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1. **Bihar Opposition Challenges BJP over Independent MLC Defections** — *The Hindu* — GS II: Indian Polity, Tenth Schedule.
2. **Gene Therapy Aims to Silence Hepatitis B DNA** — *The Hindu* — GS III: Science & Technology, Biotechnology.
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6. **Navy to Launch ₹80,000-Crore Warship Project – Project 18A** — *The Hindu* — GS III: Defence and Security.
7. **A.P. Braces for Second Cyclone within a Week – Cyclone Murasu** — *The Hindu* — GS I: Geography, Tropical Cyclones.

Bihar Oppn. attacks BJP day after 2 Independent MLCs 'join' ruling party

Tejashwi seeks disqualification of Bansidhar Brajwasi, Rahul Raj; row comes a day after BJP issued statement welcoming the two to the party; hour later, it said the MLCs had 'extended support' to it

Amit Bhelari
PATNA

A day after two recently elected Independent Members of the Bihar Legislative Council – Bansidhar Brajwasi and Rahul Raj – "joined" the ruling Bharatiya Janata Party (BJP), the Opposition on Sunday demanded that both be disqualified under the anti-defection law.

In the results declared last week, Mr. Brajwasi defeated Janata Dal (United)'s Abhishek Jha from the Tirhut Graduates' seat while Rahul Raj defeated JD(U)'s Anand Pushkar from the Saran Teachers' seat.

Around 8 p.m. on Saturday, the BJP issued a release welcoming the two legislators to the party.

Subsequently, in a media interaction, Mr. Brajwasi said, "I have joined the BJP after Chief Minister Samrat Choudhary*ji* gave me an assurance that teachers' concerns would be resolved if we work together." However, nearly an hour later, the BJP issued another press note stating that the "newly elected Legislative Council members Bansidhar Brajwasi and Rahul Raj have extended their support" to it.



RJD MP Manoj Kumar Jha said the party will urge the Acting Chairman of the Legislative Council to take action against the two MLCs. ANI

Soon after, the Tirhut Graduates' MLC put out a video on Facebook, where he said, "I have not joined BJP. I have just offered support. I don't know why people are making a hue and cry about it." There was no comment from Mr. Raj.

On Sunday, Leader of the Opposition in the Assembly and Rashtriya Janata Dal (RJD) working president Tejashwi Yadav accused the MLCs of violating the anti-defection law and hit out at the BJP for "making a mockery of the Constitution".

RJD MP Manoj Kumar Jha said under the Constitution's Tenth Schedule, those elected as Independents are liable to be disqualified upon joining any party. He added that the RJD will meet Acting Chairman of the Legislative Council Ram Bachan Rai over the issue. "If he fails to take an immediate and impartial decision, we'll raise the matter before the court of law, as well as the court of people," Mr. Jha said.

Cong. takes potshots

The Congress took potshots at the BJP, accusing it of "backstabbing its coalition partner JD(U)". "The BJP has been calling the INDIA bloc a divided house. But how it conspired to ensure the defeat of its own ally is now for all to see," said Congress spokesperson Asit Nath Tiwari.

Prashant Kishor-led Jan Suraaj Party, which also bagged a seat in the MLC polls, termed the episode a "cruel and vulgar joke".

Of the eight seats that went to the polls, ruling National Democratic Alliance partners BJP and JD (U) contested four each. While the BJP won two, the JD(U) bagged one. Two seats were won by the RJD.

1. Anti-Defection Law – Tenth Schedule

GS Paper II – Indian Polity

Context: Two Independent Bihar MLCs were accused of joining the BJP, raising questions about their disqualification under the Tenth Schedule.

1. Constitutional Background

1. Introduced by the **52nd Constitutional Amendment Act, 1985**.
2. Applies to Lok Sabha, Rajya Sabha, State Legislative Assemblies and Legislative Councils.
3. Constitutional provisions: Article 102(2) – MPs; Article 191(2) – State Legislators.

2. Grounds for Disqualification

1. **Party-elected members (Paragraph 2(1)):**
    - Voluntarily give up membership of their political party.
    - Vote or abstain against the party whip without prior permission, and the party does not condone it within 15 days.
2. **Independent members (Paragraph 2(2)):**
    - Join any political party after being elected.
    - Disqualification applies immediately; no six-month relaxation.
    - Merely extending support does not automatically mean joining a party.
3. **Nominated members (Paragraph 2(3)):**
    - Can join a political party within six months of taking their seat.
    - Joining after six months attracts disqualification.

3. Exceptions

1. **Merger (Paragraph 4):** Protection if at least two-thirds of the legislature party members agree to the merger.
2. **Presiding Officers (Paragraph 5):** Special protection for Speakers, Deputy Speakers, Chairmen and Deputy Chairmen under specified conditions.

4. Decision and Time Limit

1. Speaker: Lok Sabha and State Legislative Assembly.
2. Chairman: Rajya Sabha and State Legislative Council.
3. No statutory deadline under the Tenth Schedule; the Supreme Court in *Keisham Meghachandra Singh (2020)* indicated that petitions should ordinarily be decided within three months.
4. Decisions are subject to judicial review (*Kihoto Hollohan, 1992*).

5. UPSC Prelims PYQ – 2022

With reference to the anti-defection law in India, consider the following statements:

1. A nominated legislator cannot join any political party within six months of being appointed to the House.
2. The law does not provide any time-frame within which the presiding officer has to decide a defection case.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Answer: (b) 2 only

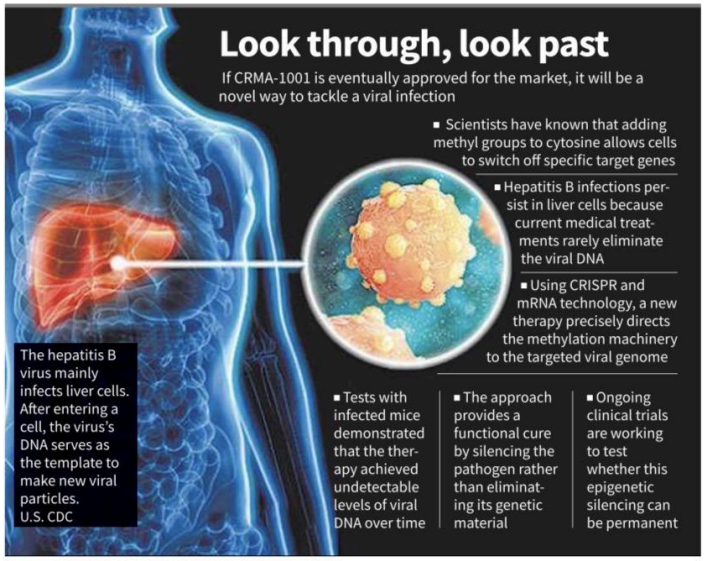
Explanation: A nominated member can join a political party within six months of taking their seat. The Tenth Schedule does not prescribe a specific deadline for the presiding officer.

Gene therapy aims for a cure by silencing hepatitis B DNA

An experimental therapy called CRMA-1001 is a remarkable development because, instead of targeting the virus directly, it silences the viral DNA; this is promising because treatments rarely eliminate the DNA, which allows the virus to rebound

Arun Panchapakesan

According to new work reported in *Nature Biomedical Engineering*, scientists have used epigenetic control to treat a hepatitis B infection. The development is remarkable because, instead of targeting the virus directly, the work silenced the viral DNA. This is promising because current treatments rarely eliminate the DNA, which allows the virus to rebound. By silencing this residue, the treatment could offer a path to a lasting functional cure for hepatitis B.



Virus in hiding

The hepatitis B virus mainly infects liver cells. After entering a cell, the virus's DNA serves as the template to make new viral particles. In many people, the immune system clears the infection, but if it does not, the viral DNA can persist for years or even decades in the host's liver.

In this time, the virus can remain silent, meaning the viral DNA is still present in the cell but its genes are not active to produce new viruses. This allows the virus to 'hide' from the immune system. Then, at a later point, the virus can activate again and produce new virus particles.

Studies have shown that one of the mechanisms by which the virus stays silent is by methylating cytosines.

DNA is segmented into genes, and each gene contains the information necessary to make a particular protein. These proteins essay their roles in the cells. Since every cell in the body has two copies – one from each parent – of all human DNA, all cells technically have the blueprint to make a whole organism. However, cells also have specialised functions: a brain cell does not need the genes for the proteins used to digest food.

One of DNA's four building blocks is cytosine. Cells can attach a chemical tag, like the methyl group ($-CH_3$), to cytosine to silence the corresponding gene. This prevents the cell's protein factory from reading the gene and the cell from making that protein. Problems in this epigenetic system can lead to diseases like cancers.

The new study has reported a new experimental therapy called CRMA-1001 that can reportedly silence the DNA of the hepatitis B virus by selectively methylating the virus's genome.

The study's authors combined two molecular components to achieve this, called a 'locator' and an 'effector'. The locator used the CRISPR-Cas9 gene-editing tool to find and bind to a specific DNA sequence: in this case, a sequence within the viral DNA. This allowed the CRISPR system to take the 'effector', the methylation machinery, to the correct location. The effector had proteins that could add methyl groups to nearby cytosines in the viral DNA and proteins that help switch off genes. Finally, the researchers packed the entire system and delivered it on an mRNA platform. Once a cell had read the instructions to make the required proteins, it degraded them, stopping the production of those proteins too.

The researchers gave mice infected with hepatitis B virus either a single dose of CRMA-1001 or three doses, one month apart, and regularly tested them for six months for the signs of infection. They reported that after one dose, the levels of several hepatitis B virus markers, including the viral DNA and two viral proteins called HBsAg and HBeAg, dropped significantly. When they tested the viral DNA, they found new methyl groups, suggesting the treatment was working as intended. The effect was even stronger after three doses: six months after the first dose, as many as 90% of the animals had less viral DNA than could be detected.

CRMA-1001 is not a cure in the traditional sense of the word. The hepatitis B virus DNA is still present in the liver cells. Instead, the study demonstrated a functional cure: when the virus is not necessarily eliminated but is kept so thoroughly suppressed that, for all intents and purposes, the patient has no active signs of disease. In this study, the team followed up with the mice for six months after treatment, and the researchers found sustained suppression of the virus in that period. However, the study did not establish whether the virus could eventually become active again after those six months, since the viral DNA was still present.

Further studies are needed to examine the long-term effects of CRMA-1001, including whether the silencing effect can persist over many years and whether the virus can ever become active again after treatment. An ongoing phase I/II clinical trial includes these among other questions. Nonetheless, CRMA-1001 represents a novel way to tackle a viral infection: instead of fighting the threat, the cell simply ignores it.

(Arun Panchapakesan is an assistant professor at the Y.R. Gaitonde Centre for AIDS Research and Education, Chennai)

2. Genetic Medicine: Experimental Therapy for Hepatitis B

GS Paper III – Science and Technology | Biotechnology and Genetic Engineering

Context: Chronic Hepatitis B can cause liver cirrhosis and cancer. Existing medicines can control viral replication but generally do not eliminate viral DNA from infected liver cells. The experimental therapy **CRMA-1001** uses CRISPR-based targeting and epigenetic modification to silence viral genes, offering a potential approach towards a functional cure.

1. Important Concepts

1. **Gene Therapy:** Treating diseases by correcting, replacing or regulating genetic material.
2. **Genome Editing:** Making targeted changes to DNA using tools such as CRISPR-Cas9.
3. **Genome Sequencing:** Determining the order of DNA bases (A, T, G and C).
4. **Epigenetic Modification:** Regulating gene expression without changing the underlying DNA sequence.
5. **DNA Methylation:** Addition of methyl groups ($–CH_3$) to DNA, which can suppress gene activity.

2. How CRMA-1001 Works

1. **Target Identification:** CRISPR-based technology identifies a specific sequence in Hepatitis B viral DNA.
2. **DNA Methylation:** Methylation machinery adds methyl groups to the targeted viral DNA.
3. **Gene Silencing:** Viral genes are switched off, reducing the production of viral proteins.
4. **Viral Suppression:** Viral DNA remains inside liver cells but becomes functionally inactive.

3. Hepatitis A, B and C

Hepatitis is inflammation of the liver, commonly caused by viral infection.

Feature	Hepatitis A	Hepatitis B	Hepatitis C
Transmission	Contaminated food and water	Blood and body fluids	Mainly infected blood
Infection	Acute	Acute and chronic	Acute and chronic
Chronic infection	No	Yes	Yes

Vaccine	Available	Available	Not available
Treatment	Supportive care	Antiviral medicines control infection	Antiviral medicines can cure most cases

Additional points:

1. **Hepatitis A:** Spreads through the faecal–oral route and usually resolves without chronic infection.
2. **Hepatitis B:** Can cause chronic liver disease, cirrhosis and liver cancer.
3. **Hepatitis C:** Often remains undetected for years but is curable in most cases using direct-acting antivirals.
4. **Hepatitis D:** Requires Hepatitis B virus for replication.
5. **Hepatitis E:** Mainly spreads through contaminated food and water and can be particularly dangerous during pregnancy.

4. Significance

1. **Potential Functional Cure:** May suppress viral activity without completely removing viral DNA.
2. **Targeted Treatment:** Specifically targets viral genetic material.
3. **Long-term Control:** May provide sustained suppression of chronic Hepatitis B.
4. **Scientific Advancement:** Combines CRISPR technology with epigenetic modification.
5. **Future Applications:** May open new research pathways for treating persistent viral infections.

5. Limitations

1. **Viral DNA Persistence:** Viral DNA remains in liver cells and may become active again.
2. **Long-term Effectiveness:** Durability of gene silencing is not yet established.
3. **Clinical Trials:** Animal-study results do not establish safety and effectiveness in humans.
4. **Delivery Challenges:** Safely delivering the therapy to target liver cells remains difficult.
5. **Safety Concerns:** Unintended genetic or epigenetic changes require further investigation.

6. UPSC Prelims PYQs – 2026

Q1. Genetic Medicine

Which of the following statements with regard to genetic medicine is/are correct?

1. Genetic medicines correct/compensate for the faulty genes responsible for disease.
2. Engineered viruses and lipid nanoparticles are used as carriers of genetic medicine.
3. Genetic medicines alter the entire DNA sequence.

(a) 1 only
(b) 2 and 3 only
(c) 1 and 2 only
(d) 1, 2 and 3

Answer: (c) 1 and 2 only

Q2. GenomeIndia Project

Which of the following statements with regard to the GenomeIndia Project is/are correct?

1. It is a part of the Human Genome Project.
2. The project is funded by the Department of Biotechnology, Government of India.
3. Its primary aim is to build a catalogue of genetic diversity of the Indian population.

(a) 1 only
(b) 2 and 3 only
(c) 1 and 2 only
(d) 1, 2 and 3

Answer: (b) 2 and 3 only

An energy revolution in the making



Pralhad Joshi

is Union Minister for New and Renewable Energy, Government of India & President of ISA Assembly

More than 21 lakh of the 65 lakh homes with PM Surya Ghar rooftop solar have received a zero electricity bill. Life for young Indians, once marked by monthly bills and regular power cuts, has seen a sea change. Now, they ask how an inverter works, what a battery costs, and whether AI can run decentralised solar. Such questions are creating engineers, entrepreneurs, skilled technicians, and informed citizens. India is raising its first generation of power producers and innovators, and I believe they will shape our energy economy for Viksit Bharat by 2047.

This rests on a decade of initiatives led by Hon'ble Prime Minister Shri Narendra Modi. In the last 12 years, India has achieved both speed and scale, with installed solar capacity up by around 6007%, from 2.8 GW in 2014 to 171 GW today. Solar power that cost around ₹8 a unit in 2014-15 now sells for as low as ₹2.15, thanks to an ecosystem, including PM-KUSUM scheme, built on the vision to achieve 500 GW of installed power capacity from non-fossil fuel sources by 2030. India stands as the only G20 country to have met its 2030 target of 50% non-fossil capacity five years early. This first chapter has proved that solar works for Indian households.

Now, the second will take agri-photovoltaics to farmers under PM-KUSUM 2.0, pair storage with solar, prioritise State-level green corridors, deepen rooftop solar penetration, and digitise our networks for more renewables. Our 500 GW commitment needs $220 billion investment - $150 billion domestic and $70 billion as FDI. Capital, manufacturing, storage, and people will decide how well we do it, along with Global South partners.

Solar power that cost close to ₹10 a unit in 2014 now sells for as low as ₹2.15, thanks to an ecosystem built on the vision to achieve 500 GW of installed power capacity from non-fossil fuel sources by 2030

Capital comes first. The first milestone of one lakh PM Surya Ghar solar installations took months; now, we achieve the number every six days. Under PM-KUSUM, our 'annadata' has become our 'urjadata' too, with over 30 lakh standalone solar pumps installed. The private sector will lead the build-out, with our States as partners, by building parks such as Khavda, the world's largest hybrid renewable energy park. Next, rooftops and pumps must become a bankable asset class with a clear pipeline for Indian and foreign pension funds and institutional investors.

Manufacturing is next. The PLI scheme brought high-efficiency module-making home. The capacity of solar module now exceeds 225 GW and around 45 GW of cells. Investment must now go into cells, wafers, and polysilicon. The National Green Hydrogen Mission is building an electrolyser industry for 5 million tonnes a year by 2030.

Storage comes third. The Central Electricity Authority sees a need for 236 GWh of batteries by 2031-32, and the Cabinet-approved third phase of the Green Energy Corridor will support 50 GWh with ₹50,000 crore and new transmission.

The last but most important is people. Rooftop solar creates significantly more jobs than ground-mounted projects. It requires local teams for surveying, designing, installing, connecting and servicing the systems – taking green jobs beyond major cities to places closer home for lakhs of youth. It also employs a high share of women. Our 500 GW target and the Green Hydrogen Mission could also support lakhs of full-time-equivalent jobs by 2030.

Under India's 2023 G20 Presidency, the African Union joined the G20 permanently, and leaders agreed to work towards tripling renewables capacity by 2030. This September, as BRICS Chair, we saw the New Delhi Declaration adopted unanimously, backing a BRICS Solar PV Cooperation Roadmap and principles for smart grids and storage.

The International Solar Alliance, launched by India and France in Paris in 2015, turns that agenda into delivery. The first 1,000 GW of global solar power took 25 years; the next came in two. With 130 signatory and member countries, ISA is helping build skills through a Global Capability Centre, an AI-driven ISA Academy, and centres of excellence in 17 countries, with capital from the $200-million Africa Solar Facility, managed with Africa50.

The Bharat Renewable Energy Summit & Expo 2026 at Bharat Mandapam on November 2-5, to be inaugurated by the Hon'ble Prime Minister, will host, for the first time, the Ninth ISA Assembly and the Fourth International Conference on Green Hydrogen together. With the participating countries and institutions, we will discuss what solar can do for them and how they can achieve reliable power, energy security without imported fuel, and food security through solar irrigation, all in the spirit of Vasudhaiva Kutumbakam.

3. India’s Renewable Energy Transition – 500 GW Target

GS Paper III – Economy and Environment | Renewable Energy and Energy Security

Context: India is accelerating its transition towards clean energy through solar power, energy storage and green hydrogen to reduce fossil-fuel dependence, strengthen energy security and achieve 500 GW of installed non-fossil fuel capacity by 2030.

1. India’s Renewable Energy Progress

1. **Solar Capacity:** Increased from 2.8 GW in 2014 to 171 GW, as cited in the study material.
2. **Declining Solar Cost:** Solar electricity cost declined from approximately ₹8 per unit in 2014–15 to ₹2.15 per unit.
3. **Non-Fossil Energy:** India achieved 50% of its installed electricity capacity from non-fossil sources ahead of the 2030 target.
4. **PM Surya Ghar Muft Bijli Yojana:** Promotes rooftop solar installations for households.
5. **PM-KUSUM:** Promotes solar-powered agricultural pumps and solarisation of agricultural feeders and land.

2. Major Pillars of Energy Transition

1. **Solarisation of Agriculture:** PM-KUSUM reduces farmers’ dependence on diesel and conventional electricity through solar irrigation pumps.
2. **Domestic Manufacturing:** Production Linked Incentive (PLI) scheme supports domestic manufacturing of solar modules and cells.
3. **Energy Storage:** Battery Energy Storage Systems and pumped-storage hydropower help manage intermittent solar and wind electricity.
4. **Green Hydrogen:** National Green Hydrogen Mission targets at least 5 million metric tonnes of production annually by 2030.
5. **Skilled Workforce:** Renewable energy creates employment in installation, manufacturing, grid connectivity and maintenance.

3. Significance

1. **Energy Security:** Reduces dependence on imported fossil fuels.
2. **Climate Commitments:** Helps reduce greenhouse gas emissions and fulfil India’s Paris Agreement commitments.
3. **Economic Growth:** Encourages investment, manufacturing and technological development.
4. **Employment:** Generates green jobs, particularly in rural areas.
5. **Agricultural Development:** Solar pumps reduce irrigation costs and dependence on conventional electricity.

6. **Inclusive Development:** Rooftop solar allows households to generate electricity and reduce electricity expenditure.

4. International Cooperation

1. **International Solar Alliance (ISA):** Launched by India and France in 2015 to promote global solar energy deployment.
2. **BRICS Cooperation:** Promotes cooperation in solar energy, smart grids and energy storage.
3. **Global South:** Encourages technology transfer, investment and capacity building in developing countries.

5. Challenges

1. **Intermittency:** Solar and wind generation depend on weather conditions.
2. **High Investment:** Renewable infrastructure requires substantial capital.
3. **Manufacturing Dependence:** Domestic production of solar cells, wafers and polysilicon needs strengthening.
4. **Grid Infrastructure:** Requires modern transmission networks and smart grids.
5. **Land-use Conflicts:** Large projects can affect agriculture and local ecosystems.
6. **Storage Costs:** Battery storage remains a technological and economic challenge.

6. Way Forward

1. **Decentralised Energy:** Expand rooftop solar and agricultural solarisation.
2. **Domestic Manufacturing:** Strengthen the complete solar manufacturing value chain.
3. **Energy Storage:** Accelerate battery and pumped-storage projects.
4. **Green Hydrogen:** Promote electrolyser manufacturing and industrial applications.
5. **Smart Grids:** Modernise electricity transmission and distribution.
6. **International Cooperation:** Strengthen technology transfer and investment partnerships.

7. UPSC Prelims Previous-Year Questions

Q1. UPSC Prelims 2026 – Green Hydrogen

Which of the following statements with regard to Green Hydrogen is/are correct?

1. It is decarbonized hydrogen obtained from natural gas reforming combined with carbon capture and storage (CCS).
2. It is produced using electrolysis of water with electricity generated by renewable energy.
3. National Green Hydrogen Mission aims for abatement of nearly 50 MMT of annual greenhouse gas emissions by 2030.

(a) 1 only
(b) 2 and 3 only
(c) 2 only
(d) 1, 2 and 3

Answer: (b) 2 and 3 only

Explanation: Natural gas reforming with carbon capture produces blue hydrogen. Green hydrogen is produced using renewable electricity for water electrolysis.

Q2. UPSC Prelims 2024 – Pumped-Storage Hydropower

Recently, the term “pumped-storage hydropower” is actually and appropriately discussed in the context of which one of the following?

(a) Irrigation of terraced crop fields
(b) Lift irrigation of cereal crops
(c) Long duration energy storage
(d) Rainwater harvesting system

Answer: (c) Long duration energy storage

Explanation: Excess electricity pumps water to an upper reservoir. When electricity is needed, the stored water is released through turbines to generate power.

Q3. UPSC Prelims 2014 – Solar Power Technology

With reference to technologies for solar power production, consider the following statements:

1. Photovoltaics directly converts sunlight into electricity, while solar thermal technology uses sunlight to generate heat for electricity production.
2. Photovoltaics generates Alternating Current (AC), while solar thermal generates Direct Current (DC).
3. India has a manufacturing base for solar thermal technology, but not for photovoltaics.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 and 3 only
(c) 1, 2 and 3
(d) None

Answer: (a) 1 only

Explanation: Photovoltaic cells generate Direct Current (DC), which can be converted into Alternating Current (AC) using an inverter.

8. UPSC Mains Previous-Year Questions

1. **2022 – GS III:** Do you think India will meet 50 percent of its energy needs from renewable energy by 2030? Justify your answer. How will the shift of subsidies from fossil fuels to renewables help achieve this objective?
2. **2020 – GS III:** Describe the benefits of deriving electric energy from sunlight in contrast to conventional energy generation. What are the initiatives offered by our Government for this purpose?
3. **2018 – GS III:** Access to affordable, reliable, sustainable and modern energy is essential to achieve Sustainable Development Goals. Comment on India's progress in this regard.
4. **2016 – GS III:** Give an account of the current status and targets pertaining to renewable energy sources in India. Discuss the importance of the National Programme on Light Emitting Diodes (LEDs).
5. **2015 – GS III:** To what factors can the recent dramatic fall in equipment cost and tariff of solar energy be attributed? What implications does this trend have for thermal power producers and related industry?

Quad plans Indo-Pacific AI push; U.S. to assist in mineral recycling

In their third meeting this year, Foreign Ministers of India, Australia, Japan and the U.S. express intent to provide trusted AI access across Indo-Pacific; Jaishankar calls for deeper cooperation on energy security, counter-terrorism, maritime issues

Press Trust of India
WASHINGTON

Foreign Ministers of Quad grouping on Saturday expressed their intent to provide $85 million in technical assistance to expand access to trusted Artificial Intelligence across the Indo-Pacific even as the U.S. committed to provide $10 million for recycling critical minerals in India and ASEAN countries.

The Quad deliberations, hosted by U.S. Secretary of State Marco Rubio on the sidelines of the G20 Foreign Ministers' Meeting in Atlanta, U.S., were attended by External Affairs Minister S. Jaishankar, Australian Foreign Minister Penny Wong, and Japan's Foreign Minister Toshimitsu Motegi.

Participating in the Quad Foreign Ministers' Meeting, Mr. Jaishankar said he spoke about countering non-market practices and increased economic stresses in the Indo-Pacific region.



External Affairs Minister S. Jaishankar with Japan's Foreign Minister Toshimitsu Motegi, U.S. Secretary of State Marco Rubio and Australia's Foreign Minister Penny Wong in Atlanta, U.S., on Saturday. AFP

Mr. Jaishankar said he highlighted the importance of maintaining stability, driving prosperity and ensuring freedom of choice as continuing commitments in the Indo-Pacific.

The Minister also underscored taking forward agreements on counter-terrorism, maritime security and capacity building to enhance resilience and contribute to peace and stability.

In a joint statement, the Quad Ministers announced the first-ever Quad Business Leaders' Forum to foster greater ties across public and private sectors, including the promotion of commercial deals in key sectors.

The Ministers also said the second Quad-at-Sea Ship Observer mission was successfully undertaken from September 25 to October 7 with representatives from all four countries aboard an Indian Coast Guard Offshore Patrol Vessel.

This was the third Quad Foreign Ministers' Meeting held this year. Earlier, the Ministers met in New Delhi in May and in Manila in July.

Quad Leaders' Summit

Moves are underway to convene a Quad Leaders' Summit, hosted by U.S. President Donald Trump in mid-November.

In a joint statement issued after the meeting, the Ministers said they were looking forward to the Quad Leaders' Summit on the sidelines of the ASEAN-East Asia meetings in the Philippines in mid-November.

"I think hopefully when our leaders meet, in November, they will be able to announce some more concrete steps," Mr. Rubio said.



4. Quad: Strategic Cooperation in the Indo-Pacific

GS Paper II – International Relations | Regional Groupings and India's Foreign Policy

Context: The third Quad Foreign Ministers' Meeting of 2026 was held in Atlanta, USA, on 31 October, alongside the G20 Foreign Ministers' Meeting. India, Australia, Japan and the US discussed cooperation in Artificial Intelligence (AI), critical mineral recycling, maritime security and resilient supply chains to strengthen the Indo-Pacific.

1. Formation and Objectives

1. **Members:** India, Australia, Japan and the United States.
2. **Origin:** Cooperation began during the 2004 Indian Ocean tsunami relief operations; the first official meeting took place in 2007.

3. **Revival:** Revived in 2017 after a decade-long gap.
4. **Leaders' Summit:** Elevated to leaders' level in 2021.
5. **Nature:** An informal strategic partnership, not a formal military alliance or treaty-based organisation.
6. **Objective:** Promote a free, open, inclusive and rules-based Indo-Pacific.

2. Major Outcomes of the October 2026 Meeting

1. **Artificial Intelligence:** Expand access to trusted AI technologies across the Indo-Pacific through technical cooperation.
2. **Critical Mineral Recycling:** The US announced $10 million in assistance for recycling critical minerals in India and ASEAN countries.
3. **Maritime Security:** Strengthen maritime surveillance, freedom of navigation and regional security cooperation.
4. **Quad-at-Sea Mission:** Representatives from all four countries participated in a Coast Guard observer mission aboard an Indian Coast Guard offshore patrol vessel.
5. **Economic Security:** Promote resilient supply chains and address non-market economic practices.
6. **Counter-Terrorism:** Strengthen cooperation and regional capacity building.

3. Major Areas of Cooperation

1. **Maritime Security:** Protect sea lanes and improve Maritime Domain Awareness (MDA).
2. **Critical Minerals:** Diversify supply chains and promote recycling of strategic minerals.
3. **Technology:** Cooperate in AI, semiconductors, telecommunications and cybersecurity.
4. **Economic Resilience:** Strengthen supply chains and reduce external vulnerabilities.
5. **Humanitarian Assistance:** Coordinate disaster relief and emergency response.
6. **Regional Stability:** Address terrorism and other transnational threats.

4. Significance for India

1. **Strategic Balance:** Strengthens India's position amid geopolitical competition in the Indo-Pacific.
2. **Maritime Security:** Protects Indian interests in the Indian Ocean and vital sea routes.
3. **Technology Access:** Expands cooperation in AI, semiconductors and emerging technologies.
4. **Critical Minerals:** Diversifies sources and strengthens strategic supply chains.
5. **Strategic Autonomy:** Enables cooperation with major powers without joining a formal military alliance.
6. **Regional Leadership:** Strengthens India's role as a security and development partner in the Indo-Pacific.

5. Challenges

1. **Different Strategic Priorities:** Members may have different approaches towards regional and global issues.
2. **China Factor:** Perception of the Quad as an anti-China grouping may increase regional tensions.
3. **No Binding Treaty:** No collective defence commitment or permanent institutional structure.
4. **Implementation Gap:** Joint declarations need to translate into practical cooperation.
5. **ASEAN Concerns:** Quad cooperation must respect ASEAN centrality and promote an inclusive regional order.

6. Way Forward

1. **Practical Cooperation:** Strengthen joint initiatives in maritime security, AI and critical minerals.
2. **ASEAN Centrality:** Maintain an inclusive Indo-Pacific approach.
3. **Supply Chain Resilience:** Improve cooperation in strategic technologies and critical resources.
4. **Strategic Autonomy:** Preserve India's independent foreign-policy choices.
5. **Effective Implementation:** Convert diplomatic commitments into measurable regional outcomes.

7. UPSC Mains Previous-Year Questions

Q1. UPSC Mains 2026 – GS Paper II (10 Marks)

"IPMDA (Indo-Pacific Partnership for Maritime Domain Awareness) bridges the gap between India's SAGAR (Security and Growth for All in the Region) vision and the Quad's collective Indo-Pacific strategy."

Make a critical assessment of the statement focusing on IPMDA.

Q2. UPSC Mains 2021 – GS Paper II (15 Marks)

The newly tri-nation partnership AUKUS is aimed at countering China's ambitions in the Indo-Pacific region. Is it going to supersede the existing partnerships in the region? Discuss the strength and impact of AUKUS in the present scenario.

Q3. UPSC Mains 2020 – GS Paper II (15 Marks)

"Quadrilateral Security Dialogue (Quad) is transforming itself into a trade bloc from a military alliance in present times." Discuss.

Bhutan builds 108 stupas in 9 hours, dedicates Chorten no. 76 to Modi

Rahul Karmakar
GELEPHU (BHUTAN)

Bhutan King Jigme Khesar Namgyel Wangchuk on Sunday dedicated one of the 108 Buddhist stupas erected in a nine-hour construction feat to Prime Minister Narendra Modi as a mark of appreciation for India's support for the country's ambitious Gelephu Mindfulness City (GMC) project.

About 40,000 trained volunteers built the 108 Jangchub Chortens in what could be a potentially record-breaking royal initiative to lay the spiritual foundation of the planned city.

Spiritual City

About 240 km south-southeast of Bhutan's capital, Thimphu, Gelephu borders Assam's Chirang district. King Wangchuk envisions the city as a spirituality-driven global economic hub.



Bhutan dedicated Chorten no. 76 to Prime Minister Narendra Modi for India's support to the Gelephu project. RAHUL KARMAKAR

The King, other members of the royal family, top officials and foreign dignitaries faced Chorten Number 79 from the ceremonial ground as thousands of people around chanted a six-syllable Tibetan Buddhist mantra a billion times while the volunteers completed the mission between 3 a.m. and noon. About two hours later, the focus shifted to Chorten Number 76, which the King dedicated to Mr. Modi "as an enduring symbol" of his "profound appreciation" for the latter's "unwavering commitment and India's steadfast support for the realisation" of GMC. Bhutanese officials said the number was chosen because Mr. Modi turned 76 more than a month ago.

Parliamentary Affairs Minister Kiren Rijiju, who represented India for 'Project 108', thanked the King. "This remarkable milestone is an enduring symbol of the deep spiritual and civilisational bonds between our two nations," he said, congratulating Bhutan on the achievement.

Collective spirit

Each 15 metres tall and 108 metres apart, the Jangchub Chortens, or Buddhist stupas, stand in a single meandering file along the Mau Chhu River, Gelephu's lifeline.

Addressing the people after the completion of Project 108, King Wangchuk said: "People from every walk of life and every generation came together to make this possible," stressing the Bhutanese collective spirit and ability to achieve "anything impossible".

5. India's Development Partnership with Neighbouring Countries

GS Paper II – International Relations | Neighbourhood First Policy and Development Cooperation

Context: Bhutan completed the construction of 108 Buddhist stupas at Gelephu Mindfulness City, with around 40,000 volunteers participating. The King dedicated Stupa No. 76 to Prime Minister Narendra Modi in recognition of India's support for the Gelephu Mindfulness City project, highlighting India's role in Bhutan's development.

1. Gelephu Mindfulness City (Bhutan)

1. **Location:** Southern Bhutan, near the Indian border with Assam.

2. **Vision:** A sustainable economic and urban development hub based on ecological sustainability, well-being and economic growth.
3. **Economic Objective:** Attract investment, generate employment and reduce the migration of skilled Bhutanese youth.
4. **Development Areas:** Infrastructure, international airport, tourism, technology, finance, healthcare, education and green energy.
5. **India's Support:** Cooperation in connectivity, infrastructure, energy and economic development.

2. India's Development Partnership Model

India supports neighbouring countries through:

1. **Infrastructure:** Roads, bridges, railways, airports and public infrastructure.
2. **Energy Cooperation:** Hydropower, renewable energy and electricity connectivity.
3. **Healthcare and Education:** Hospitals, educational institutions, scholarships and medical assistance.
4. **Digital Connectivity:** Digital payments, telecommunications and technological cooperation.
5. **Capacity Building:** Training, technical assistance and institutional development.
6. **Financial Assistance:** Grants, Lines of Credit (LoC) and concessional financial support.

3. Important Indian-Supported Projects in Neighbouring Countries

1. **Bhutan – Mangdechhu Hydroelectric Project:** Hydropower development and electricity cooperation.
2. **Afghanistan – Restoration of Stor Palace:** Assistance in preserving cultural heritage.
3. **Sri Lanka – District Hospital at Dickoya:** Healthcare infrastructure benefiting local communities.
4. **Maldives – Institute of Security and Law Enforcement Studies:** Institutional and capacity-building assistance.

4. Significance for India

1. **Neighbourhood First Policy:** Strengthens diplomatic relations and regional cooperation.
2. **Regional Connectivity:** Improves cross-border transport, trade and economic integration.
3. **Strategic Influence:** Builds trust and strengthens India's position in South Asia.
4. **Economic Opportunities:** Expands trade, investment and access to regional markets.
5. **People-to-People Relations:** Strengthens cultural, educational and social ties.
6. **Regional Stability:** Supports economic development and institutional capacity in neighbouring countries.

5. Challenges

1. **Project Delays:** Land acquisition, administrative hurdles and implementation difficulties.
2. **Geopolitical Competition:** Strategic and economic competition from other external powers.
3. **Local Priorities:** Projects must reflect the needs and priorities of partner countries.
4. **Connectivity Constraints:** Difficult terrain and infrastructure gaps increase costs.
5. **Sustainability:** Projects require long-term financial and institutional support.

6. Way Forward

1. Prioritise demand-driven projects based on partner countries' development needs.
2. Improve timely implementation and project monitoring.
3. Expand regional connectivity, energy and digital infrastructure.
4. Promote local employment, skills and capacity building.
5. Strengthen cooperation while respecting the sovereignty of neighbouring countries.

7. UPSC Prelims PYQ – 2026

Question: Match the following Indian-supported projects with their respective countries.

List I – Project	List II – Country
A. Mangdechhu Hydroelectric Project	1. Maldives
B. Restoration of Stor Palace	2. Afghanistan
C. District Hospital at Dickoya	3. Bhutan
D. Institute of Security and Law Enforcement Studies	4. Sri Lanka

Select the correct matching:

(a) A-1, B-4, C-2, D-3
(b) A-3, B-2, C-4, D-1

(c) A-3, B-4, C-2, D-1
(d) A-1, B-2, C-4, D-3

Answer: (b) A-3, B-2, C-4, D-1

Navy to launch ₹80,000-cr. warship project

Saurabh Trivedi
NEW DELHI

The government has given a major push to the Indian Navy's next-generation destroyer programme amid the growing maritime security challenges posed by China and Pakistan, both of which are strengthening their own underwater warfare capabilities.

The Defence Acquisition Council (DAC), chaired by Defence Minister Rajnath Singh, had recently accorded in-principle approval to futuristic warships under Project 18A.

The delivery of the warships is expected to begin five to 10 years after the contract is signed, given the complexity and scale of the programme.

A senior Defence Ministry official confirmed the development. The proposed programme, estimated to cost around ₹80,000 crore, aims to develop a new generation of stealth-guided missile destroyers equipped with advanced weapons, sensors, and technologies, the official said.

The warships are expected to have nearly 75% indigenous content, with both defence public sector undertakings (DPSUs) and private sector companies eligible to participate in the competitive bidding process, the official added.

The programme assumes significance as China continues to expand its naval presence in the Indian Ocean Region and enhance its submarine fleet, while Pakistan is also strengthening its underwater warfare capabilities with the induction of advanced submarines.

The evolving security environment has underscored the need for India to strengthen its surface combat fleet and maintain a credible maritime deterrence across the Indian Ocean Region.



The next-generation destroyers are expected to substantially enhance multi-domain combat capabilities. REUTERS

Futuristic capabilities

Several existing destroyers of the Indian Navy are due for decommissioning in coming years, making the induction of advanced frontline surface combatants essential to maintaining the fleet's operational strength, the official added.

The futuristic destroyers, to be designed by the Navy's Warship Design Bureau, are expected to feature significantly more advanced systems than the Visakhapatnam-class destroyers.

These warships are likely to have enhanced firepower, sophisticated surveillance sensors, improved air defence systems, and advanced anti-submarine warfare capabilities, providing the Navy with greater operational flexibility against emerging maritime threats.

The Indian Navy currently operates around 12 or 13 relatively new guided-missile destroyers, which form the backbone of its surface combat fleet and provide capabilities across air defence, anti-surface warfare, and anti-submarine operations.

These include the Visakhapatnam-class, Kolkata-class, and Delhi-class destroyers.

The existing warships are equipped with an array of advanced weapon systems, including BrahMos supersonic cruise missiles, surface-to-air missiles, naval guns, close-in weapon systems, and anti-submarine warfare equipment.

The next-generation destroyers are expected to substantially enhance India's firepower, surveillance, and multi-domain combat capabilities.

6. Project 18A – Indian Navy's Next-Generation Destroyers

GS Paper III – Defence and Security | Indigenous Defence Manufacturing

Context: The Defence Acquisition Council (DAC), chaired by Defence Minister Rajnath Singh, has accorded in-principle approval to an approximately ₹80,000-crore programme to develop next-generation stealth-guided missile destroyers for the Indian Navy.

1. Project 18A: Key Facts

1. **Estimated cost:** ₹80,000 crore.

2. **Indigenous content:** Nearly 75%, involving Defence Public Sector Undertakings (DPSUs) and private industries.
3. **Design agency:** Indian Navy's Warship Design Bureau.
4. **Delivery:** Expected to begin 5–10 years after contract signing.
5. **Major technologies:** Stealth systems, guided missiles, advanced radar, surveillance sensors and anti-submarine warfare equipment.

2. Destroyers: Important Prelims Facts

Destroyer: A multi-role surface combatant warship designed for fleet protection and offensive and defensive naval operations.

Major capabilities:

1. Anti-surface warfare – attacks enemy ships.
2. Air defence – counters aircraft and incoming missiles.
3. Anti-submarine warfare – detects and engages submarines.
4. Maritime surveillance – monitors surrounding waters through radar and sensors.
5. Stealth technology – reduces radar detectability.

Indian Navy's major destroyer classes:

- Visakhapatnam-class
- Kolkata-class
- Delhi-class

BrahMos: Supersonic cruise missile capable of engaging naval and land-based targets.

3. Defence Technologies: Quick Revision

Term	Important fact
Radar Cross-Section (RCS)	Measures an object's detectability by radar; lower RCS means reduced detection.
Radar Absorbing Material (RAM)	Absorbs radar energy and reduces reflected signals.

Stealth Technology	Reduces detectability; does not make a platform invisible.
Drone Swarm	Multiple Unmanned Aerial Vehicles (UAVs) operating in coordination.
GPS Spoofing	Uses false positioning signals to mislead navigation systems.
Ballistic Missile Defence	Detects, tracks and attempts to intercept incoming ballistic missiles.
Interoperability	Ability of different equipment and agencies to work together.

4. UPSC Prelims 2026 – Defence-Related PYQs

1. Stealth Technology

- Stealth objects have a small Radar Cross-Section and may use Radar Absorbing Materials.
- They can still be detected using specific frequencies.
- Metamaterials are not used to increase electromagnetic scattering for stealth.

Answer: Statements 1 and 2 only.

2. Mission Sudarshan Chakra

- Announced on 15 August 2025.
- Aims to strengthen India's air defence, ballistic missile defence and aerial offensive capabilities.
- Envisages rapid, precise defence responses and a nationwide security shield covering public places by 2035.

Answer: All three statements.

3. Bomb Disposal Systems

- Bureau of Indian Standards (BIS) standard: IS 19445:2025.
- Aims to improve interoperability of bomb-disposal equipment across agencies.
- Developed by Terminal Ballistics Research Laboratory (TBRL), DRDO, in collaboration with a Russian research institute.

Answer: Statements 1 and 2 only.

4. Indigenous Defence Manufacturing

Which of the following are manufactured in India?

- Su-30 MKI fighter aircraft
- T-90 MK-III tanks
- Akula-class submarine

Answer: Su-30 MKI and T-90 MK-III only. Both are manufactured in India under licence; the Akula-class submarine is Russian-built.

5. Drone Swarms

- Terahertz band communication with the command centre is not their standard operational communication method.
- Individual drones can communicate with one another.
- GPS spoofing can be used as a countermeasure against drones.

Answer: Statements 2 and 3 only.

6. Indian Army Corps and Headquarters

Army Corps	Headquarters
3 Corps	Rangapahar (Dimapur)
4 Corps	Tezpur
14 Corps	Leh

15 Corps	Srinagar
33 Corps	Sukna

PYQ answer: 33 Corps – Srinagar is incorrectly matched; its headquarters is at Sukna.

A.P. braces for second cyclone within a week

Nellore Sravani
VIJAYAWADA

Barely a week after being battered by "very severe" Cyclone Arnab, Andhra Pradesh is bracing for Cyclone Murasu, expected to make landfall on Tuesday, with five districts put on red alert.

The weather system over the Bay of Bengal intensified into a cyclonic storm and was centred at around 350 km east of Chennai on Sunday night.

As per the India Meteorological Department (IMD), the storm, which is likely to bring heavy rainfall to several Tamil Nadu districts as well, is expected to move west-northwestward and intensify into a severe cyclonic storm by Monday morning.

Between Monday night and early hours of Tuesday, it is likely to cross into



The storm is likely to bring heavy rain to Tamil Nadu and Odisha as well. B. VELANKANNI RAJ

Andhra Pradesh Chief Minister N. Chandrababu Naidu, who cancelled his visit to Delhi, held a review meeting on Sunday and directed officials to step up preparedness to tackle the possible impact of the storm.

Odisha, which reported multiple landslides during Cyclone Arnab, is also bracing for the impact of Murasu, with authorities saying southern districts were likely to receive hea-

7. Cyclone Murasu – Bay of Bengal

GS Paper I – Geography | Tropical Cyclones

Context: Andhra Pradesh was placed on high alert for Cyclone Murasu, following Cyclone Arnab within a week.

1. Cyclone Murasu: Key Developments

1. **Formation:** Developed over the Bay of Bengal, approximately 350 km east of Chennai.
2. **Movement:** Expected to move west-northwestward towards the Andhra Pradesh coast.
3. **Expected impact:** Heavy rainfall in Andhra Pradesh, Tamil Nadu and Odisha, with wind gusts potentially reaching 120 km/h.
4. **Preparedness:** Five districts in Andhra Pradesh were placed on red alert, with authorities strengthening disaster-response measures.

2. Prelims Facts: Cyclone Naming

Cyclone	Country that contributed the name	Meaning
Arnab	Bangladesh	Ocean/sea (Bengali usage)
Murasu	India	Drum (Tamil)

1. **Naming authority:** World Meteorological Organization (WMO)/United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) Panel on Tropical Cyclones.
2. **Regional naming centre:** India Meteorological Department (IMD), New Delhi, is the Regional Specialised Meteorological Centre (RSMC) for the North Indian Ocean.
3. **Participating countries:** 13 countries, each contributing 13 names – a total of 169 names.
4. **Naming threshold:** A system is named when its maximum sustained wind speed reaches 34 knots (approximately 62 km/h).
5. **Purpose:** Standardised identification helps communicate warnings and avoid confusion.