

NEXT IAS

GRADED ASSESSMENT TEST 2025

TEST CODE : M25GAT03

(To be filled by candidate)

TEST NO. : 03

Name of Candidate: PAKSHAL SECRETRY

Roll No.: MTS25-FLTRA 046 Start Time 9:30 End Time 3:50

Date of Examination: 14/07/25 Mobile No.

Q. No.	Maximum Marks	Marks Obtained
1	10	
2	10	
3	10	
4	10	
5	10	
Total Marks : 50		

Q. No.	Maximum Marks	Marks Obtained
6	15	
7	15	
8	15	
9	15	
10	15	
Total Marks : 75		

GRAND TOTAL -/ 125

EVAL CODE: GRADED DATE:

GENERAL INSTRUCTIONS

1. Immediately on receipt of the QCA booklet, please check that this QCA booklet does not have any misprint or torn or missing pages or items, etc. If so, get it replaced by a fresh QCA booklet.
2. Candidates must mention all relevant details like Name, Email, Roll No, Mobile, etc. in the space allocated.
3. Candidate is expected to attempt all 10 questions within the given timeline.
4. Answers must be written in the medium authorized at the time of admission.
5. Candidates must write answers for the specific question under the respective question itself. Any answer written outside the space allotted may not be given credit.
6. Please write neatly. Avoid illegible writing.
7. Do not write/mark irrelevant matters in the QCAB.
8. Only those copies that are submitted on the date of exam till 5 pm will be graded.

REMARKS:

<u>MARKING SCHEME *</u>			
Marks Per Ques	Below Average	Average	Above Average
10 Marks	Below 2.50	3.00 - 3.50	4.00 and above
15 Marks	Below 4.00	4.00 - 5.50	6.00 and above

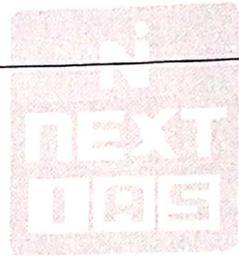
* Subject to change without prior notice.

MACRO COMMENTS
The Purpose of evaluation@nextias.com is to provide constructive suggestions on 'How to improve Answer Writing and thereby score better marks.'

STRENGTHS OF THE CANDIDATE

AREAS OF IMPROVEMENT

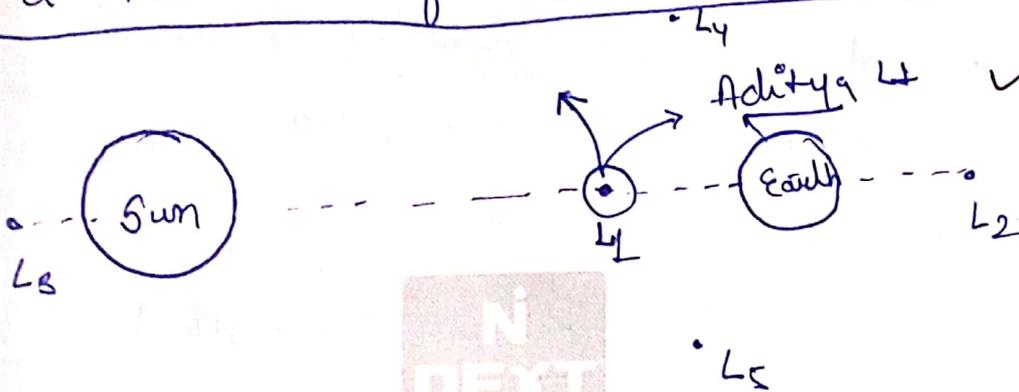
IMPROVEMENT SUGGESTIONS



Aditya-L1 marks a significant milestone in India's space programme. Discuss its scientific objectives and the broader significance of the mission for India.

(Answer in 150 words) 10 marks

Aditya-L1 is India's first space based solar observatory, ushering a new era of solar observation.



Scientific Objective

- ① Decoding the coronal paradox - i.e. Sudden rise in temperature to $1-2 \times 10^6 \text{ } ^\circ\text{C}$ in corona
- ② Understanding solar cycle and coronal microwave emission (CMEs)
- ③ ASPEX, SUIT and PAPA payload capable of sun observation with great precision
- ④ In-situ sun ray polimetry experiment (POLIX payload)

NEXT IAS

- ⑤ Better prediction of solar storms
and life of sun.

Significance of Mission

① For ISRO

- ① Makes it 4th country in world to have sun observation.
- ② Placement in 1.5 mm km far away L1 orbit → demonstrate capability of ISRO.
- ③ Cost - effectiveness of launch.

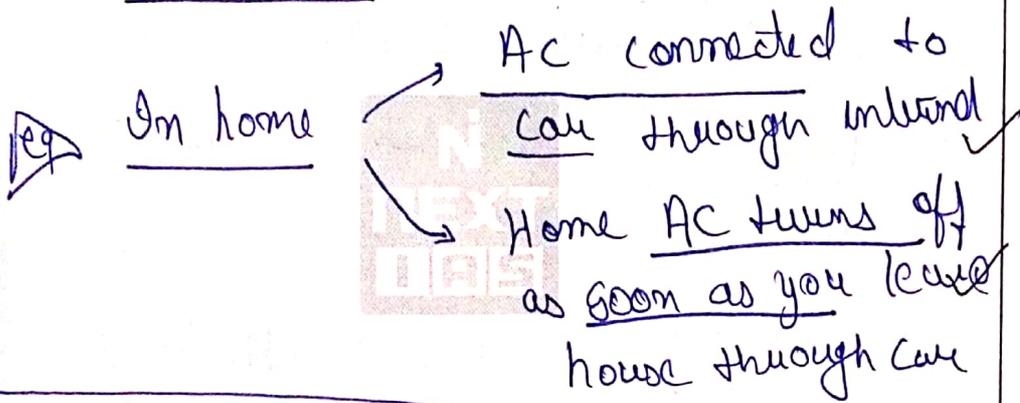
② For world

- ④ Helps in saving damages to satellite systems due to storms.
- ⑤ Scientific opportunity for future research.
- ⑥ Complements already studied work of Parker & Solar probes.

Aditya L1 is testimony to India's rising space power & leverage

2. What is the Internet of Things (IoT)? Discuss its transformative potential for India's information infrastructure and evaluate its role in enhancing agricultural productivity.
(Answer in 150 words) 10 marks

Internet of Things (IoT) is an inter connected world of machines, where each machine is able to connect, and communicate with other system.



Transformative potential

- ① Economic potential - Mckinsey study IoT market of India ~ 7.8 \$ bn
- ② Will make information infrastructure more efficient and intelligent
- ③ Potential to save cost by cooling & reducing energy use by informational system

for Informat. Infa.

NEXT IAS

- ④ Provide for practical applications and real time analysis of stored information → integration of NOAA Data on IoT for governance

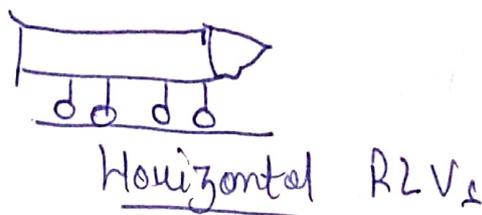
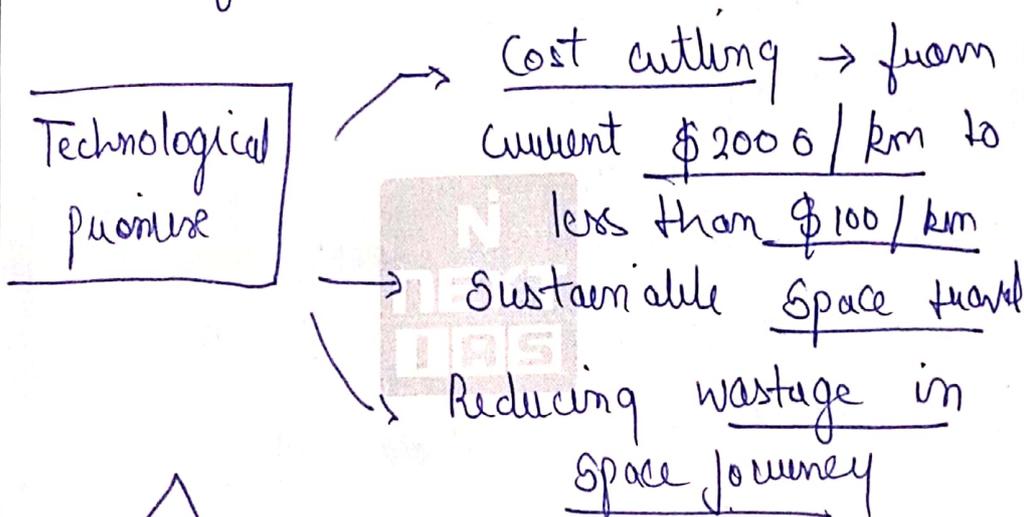
Role in Enhancing Agriculture

- ① Precision Agriculture → IoT based sensor for water, fertilizer supply → Duboi Committee → can increase yield by 45%.
- ② Cost cutting → due to efficient use of resources → more productivity
- ③ Reduce food & crop wastage in Agriculture sector
- ④ IoT Based machinery use → proper & timely harvesting of crops.
- ⑤ IoT intelligence → To manage price fluctuation of agri-commodity

IoT thus is being called next revolution in agriculture sector

3. Reusable launch vehicles (RLVs) present both technological promise and challenges. Discuss the hurdles in developing RLVs and outline India's progress in this field. (Answer in 150 words) 10 marks

Recently, Space X demonstrated catching off a booster of Falcon 9 through mechanical arms, ushering a new era for RLVs.



Challenges / Hurdles in developing

- ① Despite years of research, still not able to develop RLVs.
- ② Burning of 2nd and 3rd stage of rocket due to very high heat

- ③ High initial cost involved in development ✓
- ④ failed programmes → Roscosmos & RLV Mission ✓
- ⑤ No significant progress in Horizontal RLV development ✓

India's progress

- ① Dedicated Mission for RLVs → more than 10 years of research ✓
- ② Successful demonstration of RLV-TD Mission (2023) ✓
- ③ Made non-burning material - Tefton / Kevlar polymer by Ahmedabad SAC ✓
- ④ Test ongoing for development of full horizontal reusability ✓

✓ The promise of making NGRLV as reusable would usher a new era in space market

What is Digital Public Infrastructure (DPI)? Examine how DPI can accelerate India's development and evaluate the initiatives taken to build a digital stack for the agriculture sector. (Answer in 150 words) 10 marks

Digital Public Infrastructure is model of digital public good that provide for scalable, inclusive and user-friendly digital solution

eg UPI system, ONDC project.

Accelerating Development

- Economic growth ✓
eg \$300 bn UPI transaction
- Inclusivity eg 99.9% Aadhar coverage ✓
- Reducing leakages ✓
eg JAM Trinity - saved
Rs 1.5 lakh crore
- Democratizing of digital space ✓
eg ONDC platform

NEXT IAS

→ fostering pmo - people connect
 + pmo - vulnerable
 → NIDM for Health

Digital State for Agriculture

to build
digital
stack

- 2800 crore Rs Mission
- Farmer Registry → online database
- unique farmer ID - 11 digit
for identification
- DCOES → To guide decision
support to farmer
- Soil health profile and village level maps
- connecting the lab to farm
by constant advisory system

5. India's proposed mission to Venus poses multiple challenges. Discuss the scientific and technological difficulties associated with exploring Venus. (Answer in 150 words) 10 marks

① India's Shukrayaan Mission is set to launch in 2027, making it 4th country to have a dedicated Venus Mission ✓

Challenges

- ① Distance of Venus ✓
- ② Observation challenges — thick layer of green house in Venus
- ③ No space rovers → currently able to send satellite in such far distance .
- ④ High cost involved .
- ⑤ Scientific Difficulty → To align spacecraft → as only narrow window of Venus closer to earth .

⑥ Making payloads capable
of observing venus

Candidates
write on
Intro
Body
Conc.
Total



Operation Sindoor highlighted the decisive role of technology in modern warfare. In this context, examine the technological advancements that contributed to its operational success. (Answer in 250 words) 15 marks

As a response to cross border, terrorist attack by Pakistan in Pokhram (J&K). India launched operation Sindoor

Technological Advancements

A) Offensive System

① Role played by 4.5th gen aircraft like Rafal and Tejas

② Brahmos cruise missile → obliterated Pakistani Bases on 10th of May (2025)

③ Missile to strike deep into Pakistan eg SCALP and Hammer missile to reach 300 km inside Pak

B) Defensive System

① Integrated Air Defense System - layered structure of air defense

- ① Role of Indigenous System the Akash Teer for air defence
- ② S-400 System to bring down Shaheen Missile of Pakistan
- ③ Drone Technology Advancements
- ① Joint Indo - Israel drone system in use
- ④ Supporting Technology
- ① ISRO's GISAT QB for surveillance purpose
- ② Real time information collection using surveillance drones

As C Raja Mohan says, "Operations Sindoor was not just about retribution, but defined new line of tolerance for India and displayed our technological might & power"

Candidates must not write on this margin

Intro :
Body :
Conc. :
Total :

Other Technological Advancement

- ① Developing of precision weapon system → Accurately targeting of Terror sanctuaries.
- ② Communication system → To clearly articulate India's stance

Significance

- ① clear new red lines
- ② every act of terror = Act of war

- ③ Shift from deterrence by surveillance to deterrence by punishment

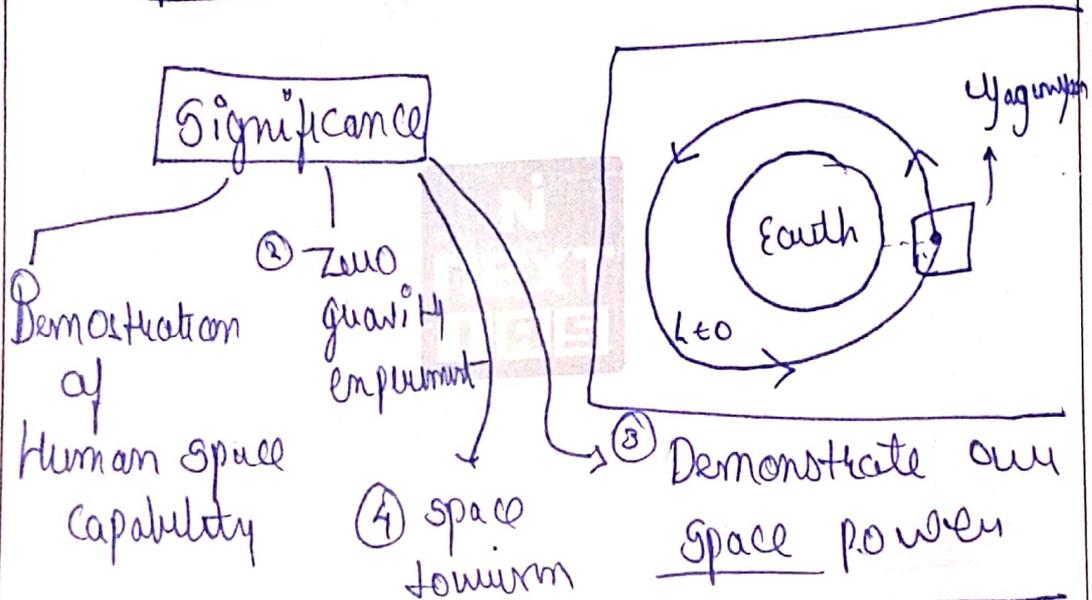


New export opportunity have been unlocked due to pin point & 100% success of Indian system

NEXT IAS

7. Human spaceflight poses unique safety challenges. Discuss the major risks involved in human space missions and outline the steps taken under the Gaganyaan mission to address them. (Answer in 250 words) 15 marks

Gaganyaan Mission is India's first human space flight mission, which would make it 4th country to have a space human flight.



⊗ Risk involved in human space Mission

① Risk to Pilots / Space Traveller

(i) Risk of life loss in case of failure \rightarrow Kalpana Chawla died in such program

(ii) Risk of radiation impact, may even lead to genetic mutation

(iii) Space Travel Disease

eg Reducing Bone density,
Hairfall → due to radiation

(iv) psychological risk → ~~mental~~ mental
health issue due to no sleep
and loneliness in spacecraft.

(2) Risk to ISRO / India

(i) No defined liability structure in
case of failure of project

(ii) Risk of hurting public sentiment
& in case of failure eg Chandrayaan-3

(iii) Might contribute to space debris
→ higher risk of Kessler Syndrome

Steps Taken

(1) Development of Human usable
GSLV system by SAC (Ahmedabad)

(2) Kevlar polymer use to reduce
impact of radiation

NEXT IAS

Candidate
write on:
Intro
Body
Conc.
Total

③ Test flight (9 in 2026) to ensure proper check before sending humans

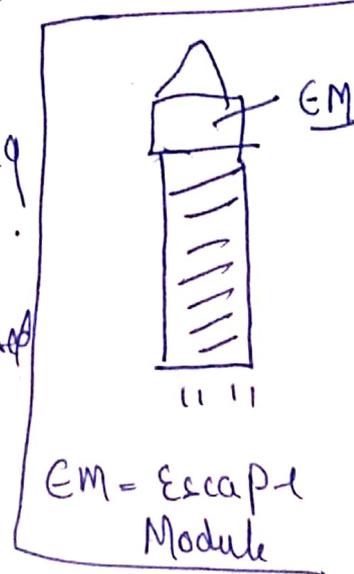
④ Vyommithuq → Robot to interact with humans

↳ solves loneliness problem

↳ Help in zero gravity experience

⑤ Escape Module to abort mission and bring astronaut back safe.

⑥ Development of AI based simulation tested - to check for all possibility



⑦ Collaboration with other agencies
eg → NASA - Shubhanshu Shukla
for data sharing

The recent flight of Shubhanshu Shukla marks the beginning of India's Human Space Program

India has made notable progress in nuclear energy. Discuss the technological advancements in this domain and evaluate their contribution to India's developmental goals.

(Answer in 250 words) 15 marks

India's current nuclear generation capacity has risen to 8.1 GW in 2024, bringing us close to dream of 100 GW nuclear generation.

India's progress in Nuclear

- 8.1 GW energy generation ✓
- Among Top 10 nuclear power generation ✓
- Indigenous development due to non-entry to NSG ✓

Technological Advancement

① Development of Small Modular Reactors (SMRs) ✓

→ First deployment by 2035
→ Easy to use, cost friendly and modular nature.

② Shift to 2nd stage of India's nuclear doctrine ✓

NEXT IAS

Candidates must
write on this mat

① NPCIL & BHAVANI led plant
in Kalpaahom (2nd generation)
is commissioned

③ Technological demonstration of
2nd gen prototype by BARC.

④ Advancement in Nuclear fusion
→ Near Breakdown result in
India participated ITER fusion
reactor
→ Advancement in Indian fusion
reactor project of Jyväskylä.

⑤ New Method in Nuclear fission
① Shift from Boiling water based
to Advanced gas cooled fusion
reactor (Tarapur plant)
plan

⑥ Improved efficiency of existing
plant ① Use of PHWR
reactor in Kundahulam

⑦ Development of technology to turn
fertile Thorium into fissile material

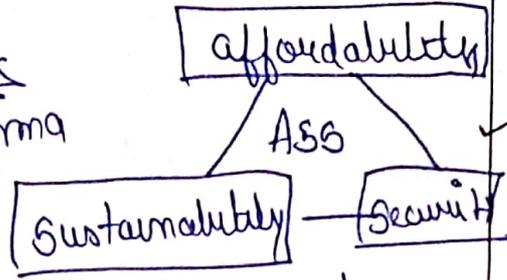
Candidates must not write on this margin

Intro :
Body :
Conc. :
Total :

Contribution to India's goals

① Energy Security goals

⇒ solved India's
 & energy Trilemma
 of ASS →



paradom

② Developmental goals → key to make India a developed nation by 2047.

③ Environmental goals → clean source of energy & no carbon leakage

④ Technological goal → established India as superpower in Nuclear domain

Limitation of Nuclear power

- Nuclear waste issue ✓
- Environmental concern ✓
 (eg) Kundahulam protest
- Technological Denial ✓
 - Not a member of NSG.
- High installation cost ✓

Recent proposal to allow private players in Atomic energy will be key to realise goal of Energy Admanushya by 2040

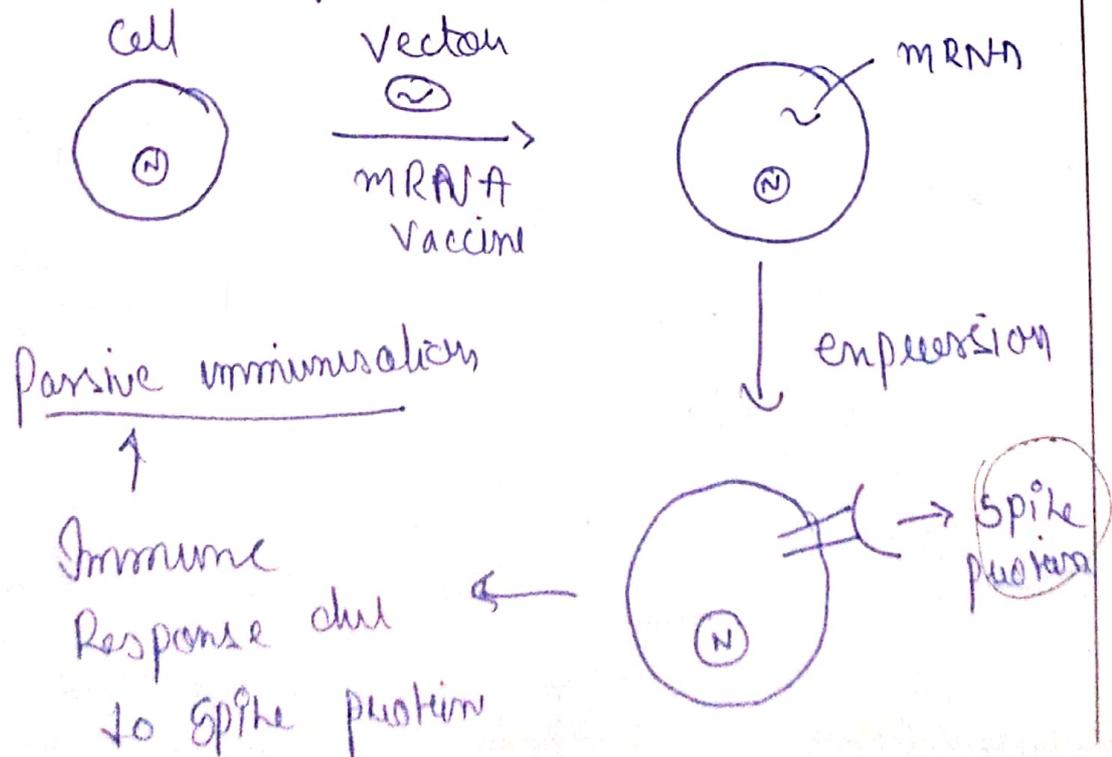
9.

What are mRNA vaccines? Explain how they function and highlight how they differ from DNA-based vaccines. (Answer in 250 words) 15 marks

India developed mRNA vaccine
in record time of 10 months
during Covid-19 pandemic

mRNA Vaccine

- ① Vaccine that use mRNA of the virus/pathogen for passive immunisation
- ② Vector carries mRNA to host cell and triggers immune response
- ③ Help in expression of specific proteins in cytoplasm of cell



functioning (see diagram)

① Helps in immune response by triggering passive

② In fig 2

① PIR = case of no vaccination (Primary Immune Response)

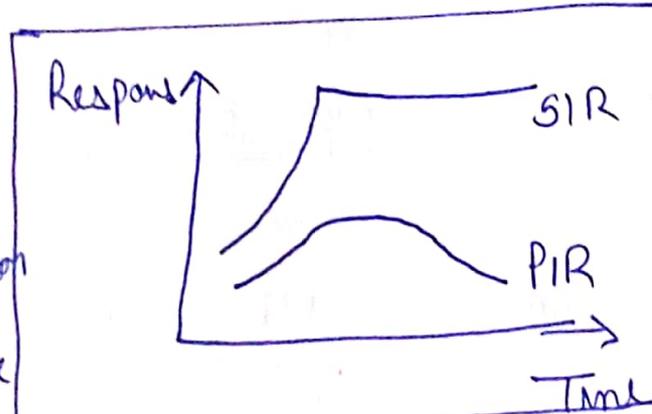


Fig 2 / Response to attack

② SIR (Secondary Immune Response) due to vaccination by mRNA

③ Provides memory to cell to respond in case of future attack

Difference with DNA vaccine

Aspect	mRNA	DNA
① <u>Material Targeted</u>	Host cell (cytoplasm)	Host cell Nucleus <u>Transcription</u>

NEXT IAS

Candidates must not write on this margin

Intro :
Body :
Conc. :
Total :

③ <u>Stability of Vaccine</u>	Not stable Stable at room temperature	Stable at room temperature
④ <u>Cost</u>	<u>High cost</u>	<u>low cost</u>
⑤ <u>Storage</u>	In refrigeration (0°C)	At normal temperature → 2-8°C
⑥ Risk of DNA mutation	<u>Very low risk</u>	<u>Very high risk</u> (as it goes to nucleus)
⑦ Effectiveness	Need <u>frequent boosters</u>	Highly effective in nature
⑧ Example	<u>Corishield</u> &	DNA vaccine Covaxian

Both are thus important tools of ensuring vaccine protection

What is fifth-generation warfare? Examine the emerging challenges associated with it and suggest measures India should adopt to strengthen its preparedness.

(Answer in 250 words) 15 marks

Fifth generation warfare is a complex system of warfare involving

- ① space warfare (5th domain)
- ② grey zone warfare
- ③ Hybrid warfare tactics
- ④ Informational warfare
- ⑤ Cyber warfare ✓

Thus, all this system are used to describe 5th gen warfare

Key features of 5th gen

- unpredictability of attack ✓
- Role of Heteropolax actors
- Weaponisation of everything ✓
eg Pager Attack by Israel
- Anonymity of attack ✓
- No war - No peace nature of attack ✓

Emerging Challenges

- ① Diffusion of Technology → emergence of heteropolan elements ✓
eg) Cyber & critical warriors
- ② 2.5 front Threat for India ✓
- ③ Space as new domain of war. ✗
eg) Golden Dome project of India
- ④ low Traceability and lack of effective countering power ✗
- ⑤ limited cyber offensive capability of India to be prepared for 5th generation ✓
- ⑥ Hybrid Dilemma of response
→ conventional response = war ✓
→ no response = ↑ threat of attack ✓
- ⑦ Using weak and capability of our adversaries
eg) China, Pakistan

Intro :
Body :
Conc. :
Total :

Way forward

① Shetkumar Committee

① Establish a space command for our forces.

② Establishing cyber command

③ Building of cyber offensive capability

④ Clear Doctrine to deal with
5th generation threat

⑤ Madhuban Gupta Committee

① Constant focus on military modernisation

② Building deterrence capability

③ Technological Advancement in domain
e.g. Mission Shakti (2019) - ACA T.

India needs to become future ready to counter emerging threat of 5th gen warfare