GS Answer Writing Module 2023

Test 9

Time Allowed: 1.5 Hour

Max Marks: 125

Name: Aakriti

Test Submission Date: 20/9/23

Email Address:

Instructions:

1. All questions are compulsory.
2. Question 1-5 10 marks each & Word Limit 150.
3. Question 6-10 15 marks each & Word Limit 250.
4. Answers must be written in the medium authorized in the admission Certificate, which must be stated clearly on the cover of the booklet in the space provided.
5. Content of the answer is more important than its length.
6. Any page or portion of the page left blank in the Question-Cum-Answer Booklet must be clearly struck off.
7. All parts of the question should be written at one place itself.
8. Filling all the details in BLOCK LETTERS is mandatory.

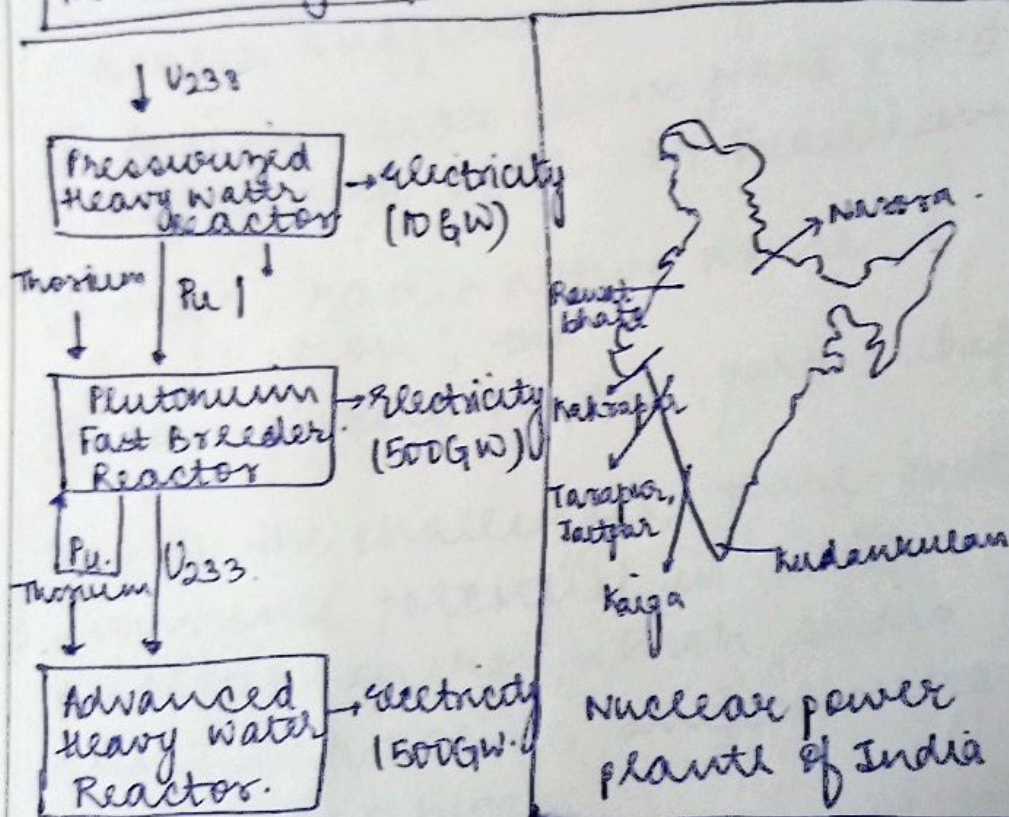
Q. No.	Marks	Q. No.	Marks
Q1		Q6	
Q2		Q7	
Q3		Q8	
Q4		Q9	
Q5		Q10	
Total Marks:		Evaluator Code:	

Que.1

Explain in brief the three staged nuclear program of India. (10 Marks, 150 words)

India's three staged nuclear program was envisioned by Homi Jahangir Bhabha soon after Indian Independence.

Three stages



Nuclear program benefits

- ① It will serve as a clean source of renewable energy

② It will help India meet its 2010 ambitious target (Government aims to triple nuclear capacity by 2032).

③ It will reduce India's import bill

Challenges

① India is facing difficulty to access sufficient Pu for 2nd stage

② Anti-nuclear power plant protest especially after 2011 Fukushima

③ High radioactive waste generation; ~~the~~

④ Low public private partnership

Despite the challenges, there exists immense potential in civil nuclear energy, which India can capitalise overcoming these roadblocks.

Que.2

Science and Technology (S&T) has emerged globally as one of the major drivers of socio-economic development of the country. In this context, highlight the various challenges being faced by S&T sector and reforms needed to strengthen S&T ecosystem in India. (10 Marks, 150 Words)

Science & Technology (S&T) sector has proved its capacity for socio-economic development in the past few years. eg. Aadhar, VPI, vaccines, Blockchain based Aarogya Setu etc.

However, the sector faces certain challenges.

Challenges

- ① Low Research & Development focus (GERD $\approx$ 0.7%).
- ② Industry - academia silos
- ③ Poor private-sector engagement except in few areas like biotech
- ④ Skill gap due to lack of modern curriculum & updations training
- ⑤ Low Foreign Direct Investment due to intellectual property concerns

Reforms needed

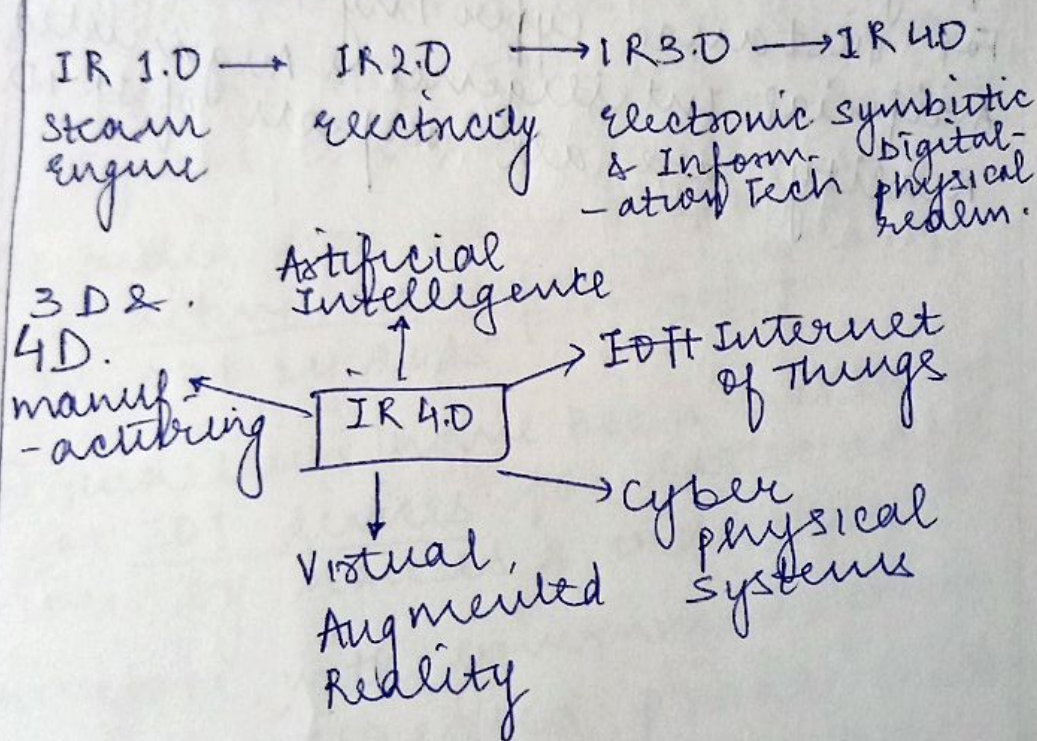
- ① Break the industry-academia silos via apprenticeship directly in research institutes
- ② Increased R & D. investment to create a strong base.
- ③ encourage private players. especially in space technology for better services & innovation
- ④ encourage FDI via bilateral engagement eg. in case of India Israel joint innovation funds
- ⑤ encourage women participation using schemes like KIRAN or Pragyani Jyoti Yojna

Science & Technology possesses immense potential to revolutionise almost every sector. Early action & road maps will yield long term benefits.

Q.3

(10m)

What do you understand by Industrial Revolution 4.0? How can it help India become \$5 trillion econ by 2024? Industry Revolution 4.0 ^(IR) is a collective term for all the technologies that seek to blur the gap between the digital, physical & biological realms. It is a build on IR 3.0.



Given the pace with which the IR 4.0 is moving, it possess significant capacity to help India become a \$5 trillion



economy by 2024.

Realising \$5 trillion economy target via IR4.0

- ① As per NITI Aayog, Artificial Intelligence can add \$500 billion dollar to Indian GDP by 2025 ($\approx 10\%$ of \$5 trillion GDP).
- ② AVGCXR sector is likely to grow at 17% rate in the next 5 years contributing to the economy.
- ③ India has set a target for Additive Manufacturing $\rightarrow 5\%$ to GDP by 2025. (SDS).
- ④ Guidelines have been released for IoT devices for faster adoption by houses & industries. Therefore, with government policy focus & increased private sector engagement, IR4.0 can help India achieve its ambitious \$5 trillion economy target.

Que.4

"5G technology has the potential of being a transformational force for Indian society by unleashing new economic opportunities and societal benefits". In this context, discuss the benefits and associated challenges with the use of 5G technology in India. (10 Marks, 150 Words)

5G is the latest mobile broadband network (internet) operating at higher frequencies. It is built on 4G network and poses several benefits in socio-economic sphere.

New economic opportunities

- ① support the development of Industry 4.0 in India (low latency)
- ② It will support India's super-computing & Quantum computing ambitions
- ③ It will facilitate easy work from home even in the remotest areas (Reliability & higher penetration).

Social benefits

- ① Reliable internet in the remotest villages ⇒ education & employment benefits

② It will allow remote health services (telemedicine, tele-surgery etc)

③ It will promote digital payments & inclusivity in far flung areas (financial inclusion).

Challenges

① Environmental → 4G devices will be discarded → generate e-waste

② Health → Little knowledge about impact of Radio frequency on health.

③ Economic → Heavy investment will be needed as 5G tower has lesser coverage.

④ Security → Rising cybercrimes, ~~sale~~ need for reliable 5G devices to protect privacy.

⑤ Redundancy → 6G vision is also ~~only~~ emerging

with an expected 500 million 5G users in India by 2027, 5G can serve as a transformational force but the challenges must be overcome as soon as possible.

Que.5

What do you understand by Nanotechnology? Discuss its application in various fields and associated challenges. (10 marks, 150 Words)

Nanotechnology refers to the technology that leverages nano-sized particles to solve a variety of problems as well as innovate for new products.

Applications

① Health & medicine

- Nanobiosensors to detect ^{diseases} plaque
- Carbon Nano Tubes for destroyed arteries
- Targeted Drug delivery → reducing Anti Microbial Resistance

② Agriculture & food

- Nano fertilizers & pesticides eg NOL by IFFCO. Nano DAP.
- Nano packaging material to prevent food contamination

③ Defence & security

- Nano materials in drones for lightweight
- Nano-bullets for target kill



- (4) Clean energy
→ Nano tubes to carry hydrogen fuel
→ Nano material for wind mills

Challenges

- (1) Nano sized particles can cause pollution eg. nanoplastic in cosmetics
- (2) Low Research & Development in the field
- (3) Low private sector involvement to actually invest in applications
- (4) Low understanding of nano particles inside human body.
- (5) Absence of any dedicated body to facilitate the growth of sector

Nanotechnology finds application in a variety of fields & even more keep emerging. Dedicated investment & research can help a clear government policy can promote the sector for benefit to the society and economy.



Que.6

What are different types of Hydrogen? Also discuss the role of green hydrogen in energy security and the associated challenges. (15 Marks, 250 Words)

Hydrogen (atomic number 1) is the lightest elemental gas on the periodic table. It has emerged as a key pillar for the growth of green economy of India in the past few years.

Types of Hydrogen (color based)

- ① Green → Renewable energy powered water electrolysis
- ② Yellow → Sun power water electrolysis
- ③ Blue → Hydrogen from methane but with carbon capture
- ④ Black / brown → Coal based hydrogen without carbon capture
- ⑤ Pink → Nuclear power based water electrolysis.

Role of green hydrogen in energy security (reducing import dependence).

- ① Hydrogen fuel ^{cell} can help decarbonize railway sector.
- ② Hydrogen fuelled cars can reduce petrol & diesel demand.
- ③ Hydrogen blended natural gas decarbonize natural gas.
- ④ Hydrogen fuel can also be used in coal based Thermal power plants & ^{other} industries.

Challenges

- ① Hydrogen fuel can corrode engines quickly.
- ② Lack of any standardization in production & storage.
- ③ Low infrastructure investment in hydrogen fuel refill stations → reduces demand.
- ④ Hydrogen fuel can be difficult to transport over distances.

Steps taken

- ① National Hydrogen Mission - 5MMT of hydrogen by 2025 abating 50MMT greenhouse gas emissions
- ② Railway → goal of introducing first hydrogen fuelled train by 2023 end.
- ③ NITI Aayog is working to develop hydrogen fuel related standards.

Way forward

- ① Generate awareness to encourage private vehicles
- ② Increase investment in requisite infrastructure. (charge Refill stations).
- ③ International collaboration for information exchange. green hydrogen can help India fulfil its target of net zero by 2070 and also promote energy security by reducing import dependence.

Explain the role of application of biotechnology as a precision tool for national development & social wellbeing

Biotechnology is a fast emerging sector in India expected to contribute approx. \$106 billion to the economy by 2025.

Biotechnology refers to the technology that leverages bio-resource to serve as the building blocks of products in chemical, material & energy fields.

Applications

- ① Health & medicine → drugs, vaccines, bio-healthy drinks, gene therapy
- ② Agriculture & food → biofortification, food preservatives, GM crops (Bt cotton), climate resilient crops.
- ③ Animal husbandry → cloned livestock, sex selective insemination.

- ④ environment - bio remediation, bio monitoring, GM tree - quick growth, etc.

[Tool for national development]
National development entails increased investment, improved GDP & better centre-state coordination

- ① India is the top 3 in the most preferred destination for biotechnology investment.
- ② Research & development finance has reached \$1 billion in just 1 year.
- ③ Genome valley in Telangana has been facilitated with centre-state coordination.
- ④ Biotech startups have reached to more than 100 in past 5-6 years.

Well-being of society

- ① elderly → good bacteria drinks, anti-aging products.
- ② children & women → vaccination like CERVAVAC, polio, M-R etc. have reduced diseases.
- ③ Cancer treatment → CAR-T, base editing etc. have made it possible to treat cancer.
- ④ Food & nutrition → biofortification has ~~not~~ increased nutrition intake. eg. Fortified rice & salt.

Way forward →

- skill development
- plug & play infrastructure
- focus on ease of business

Biotechnology sector has emerged as a leading sunrise sector enabling India to play a significant role at global scale while also promoting national development & social wellbeing.

Que. 8

What are different types of cyber threats? Discuss measures taken by the government to strengthen cyber security architecture and thwart cyber security threats. (15 Marks, 250 Words)

Cyber threats refer to the illicit activities in the cyber domain that threaten right to privacy & perpetuate criminal activities.

Types of cyber threats

→ Phishing & its variants like Vishing, social phishing, etc.

→ Ransomware → data blocked for a ransom eg. AIMS data breach

Cyberwar → to take national data during peace times & otherwise eg. power outage.

→ Virus attack.

Cyber terrorism → eg. spreading false information by non-state actors.

→ Cyber espionage → spying activities

Measures taken

- ① Information technology Act 2008 is the umbrella legislation dealing with cyber threats including critical infrastructure protection
- ② Cyber cell (tri-service) has been created under Ministry of Defence
- ③ National Cyber Security Policy 2013 → National critical Information & Infrastructure protection centres created
- ④ Islanding scheme to safeguard critical infrastructure
- ⑤ CERT-IN - emergency response measure.

- ⑥ Ministry of Home. I4C → cyber complaints
- ⑦ Cyber swachta kendras - regular maintenance by public

In the context of rising cyber attacks (Ministry of Home → ~~12~~ lakh complaints in first 6 months of 2022), ~~it is~~ and rapidly growing digitalization endeavours, a secure cyberspace is important for an inclusive, transparent and safe digital India growth.



Que.9

What is 'Net Zero Emissions Pledge'? Discuss whether India should adopt a net zero emission target. (15 Marks, 250 Words)

"Net Zero emission Pledge" is a pledge for neutral greenhouse gas emissions. It means that a country will emit the same amount of greenhouse that it will sequester.

Several countries including India have taken this pledge with an intent to prevent the climate change damage. eg. EU → 2050 target, India → 2070. South Korea - 2035.

Benefits of this pledge

- ① It will help mitigate climate change.
- ② Promote transition towards a cleaner economy.
- ③ Reduce climate related stress & hazards.

India should take the pledge

- ① India is the third largest emitter of carbon dioxide
- ② India seeks to emerge as a rule-maker & leader in clean economy. eg International solar alliance
- ③ It will benefit its population as India is one of the top 7 vulnerable nations

India should not take the
pledge.

- ① Climate justice dictates that India should utilize its fair share for carbon budget needed for its development
- ② India's per capita carbon emission is very low in comparison to global average.
- ③ Transitioning to cleaner options



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will cause job losses. (seen in context of high demographic dividend).

④ India needs fossil fuel based energy to transition to a developed economy.

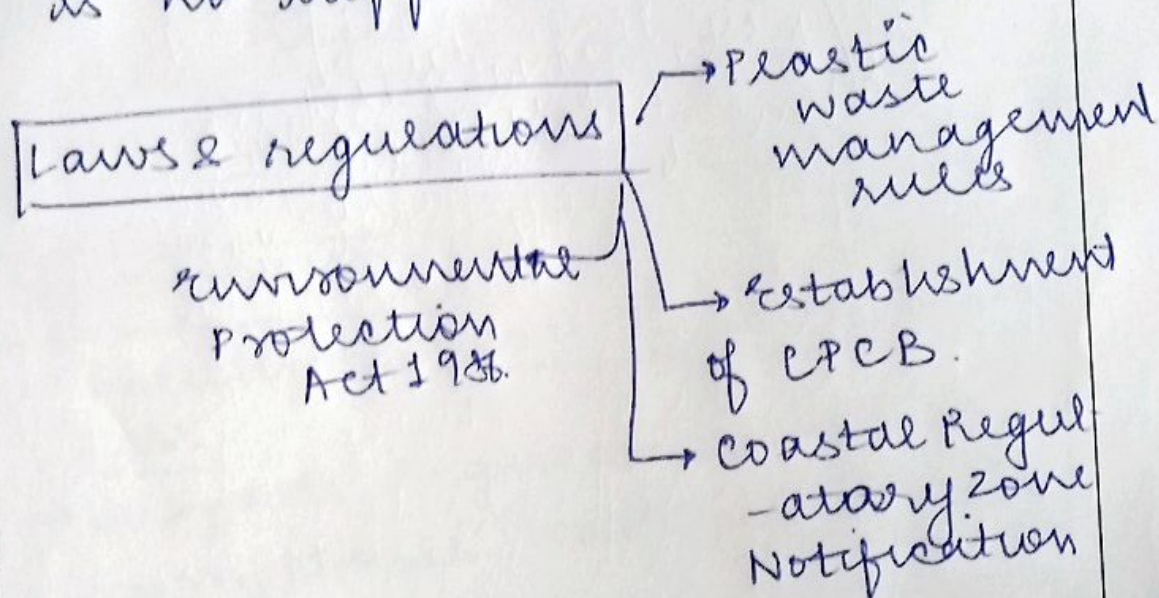
⑤ Despite low historic responsibility India is already at the forefront of renewable energy development.

Therefore, while it's true the India must continue its efforts towards clean energy development but it mustn't take any binding pledges. India should lead the call for climate justice at global stage but also ensure responsible use of fossil based energy.

Q.10

Despite various laws and regulations in place, India has failed in effective management of (plastic waste). Critically comment. Also discuss significance of 2018 amendments to "The Plastic Waste Management Rules, 2016", toward scientific plastic management in India. (15 Marks, 250 Words)

Plastic pollution has emerged as a global concern & India is no different.



Success

- ① India has effected a single use plastic Ban by 2022.
- ② There is an increase in registration of plastic waste processors and manufacturers.

- ③ Plastic bags less than 50 microns
* banned
 - ④ Municipal corporation collects waste from houses & charges fee.
 - ⑤ Extended Producer Responsibility despite laws & regulations, ^{enforced} success is suboptimal →
 - ① India drains approximately 600 kg plastic waste into rivers
 - ② Plastic waste continues to be a major portion of waste generated in India
 - ③ Plastic litter is found in public spaces
 - ④ Plastax not yet introduced
- 2016 rules
- Producers to keep record of vendors
EPR mandated
- Extended rules to rural areas
 - 50 micron bags banned
 - Mandatory registration of plastic bag manufacturers



2018 amendment

Automated registration with ease of doing business.

National level registry for PIBOM ≥ 2 states

phasing out of Multilayered plastic (non-recyclable)

prescribe a central registration system of PIBO

Significance

→ Facilitates ease of doing business - ess

→ supports regulation of non-recyclable waste, eventually to phase out.

→ helps centre fulfil its role according to environmental protection Act 1986; meet SDG goals #15, 16, 14 etc

Thus, with rising menace of plastic in terrestrial & marine environment, there is a need to take effective actions.