



UPSC EXAM NOTES

PROBABLE TOPICS

Prelims 2022 revision

upsceexamnotes.com

Table of Contents

Zero Hour and Question Hour.....	6
Question hour	6
Three kinds of questions	6
Zero Hour	6
Parliamentary committees.....	6
Standing Committees and Ad hoc Committees	7
Kesavananda Bharati.....	7
Golaknath case (1967)	8
Minerva mills	8
Naga insurgency.....	8
Parliament sessions.....	9
Termination of session	9
Meetings of session.....	9
Removal of Rajya Sabha Deputy Chairman.....	9
Lok Adalat.....	10
Federalism and emerging challenges.....	11
Inter-state River water disputes	11
The Godavari basin	11
The Krishna basin	12
Rivers boards act 1956.....	12
The inter-state water disputes act 1956.....	12
Types of parties.....	12
Conditions for Recognized parties.....	12
National party	12
State Party.....	12
Loss of Recognised Status	13
Boundary disputes in Northeast	13
Assam- Mizoram shares a 165 km boundary.....	13
Assam –Nagaland - 500 Km boundary	13
Assam- Arunachal Pradesh 800 km boundary	13
Assam-Meghalaya 884 km boundary	14
In-House Procedure against Judges of the higher judiciary.....	14
Article 121	14

Article 211	14
Uniform Civil code (UCC).....	14
The Pardon powers	15
President's Rule	15
The freebies politics - Economic Perspective	16
Anti-Defection Law.....	16
History of Anti-defection Law	16
Rules for Disqualification	16
Exceptions:.....	17
Exemptions:	17
Supreme Court Verdict:	17
91st Constitutional amendment, 2003.....	17
Election of President	18
President of India	18
How does the Value of vote calculate.....	18
National language	18
Three Language Formula	19
Anti-Conversion Laws.....	19
The Status of Anti-Conversion Laws in India.....	19
Hijab row	20
Off Budget Borrowing	21
Bharat Gaurav Scheme.....	21
INSOLVENCY AND BANKRUPTCY	21
India Industrial Land Bank (IILB).....	23
Impacts of pandemic	24
Classification of MSME.....	25
Important points	28
Why do investors buy them?	29
Genome Sequencing	30
.....	35
About:	36
NASA rover 'Perseverance' captures eclipse involving Mars' satellite 'Phobos'	39
.....	41
2. Indian Research on Blue straggler	44

3. Importance of the Study.....	44
FIVE-STEP STRATEGY-.....	50
About Platform Capitalists.....	56
Data	56
• Recent findings on the most precise measurement of the W Boson mass ever made have stunned scientists, as it could potentially rewrite particle physics	57
Context.....	58
Key points	58
Context.....	59
About Gaganyaan Mission.....	60
.....	60
Key Points	60
Major collaborating partners	61
New technologies.....	61
Advantages of Gaganyaan's Mission	62
.....	63
Context.....	63
Key Points.....	63
Top producers of rare minerals	63
Measures	64
Introduction	64
AI Chips	64
Types of AI Chips.....	64
Different from Traditional Chips	65
Applications	65
What can be expected in the future?	65
India Hypertension Control Initiative (IHCI).....	66
Context.....	67
Key points	67
New spectrum for 3GHz	67
Evolving communication needs	68
Advanced R & D.....	68
DANDI.....	69
All about Dandi March	69

About Raja Rammohan Roy:	75
RRR Contributions.....	76
1. Introduction.....	77
2. Sheel Bhadra Yajee:.....	78
3. Chandraprabha	78
4. Laxman Nayak- The Gandhi of Malkangiri.....	78
5. Basanti Devi.....	79
6. MA IYENGAR	79
LAL BAHADUR SHASTRI	79
VEER CHANDRA SIGH GARHWALI	80
UTKALMANI GOPABANDHU DAS	80
ANNIE BESANT.....	80
MUNSHI PREMCHAND	80
LOKMANYA TILAK	81
Mahavir Jayanti.....	82
Anekantavada.....	83
Religious importance	84
Key Findings	85
About Basavanna	86
.....	87
Archaeology references vs. Literature references.....	87
Travellers Insight	87
The Dynasties.....	88
Mahavihara as a University.....	88

Probable Topics for Prelims 2022

Polity

Zero Hour and Question Hour

Question hour

The first hour of every parliamentary sitting, in 2014 was shifted in the Rajya Sabha from 11 am to 12 noon.

Presiding officers of both houses are the **final authority** for the conduct of question hour.

Three kinds of questions

Starred: It requires oral answers and the supplementary question can follow.

Unstarred question

Written answers and supplementary questions cannot follow.

Short notice question

It is asked for notice of fewer than ten days, and it is answered orally.

President address and budget presentation are the exemptions

Zero Hour

It is parliamentary innovation. MPs can raise matters without any prior notice.

It starts immediately after the question hour and lasts until the agenda for the day.

Parliamentary committees

The constitution of India makes mentions these committees in different places.

Without making any specific provisions regarding their composition, tenure, functions, etc.

24 Departmental Standing Committees, 8 for Rajya Sabha and 16 for Lok Sabha

Each standing committee consists of 31 members 21 from Lok Sabha and 10 From Rajya Sabha. A minister is not eligible.

Standing Committees and Ad hoc Committees

Standing Committees: permanent and work continuously.

Financial committees

Departmental Standing Committees (24)

Committees to inquire

Committees to Scrutinise and control

Committees relating to the day-to-day business of the house

House-keeping Committees or service committees

Ad hoc Committees; are temporary and cease to exist on completion of the task assigned

Inquiry committee and Advisory Committee

Examples Joint Committee on Bofors Contract, Joint Committee on Fertilizer Pricing etc.

Kesavananda Bharati

He Challenged the Kerala land reforms legislation in 1970 under Article 26.

A 13- judge bench was set up by the Supreme Court.

Court says that the Parliament had the power to amend any part of the constitution including Fundamental rights but did not change the basic structure.

Court declared that article 31 C of the constitution is unconstitutional and invalid.

Parliamentary democracy, fundamental rights, judicial review, and secularism are the basic structure.



Golaknath case (1967)

Supreme Court held that Parliament could not amend Fundamental Rights and power to amend the constitution.

Court held that an amendment under Article 368 is law within the meaning of Article 13 of the constitution.

The government enacted major amendments to the constitution

24TH constitutional Amendment act 1971 parliament itself the power to amend any part of the constitution

25TH constitutional amendment act 1972 the right to property had been removed as a fundamental right.

Minerva mills

42ND amendment was challenged before Supreme Court.

The owners of Minerva mills a sick industrial firm in Bangalore were nationalised by the government in 1974.

The basic structure was reaffirmed in the Minerva mills and later in the waman Rao case in 1981.

Naga insurgency

The Naga Hills were part of British India in 1881.

Naga club rejected the Simon commission in 1929 and declared them independent state on 14th August 1947.

They conducted a referendum in 1951 and claimed that 99.9 per cent of the Nagas supported a sovereign Nagaland.

The government of India sent Army to crush the insurgency and enacted the Armed Forces Special Powers Act in 1958.

The incumbent government and the National Socialist Council of Nagalim (Isak-Muivah) signed a Naga peace accord in August 2015.

They demanded Naga National Flag and Naga Yezhabo (constitution).

Parliament sessions

The president of India is empowered to summon each house of parliament.

The maximum gap between the two sessions cannot be more than six months.

The parliament should meet at least twice a year.

Three sessions in a year

Budget session (February to May)

Monsoon session (July to September)

Winter Session (November to December)

The period between the prorogation of a house and its reassembly in a new session is called a recess.

Termination of session

Adjournment;

It suspends the work in a sitting for a specified time may be hours, days or weeks.

Adjournment sine die; means terminating a sitting of parliament for an indefinite period

The power of adjournment, as well as adjournment sine die, lies with the presiding officer

Prorogation; The president issues notification for the prorogation of the session after the business of a session is completed and the presiding officer declares the house adjourned sine die.

Dissolution; only the Lok Sabha is subject to dissolution.

Rajya Sabha is a permanent house and not subject to dissolution

The president is empowered to dissolve the Lok Sabha

Meetings of session

Each meeting of a day consists of two sittings a morning from 11 am to 1 pm and post-lunch sitting from 2 pm to 6 pm for Lok Sabha and 2 pm to 5 pm for Rajya Sabha.

Removal of Rajya Sabha Deputy Chairman

Article 90 of the constitution, the deputy chairman vacates his office,

If he ceases to be a member of the Rajya Sabha

If he resigns by writing to the chairman

If he is removed by a resolution passed by majority members of the Rajya Sabha, such a resolution can be moved only after giving 14 days' advance notice.

Lok Adalat

It is based on the Gandhian principles and alternative dispute resolution system and delivers informal, cheap and expeditious justice to the common people.

It was given statutory status under the legal services authorities' act 1987.

It can be organised by state or district legal services authority or the Supreme Court or high courts or Taluka legal services committee.

It consists of serving or retired judicial officers and a lawyer and a social worker as members.

The legal services authorities' act 1987 was amended in 2002 to provide for the establishment of the permanent Lok Adalat to deal with public utility services.

Many states are exploring the possibilities of passing legislation under article 254 (2)

It enables a state government s to pass a law on the subject in the concurrent list and needs the president's assent.

Rajasthan government changes the central labour laws of the factories act and the industrial disputes act and the contract labour act but it failed due to parliament is not barred.

Article 246 is the distribution of legislative powers between the union and states.

The seventh schedule of the constitution has three lists

Union list includes the matters of national importance; it contains 98 subjects (originally 97) like defence, banking foreign affairs etc.

The state list includes the matters of regional and local legislature and exclusive powers. It has 59 subjects (originally 66) like public order, police, public health and sanitation, agriculture etc.

The concurrent list

Both the parliament and state legislature can make laws.

It has 52 subjects (originally 47) like criminal law and procedure, civil procedure, marriage and divorce, electricity etc.

42ND amendment act of 1976 transferred five subjects to concurrent list from state list i.e. education, forests, weights and measures, protection of wild animals and birds and administration of justice, constitution and organisation of all courts except supreme court and the high courts.

Residuary powers are not enumerated in any of the three lists and vested in the parliament

Federalism and emerging challenges

As per **the GST Act**, states are guaranteed compensation for the revenue shortfall below 14 per cent growth for the first five years.

The lower revenues are the result of an '**act of God**' and the centre is not responsible for it.

Farm laws act allows farmers to sell their produce outside the Agricultural produce market committee and aim to promote inter-state trade. Even though agriculture and markets are state subject

Bringing **cooperative banks** under the Reserve bank of India's supervision, cooperative societies come under the state list.

It requires a proper balance between the pillars of federalism i.e. autonomy of states, national integration, centralisation, decentralisation, nationalisation and regionalisation.

Inter-state River water disputes

Krishna and Godavari are autonomous bodies established as per the Andhra Pradesh reorganisation act 2014.

It regulates the waters of the Krishna and Godavari basin respectively in the states of Andhra Pradesh and Telangana.

The Godavari basin

It is the largest Peninsular River, it rises from Nasik. It has a total length of about 1500 km.

Its drainage basin comprises parts of Maharashtra, Madhya Pradesh, Orissa, Andhra Pradesh and Telangana.

Tributaries: - The Purna, the Wardha, the Penganga, and the Wainganga.

It is also known as Dakshin Ganga.

The Krishna basin

Rising from Mahabaleshwar flows 1400 km through Maharashtra, Karnataka, Telangana and Andhra Pradesh.

Tributaries: - The Tungabhadra, the Konya, the Ghatprabha, the Musi and the Bhima

Article 262 of the constitution provides adjudication of inter-state water disputes

Rivers boards act 1956

River boards were established by the central government for the regulation and development of Inter-state Rivers and river valleys on the advice of state governments

The inter-state water disputes act 1956

It empowers the central government to set up a tribunal for the water disputes of an inter-state or river valley. The Tribunal decision is final and binding.

Neither Supreme Court nor any other court is to have jurisdiction in respect of any water dispute referred to such a tribunal under this act.

Types of parties

It is mentioned under the Election Symbols (Reservation and allotment) order, 1968.

Conditions for Recognized parties

National party

6 Per cent valid votes polled in any four or more states at the general election to Lok Sabha or the state legislative assembly and in addition it wins four seats in the Lok Sabha from any state.

2 per cent of all Lok Sabha seats in the last such election, with MPs, elected from at least three states

Recognition as a state party in at least four states

State Party

Two seats plus a 6 per cent vote share in the last assembly election in that state.

One seat plus a 6 per cent vote share in the last Lok Sabha election from that state.

3 per cent of the total assembly seats or 3 seats, whichever is more

One of every 25 Lok Sabha seats or an equivalent fraction from a state

An 8 per cent state-wide vote share in either the last Lok Sabha or the last Assembly polls.

Loss of Recognised Status

Any political party loses its given status only if it fails to fulfil any of the conditions for two successive assemblies and Lok Sabha elections.

Boundary disputes in Northeast

Assam- Mizoram shares a 165 km boundary.

The dispute stems from an 1875 notification that differentiated Lushai Hills from the plains of Cachar and 1933 demarcates a boundary between Lushai Hills and Manipur.

Mizoram believes the boundary should be demarcated based on the 1875 notification.

According to an agreement between the governments of Assam and Mizoram that no man's land in the border area

Assam –Nagaland - 500 Km boundary

Violent clashes and armed conflicts occurred since 1965

The dispute is in the Supreme Court.

Assam- Arunachal Pradesh 800 km boundary

Clashes since 1992 several accusations of illegal encroachment from both sides and intermittent clashes and issue are in Supreme Court.

Assam-Meghalaya 884 km boundary

Meghalaya's existence as an autonomous state in 1970 and there are 12 areas of dispute between the two states.

In-House Procedure against Judges of the higher judiciary

Judges of the High courts and Supreme Court can be removed by the process of impeachment.

Article 121

No discussions shall take place in parliament concerning the conduct of any judge of the Supreme Court or High Court except upon a motion for the removal of the Judge.

Article 211

No discussion shall take place in the legislature of the state concerning the conduct of any judge of the Supreme Court or High Court in the discharge of his duties.

AP CM has made the allegations publicly; such an act may invite action for contempt of court.

Uniform Civil code (UCC)

Article 44 of the constitution states about the UCC

The formulation of one law for India applicable to all religious communities of marriage, divorce, inheritance and adoption

The British government 1835 report for UCC relating to crimes evidence and contracts etc

Implications

Protection to the vulnerable sections of the society, simplification of laws, gender justice and adhering to the ideal of secularism

Exceptions

This act is not implemented in the Goa, Pondicherry and Daman and Diu.

Article 371A and 371G state that no parliamentary legislation will replace the customary law and religion of the Mizoram and Nagaland states

Article 25 of the constitution seeks to preserve the freedom to practise and propagate any religion gets conflict with the Article 14 right to equality.

The Pardon powers

- Both the President and the Governor have been vested with the sovereign power of pardon by the constitution, commonly referred to as mercy or clemency power.
- **Under Article 72**, the President can grant pardons, reprieves, respites or remissions of punishment or suspend, remit or commute the sentence of any person convicted of any offence in all cases.
- Here, the punishment or sentence is a court-martial. In all cases, the punishment or sentence is for an offence under any law relating to the Union government's executive power and in all cases of death sentences.
- It is also made clear that the president's power will not in any way affect a Governor's power to commute a death sentence.
- **Under Article 161**, a Governor can grant pardons, reprieves, respites or remissions of punishment or suspend remit or commute the sentence of any convicted under any law on a matter which comes under the state's executive power.

President's Rule

- It implies the **suspension of a state government** and the **imposition of direct rule of the Centre**. It is also known as 'State Emergency' or 'Constitutional Emergency'.
- The SC in **Bommai case 1994** enlisted the situations where the exercise of power under Article 356 could be used.
 - One such situation is that of hung assembly i.e. where after general elections to the assembly, no party secures a majority.
- The President's rule is imposed through the invocation of **Article 356** of the Constitution **by the President on the advice of the Union Council of Ministers** (executive).
 - If the President, upon **receipt of the report from the Governor of the State** or otherwise, is satisfied that a situation has arisen in which the government of the State cannot be carried on in accordance with the provisions of the Constitution.
- **Parliamentary Approval and Duration:**
 - A proclamation imposing President's Rule **must be approved by both the Houses of Parliament within two months** from the date of its issue.
 - The approval **takes place through simple majority** in either House, that is, a majority of the members of the House present and voting.

- **Initially valid for six months**, the President's Rule can be **extended for a maximum period of three years** with the approval of the Parliament, every six months.

The freebies politics - Economic Perspective

- Freebies will put an additional burden on the exchequer; political parties have been competing with each other in the run-up to elections by announcing a string of freebies to woo the voters.
- The culture of freebies was started by late Tamil Nadu Chief Minister, J Jayalalitha, promising free sarees, pressure cookers, washing machines, television sets etc., It was quickly followed by other political parties.
- Aam Aadmi Party took the lead, sweeping the Delhi Assembly Elections in 2015, by promising free electricity, water and bus travel to the voters of Delhi.
- In 2019, when the Modi government announced a Rs 6,000 gift to all farmers in India, it was hailed as a political masterstroke.
- In the 2021 Kerala Assembly elections. Two years after being routed in the Lok Sabha polls, the ruling Left Democratic Front is said to have got elected for a second straight term with a thumping majority, promising subsidised rice and food kits.
- The pronouncements made by state governments like Punjab, Delhi, Telangana, Andhra Pradesh and West Bengal are unsustainable.
- Aid to the poor is seen as a wasteful expenditure. But low-interest rates for corporates to get cheap loans or the sop of cutting corporate taxes are never criticised.
- The utter failure of our economic policies to create a decent livelihood for a vast majority of Indians.
- If anything, both the RBI-KLEMS estimates for employment since 1981 and the employment surveys done by the Centre for Monitoring India's Economy (CMIE) since 2016 have shown that employment growth initially slowed down from the 1990s.
- Then has turned negative over the past few years. It is obvious that if people don't earn enough to get two square meals a day, they will be unlikely to vote governments back into power.

Several political parties are providing free electricity, putting a strain on the state budget.

Anti-Defection Law

Context: Vice President M.Venkaiah Naidu said there was a need to amend anti-defection legislation in the country to plug existing loopholes

History of Anti-defection Law

Rajiv Gandhi's government introduced a ban on Defection through the **52nd Amendment act**. The act aims to prohibit undemocratic, unethical and unprincipled political defection by the members of the legislature, by the innovation of an instrument of disqualification

Rules for Disqualification

A Member of Parliament or state legislature belonging to any political party is disqualified from being a member of that house if

- He/she voluntarily gives up membership of that political party
- An independent member joins a political party if they join after the election results
- A nominated member joins a political party after 6 months
- A member does not act according to the whip issued by His/her Party

There are certain exemptions and Exceptions to these rules

Exceptions:

- If 1/3rd of members of a political party resign from their political party & form a splinter group
- If 2/3rd members of a political party resign from their party and merge with another party

Exemptions:

- Speaker & Deputy Speaker of Lok Sabha, deputy chairman of Rajya Sabha
- Speaker & Deputy Speaker of Legislative Council, Chairman & Deputy Chairman of Legislative Assembly

On the Subjects of Disqualification decision of the Speaker of chairman/speaker of the house shall be final

No court will have jurisdiction under this act with respect to members of the House

Supreme Court Verdict:

- Decision of the presiding officer of the house shall be final
- Decisions of the presiding officer of the legislature are open to judicial review
- In 1992, the court further upheld the whip issued by a political party on its members only in case of **Confidence motion, No-confidence Motion, Money bills and vote of thanks to President, Governors**

91st Constitutional amendment, 2003

- Council of Minister's size is to max 15% of the lower house in Centre as well as at states- smaller states like Mizoram can have a minimum of 12
- Bill seeks to debar a defector from holding any remunerative political post for the remaining tenure of the legislature or unless re-elected

Election of President

President of India

About:

The President of India is the head of the state; he/she is the first citizen of India. The president is the formal head of the executive, legislature and judiciary of India and is also a commander in chief of the Indian Armed forces

Article 54 of the Indian Constitution deals with the election of the President of India

President shall be elected with the electoral college of the following

1. **elected members of both houses of parliament**
2. **elected members of the Legislative assembly of the states which includes union territories Delhi and Pondicherry**

The number of electors will be 4,896-543 Lok Sabha MP's, 203 Rajya Sabha MP's and 4,120 MLA's of state Legislature including Delhi and Pondicherry

How does the Value of vote calculate

- Vote Cast by each MP, MLA does not count as one vote, there is a larger value attached to it
- The fixed vote value of MP of Rajya Sabha and Lok Sabha is 708, the vote value of MLAs differs from state to state
- The value of MLA vote is calculated by dividing the state population by the number of MLAs in the state legislative assembly and the quotient is achieved is further divided by 1000 -The vote value of MLA
- Vote value of MLA differs from state to state, for instance, Uttar Pradesh MLA vote value is 208 which is the highest, Maharashtra's vote value is 175 and Arunachal Pradesh's MLA is just 8
- Based on this the total value of all MP's vote value will be 5, 59,408 (776MP X 708) and the total value of all MLA's would be 5, 49,495.
- The total value of the whole electoral college comes to 10,98,903

National language

Eighth Schedule

Eight Schedules contains a list of languages in the country.

There were 14 languages in the schedule, but now there are 22 languages.

Article 344(1) provides for the formation of a Commission by the President.

Which should have a Chairman and members representing these scheduled languages?

Its recommendations for the progressive use of Hindi for Official purposes of the Union and for restricting the use of English

Article 351, says the Union government must promote the spread of Hindi so that it becomes

"a medium of expression for all elements of the composite culture of India".

It also assimilates elements of forms and expressions from Hindustani and languages listed in the Eighth Schedule.

Three Language Formula

- The Centre's education policy documents speak of teaching three languages- Hindi, English and one regional language in the Hindi-Speaking States and Hindi, English and the Official regional language in other states.
- In states where Hindi is the official language, a third language is rarely taught as a compulsory subject.
- Tamil Nadu has been steadfastly opposing the three-language formula and sticks to teaching Tamil and English.

Anti-Conversion Laws

The Haryana government released the draft of the **Haryana Prevention of Unlawful Conversion of Religious Bill, 2022**.

- It aims at prohibiting religious conversions which are affected through misrepresentation, force, undue influence, coercion, allurement or by any fraudulent means or by marriage or for marriage by making it an offence.
- The Other States such as Karnataka, Arunachal Pradesh, Chhattisgarh, Gujarat, Himachal Pradesh, Jharkhand, Madhya Pradesh, Odisha, Uttar Pradesh and Uttarakhand have also passed laws restricting religious conversion.

The Status of Anti-Conversion Laws in India

Constitutional Provision:

The Indian Constitution under **Article 25** guarantees the freedom to profess, propagate, and practise religion, and allows all religious sections to manage their affairs in matters of religion; subject to public order, morality, and health.

However, **no person shall force their religious beliefs and** consequently, no person should be forced to practice any religion against their wishes.

Existing Laws:

- There has been **no central legislation** restricting or regulating religious conversions.
- However, since 1954, on multiple occasions, Private member bills have been introduced in (**but never approved by**) the **Parliament**, to regulate religious conversions.
- Further, in 2015, the Union Law Ministry stated that parliament **does not have the legislative competence** to pass anti-conversion legislation.
- Over the years, **several states have enacted 'Freedom of Religion' legislation** to restrict religious conversions carried out by force, fraud, or inducements.

Hijab row

- The implications of this are:
 - **Freedom of conscience:** Inner freedom of an individual to mould his relation with God or Creatures in whatever way he desires.
 - **Right to Profess** Declaration of one's religious beliefs and faith openly and freely.
 - **Right to Practice:** Performance of religious worship, rituals, ceremonies and exhibition of beliefs and ideas.
 - **Right to Propagate:** Transmission and dissemination of one's religious beliefs to others or exposition of the tenets of one's religion.
- In 1954, the SC held in the *Shirur Mutt* case that the term "**religion**" will cover all rituals and practises "**integral**" to a religion. The test to determine what is integral is termed the "essential religious practises" test.
- The test, a **judicial determination of religious practises**, has often been criticised by legal experts as it pushes the court to delve into theological spaces.
- In several instances, **the court has applied the test to keep certain practices out.**
 - In a 2004 ruling, the SC held that the Ananda Marga sect had no fundamental right to perform the Tandava dance on public streets
- While these issues are **largely understood to be community-based**, there are instances in which **the court has applied the test to individual freedoms as well.**
 - For example, in 2016, the SC **upheld the discharge of a Muslim airman from the Indian Air Force for keeping a beard.**
 - **Armed Force Regulations, 1964**, prohibits the growth of hair by Armed Forces personnel, except for "personnel whose religion prohibits the cutting of hair or shaving of face".

The court essentially held that **keeping a beard was not an essential part of Islamic practice.**

Economy

Off Budget Borrowing

Borrowing is a loan which falls under capital receipt in the Union budget documents

The government borrows through securities which are called Treasury Bills and G-secs

G-Sec is a tradable instrument issued by the Central Government or State Government

Off budget borrowing:

All governments want to limit their fiscal deficit and off-budget borrowing is one of the ways

It is a process by which the Central government finances its expenditures while keeping the debt off the books

The central government will not make loans directly but from any public institution with the directions of the central government

Since the loan is not taken by the central government liability will not be on it and it will not be added to the national fiscal deficit

Bharat Gaurav Scheme

Theme based circuit trains are run under this scheme, on the lines of the Ramayana express

They can be run either by Private or Public Operators

They will offer all-inclusive programs to tourists with train travel, sightseeing, and hotel accommodation

Bharat Gaurav Scheme is under the Ministry of Railways

INSOLVENCY AND BANKRUPTCY

Why in the News?

Implementation of the Insolvency and Bankruptcy Code is facing at the adjudicatory level.

1. Background

- The term insolvency is used for individuals, partnerships or companies.
- While insolvency is a situation where a customer's inability to pay off the debts.
- Bankruptcy is a situation wherein an application is made to an authority declaring insolvency and seeking to be declared bankrupt.

2. About insolvency and bankruptcy code 2016 (IBC)

- This code was introduced for the liquidation of assets of the company after its inability to pay the debt and to overcome the challenges of the earlier SARFAESI Act.
- The process of liquidation can be initiated by either the debtor or the creditors.
- The Code establishes the Insolvency and Bankruptcy Board of India, to oversee the insolvency proceedings in the country.

3. Resolution under IBC

- When a company is unable to repay its debt.
- Then the company's account is declared as a Non-performing Asset by the bank.
- Now the insolvency process can be initiated by either the debtor or the creditors by approaching the National Company Law Tribunal.
- The National Company Law Tribunal grants a moratorium and an insolvency professional starts the liquidation plan for the company.
- The Resolution plan so made should be approved by the majority of creditors by voting.
- An insolvency professional will liquidate the assets of the company and recover the dues.

4. Appeal Structure Of Insolvency and Bankruptcy

About National Company Law Tribunal-NCLT

The Central Government has constituted National Company Law Tribunal (NCLT) under section 408 of the Companies Act, 2013 (18 of 2013) w.e.f. 01st June 2016.

In the first phase, the Ministry of Corporate Affairs has set up eleven Benches, one Principal Bench in New Delhi and ten Benches in New Delhi, Ahmadabad, Allahabad, Bengaluru, Chandigarh, Chennai, Guwahati, Hyderabad, Kolkata and Mumbai.

5. Limitations under IBC-2016

- Insolvency and Bankruptcy Code 2016 is not applicable in the case of the wilful defaulter. Insolvency and Bankruptcy Code 2016 is not applicable for incapable defaulters (A borrower whose loan account is NPA for more than a year).

6. Wilful defaulter.

- According to the Reserve Bank of India a wilful defaulter is an entity (legal/natural) that has not repaid the loan amount despite its financial ability to repay it.

6.1. Classification of wilful defaulter by RBI

- The unit has defaulted in meeting its payment/repayment obligations to the lender even when it can honour the said obligations.
- The unit has defaulted in meeting its payment/repayment obligations to the lender and has not utilized the finance from the lender for the specific purposes for which finance was availed but has diverted the funds for other purposes.
- The unit has defaulted in meeting its payment/repayment obligations to the lender and has siphoned off the funds so that the funds have not been utilized for the specific purpose for which finance was availed of, nor are the funds available with the unit in the form of other assets.
- The unit has defaulted in meeting its payment/repayment obligations to the lender and has also disposed of or removed the movable fixed assets or immovable property given to secure a term loan without the knowledge of the bank/lender.

7. View of Supreme Court

- The Supreme Court upheld the government's move to allow lenders to initiate insolvency proceedings against personal guarantors (One who has provided surety of the loan taken by the lender).
- the apex court decides to boost banks' recovery efforts regarding bad loans
- This clause has left no escape clause for personal guarantors.

E-RUPI

- It is a digital payment system which is contactless
- It is based on QR code and SMS string-based vouchers which receive on the mobile of beneficiaries
- e-RUPI has been developed by the National Payments Corporation of India (NPCI), National Health Authority, Department of financial services, Ministry of Health and Family welfare
- The beneficiary can redeem the voucher without a card, digital payment app, or Internet banking access at the service provider

India Industrial Land Bank (IILB)

- It is a one-stop for all Industrial related information
- It helps all the investors who are looking for the land in remote places
- It is a GIS-based portal with all the industrial related information like connectivity, infra, natural resources and terrain, plot-level information on vacant plots, line of activity, and contact details
- IILB is under the **Department for Promotion of Industry and Internal Trade (DPI)**

Micro, small, and Medium Enterprises (MSME)

MSMEs are very important in achieving the overall objectives of economic development. This sector is a significant contributor to the following

1. Industrial Output
2. Employment generation
3. Share in the Gross domestic product (GDP)

The COVID-19 pandemic made MSME sector much more vulnerable, this sector is still struggling to survive and recover from pandemic induced shocks

Impacts of pandemic

A recent survey in National Capital Region (NCR) showed the following facts

- Turnover of 90% of small firms have been declined
- Around 53% of firms faced more than a 50% decline in their turnover
- 29% of firms report a collapse in their business
- 53% observed a decrease in demand while 36% faced an erratic supply of raw materials

Reasons for this fall in turnover are:

1. Restrictions in the economic activities and mobilities
2. Decrease in demand
3. Shortage of raw materials
4. Restrictions on trade
5. Slow recovery of markets
6. Slow payment and labour shortage

Not all the factors have suffered from the COVID-19 pandemic, there is 10% of the sectors had a rise in their turnover or reported no change.

The key firms in this sector operated in health activities, Pharma industries, and medicinal, chemical and botanical products

To make the MSME sector resilient, there should be a provision from the beginning like a public provident fund

Owners of these sectors reported that they have used E-commerce platforms and some have shifted to other platforms like making sanitizers, masks etc.

Entrepreneurs from Other backward castes own nearly 30% of MSMEs in the Country

Maharashtra tops India's list of micro, small, and medium enterprises (MSME)

Classification of MSME

Size of the Enterprise	Investment and Turnover
Micro	Investment less than 1 crore Turnover is up to 5 crore
Small	Investment less than 10 crore Turnover up to 50 crore
Medium	Investment less than 20 crore Turnover up to 100 crore

Inflation

RBI, the central bank of India is mandated to control (Stabilize) the prices in the Country

- **Inflation is the rate at which the value of a currency is falling and, consequently, the general level of prices for goods and services is rising.**
- Inflation is **sometimes** classified into three types: **Demand-Pull inflation, Cost-Push inflation, and Built-In inflation.**
- The most commonly used inflation indexes are the **Consumer Price Index (CPI) and the Wholesale Price Index (WPI).**
- Inflation can be viewed **positively or negatively** depending on the individual viewpoint and rate of change.
- Those with tangible assets, **like property or stocked commodities, may like to see some inflation as that raises the value of their assets.**

Consumer Food Price Index:

The Central Statistics Office (CSO) launches Consumer Food Price Index constructing index from 2014 onwards

There are two indices for measuring food inflation

1. **Food Price Index**- Calculates food prices that come under the WPI
2. **Consumer Food Price Index**

Consumer Food Price Index is a measure of change in retail prices of food items consumed by the Population

Under CSO's CFPI, the index gives food price level changes for rural, urban and all of India

The base year used to calculate CFPI is 2012

CFPI is based on retail price quotations as in the case of CPI, whereas the food index of WPI is obtained from wholesale price quotations

Open Network for Digital Commerce (ONDC)

The Open Network for Digital Commerce is an initiative of the government to promote an open platform for all aspects of the exchange of goods and services through an electronic network

ONDC is a network based on open control and will enable local commerce across segments such as mobility, grocer, food order and delivery, hotel booking and travel, among others, to be discovered and engaged by any network-enabled application

- It is an initiative of the Department for Promotion of Industry and Internal Trade (DPI) under the Ministry of Commerce
- This platform creates new opportunities, curbs digital monopolies and by supporting micro, small and medium enterprises and small traders help them get on online platforms
- Through this platform consumers can potentially discover any Product, seller, Product or Service by using any ONDC Compatible application or platform, thus increasing the freedom of choice of consumers
- ONDC was incorporated as a private entity, a non-profit company on December 31, 2021

Green Tax

Union Minister for Road Transport and Highways has proposed the following

1. Transport vehicles which are older than 8 years will be charged Green Tax at the time of renewal of fitness certificate, at the rate of 10-25% of road tax
2. Personal vehicles will be charged green tax at the time of renewal of Registration Certificate after 15 years
3. Public transport vehicles such as buses will be charged less green tax
4. Higher green charges(50% of Road tax) will be levied on the vehicles which are in heavily polluted cities
5. Different taxes will be levied depending upon the type of vehicle (Petrol/Diesel)
6. Vehicles like a strong hybrid, electric, and CNG are exempted
7. Vehicles used in farming such as tractors are exempted
8. Revenue collected via green tax will be kept under a separate account and used for tackling pollution and for states to set up state of art facilities for emission monitoring

Benefits of Green Tax

- To discourage people from using vehicles which are harmful to the environment
- To motivate people to switch over to less polluting vehicles
- Green tax will reduce pollution and make the polluter pay

Sovereign right to taxation

Context: The government of India withdrew the retrospective taxation amendment in the I-T act introduced in March 2012

The sovereign right of taxation

India's constitution gives the right to levy taxes on individuals and organizations but makes it clear that no one else has the right to levy or charge taxes except by the authority of law

Any tax being charged has to be backed by the law passed by the legislature or Parliament

Retrospective tax is imposed on a transaction or a deal that was conducted in the past

Was introduced a 2as 012 amendment to the Finance Act

This tax enables as imposition of tax on things which were executed before 1962 which involves transfer of shares in a foreign entity which had assets in India

K-Shaped Recovery

A K shaped recovery divides the economy into two, with divisions based on wealth, geographic, and industrial characteristics

It is called K-shaped recovery because at its most basic, one portion of the economy is bouncing back and increasing in value, and others continue to suffer the effects of the recession

A K-shape recovery happens when different sectors recover at different rates (COVID Pandemic)

- When one sector rebounds from recession and another sector continue to decline
- K-recovery is possible when the creative destruction of old industries due to the development of new industries and technologies during the recession

Government strategies like monetary and fiscal policies used to combat the recession can lead to a K-shaped recovery

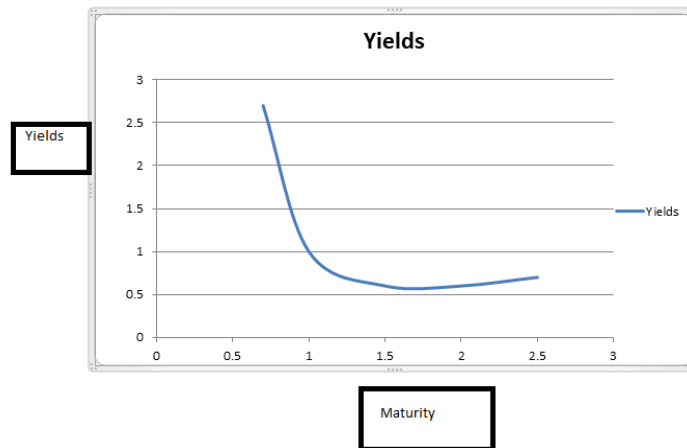
Other shaped recoveries

L-shaped	An enormous recession which takes one year to recover
U-shaped	A sharp decline follow by a time where economy sitting at a low point, before finally recovering
W-shaped (double dip)	When economy hits rock bottom followed by a temporary increase and finishing with another decline
V-shaped	When there is a sharp decline followed by a quick recovery

Yield Curve Inversion

What is the Yield curve?

The yield curve graphically represents yields on similar bonds across a variety of maturities. It is also known as the term structure of interest rates



It is a line that plots yields (interest rates) of bonds having equal credit quality but different maturity lines. The slope on the curve gives the idea of future interest rates and economic activity

Two yield curve signals a spread between two maturities

Important points

- Yield curve graphically represents yields on similar bonds across a variety of maturities
- An inverted yield curve occurs when short term debt instruments have higher yields than long term instruments of the same credit risk profile
- **An inverted yield curve reflects bond investors' expectations for a decline in longer-term interest rates, typically associated with recessions**
- Market Participants and economists use a variety of yield spreads as a proxy for the yield curve

NARCL and IDRCL

Context:

Banks Miss 50k-cr Bad loan transfer deadline to NARCL, The March 31st deadline was set by The State Bank of India within which Banks have to Transfer 50,000 Crore of Bad Loans to the National Asset Reconstruction Company Limited (NARCL).

A Total of 38 Non-performing accounts amounting to 82,845 crores which were have been identified to transfer in a Phased Manner. In Phase-I about 15 Accounts total 50,335crores.

About National Asset Reconstruction Company Limited (NARCL):

NARCL has been incorporated under the Companies Act. It's a bad bank created by the Government in the mould of an asset reconstruction Company

NARCL will pick up bad loans above a Certain Threshold from Banks and would aim to sell them to Perspective buyers of distressed debt

NARCL will also be responsible to value the bad loans decide on what price they would be sold

Bad Bank would provide government receipts to banks as it takes on Non-Performing Assets from their Banks

Indian Debt Resolution Company Limited (IDRL)

It's another Entity which will try to Sell Stressed Assets Acquired by NARCL

State-Owned Banks will hold a 51% stake in IDRL and Financial Institutions (FI) and Debt Management Companies hold a 49% stake

Indian Bank's Association had proposed to create a bad bank for a swift resolution to Non-Performing Assets (NPA) following this Finance Minister has put up these two

Asset reconstruction company (ACR)

It is a specialized financial institution that buys Non-Performing Assets (NPAs) from banks and financial institutions so that they can clean up their balance sheets

ARC is registered under the RBI

As per the amendment made in SARFAESI Act in 2016, an ARC should have minimum net owned fund of 2 crore and RBI raised this amount to 100 crore in 2017

ARC should maintain capital adequacy ratio of 15% of its risk weighted assets

Negative yield bonds

Negative yield bonds are debt instruments that offer to pay the investor a maturity amount lower than the purchase price of the bond

These bonds issued by Central banks or governments, and investors pay interest to the borrower to keep their money with them

Why do investors buy them?

Negative yield bonds attract investments during times of stress and uncertainty as investors look to protect their capital from significant erosion

At a time when the world was battling the COVID-19 pandemic and interest rates in developed markets across Europe are much lower, investors are looking for relatively better yielding debt instruments to safeguard their interests

While Europe, US and other parts of the world was fighting with second wave of COVID-19 cases China has demonstrated that it has controlled the spread of the pandemic and is therefore seen as more stable region

Many feel that European investors are also looking to increase their exposure in China, and hence there is huge demand for these bonds

Cartelisation

Cartel:

According to Competition Commission of India (CCI) –Cartel includes an association of producers, sellers, distributors, traders or service providers who, by agreement amongst themselves, limit, control or attempt to control the provision of services

Three components of cartel

1. An agreement
2. Between competitors
3. To restrict competition

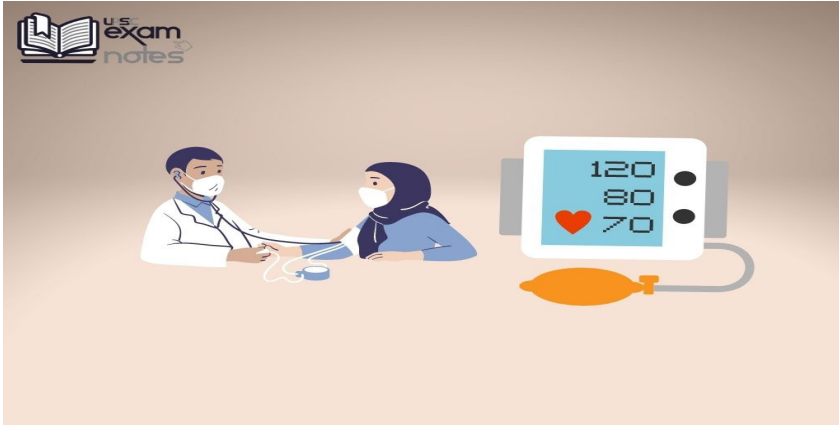
How does a cartel work?

- Price fixing
- Output restrictions
- Market allocation
- Bid rigging

Science and Technology

Genome Sequencing

General Studies 3 by [Archana Sabba](#)



What is a Genome?

A genome refers to all of the genetic matter in an organism. The human genome is almost the same in all individuals, but a very small part of the DNA does vary between one individual and another. By constructing a complete human genome, researchers can use it as a reference while studying the genome of various individuals, which would help them understand which variations if any, might be responsible for causing a disease.

Genome Sequencing

Genome Sequencing is a laboratory method that is used to determine the entire genetic makeup of a specific cell type or organism. With a complete human genome, researchers can easily study the genetic variation between populations or between individuals. The genome sequencing method can also be used to find changes in areas of the genome. These changes can help determine the scientists understand how a specific disease such as cancer, actually forms. Results of genomic sequencing may be used to diagnose and treat various diseases.

Human Genome Sequencing Project

The Human Genome has around 3.1 billion base pairs. The Human Genome Project was a 13 year long publicly funded project, started in 1990 with the objective of sequencing, and identifying all base pairs in the human genetic instruction set, determining the DNA sequence of the entire euchromatic human genome, finding the genetic roots of disease and then developing treatments within 15 years. The early days of the Human Genome Project were viewed with scepticism by both scientists and non-scientists alike. One important question was whether the huge amount spent on the project would outweigh the potential benefits.

Backdrop

Nearly two decades ago, when scientists had published the map of the human genome for the first time, it was regarded as a breakthrough in medical science. The map of the human genome was incomplete and about 8% of the human DNA was left unsequenced. Now, the fully sequenced genome is the result of the efforts of a large global collaboration called the Telomere-2-Telomere (T2T) project. The invention of new methods of computational analysis and DNA sequencing has helped complete the reading of the remaining 8% of the genome. Thereby, completing the picture of the completely sequenced human genome for the first time. The complete human genome sequence would be of immense value for further studies that aim to establish comprehensive views of human genomic variation.

Current Scenario

Today the overwhelming success of the Human Genome Project is evident. The new Telomere-2-Telomere (T2T) reference genome will complement the standard human reference genome, known as Genome Reference Consortium build 38 (GRCh38), which had originated from the Human Genome Project. The successful completion of this project has not only opened the doors for a new era in medicine but has also led to significant advances in the types of technology that are used to sequence

DNA. Late, many research groups started using a pre-release version of the complete human genome sequence for their research.

MH-60R

The United States Navy handed over the first two skirosky MH-60R Helicopters to the Indian Navy at Naval Air station in North Island, San Diego

This will be the major induction of helicopters in the Indian Navy in decades for deployment on ships

The MH-60R helicopters will provide the navy enhanced offensive role including anti-submarine warfare, anti-ship strike, specialised maritime operations as well as search and rescue operations

The MH-60R helicopters are a replacement to the Sea King 42/42A helicopters which are decommissioned in the 1990s, these are envisaged to operate from the frontline ships and aircraft carriers providing them with the critical attributes of the flexibility of operation, enhanced surveillance and attacking capability

Animation, Visual effects, Gaming, Comics (AVGC) Task Force

AVGC Task Force has constituted by the Ministry of Information and Broadcasting ministry. It will have representatives from industry, academia and state governments

The body will frame a National AVGC policy

-National curriculum framework for graduation, post-graduation and doctoral courses in AVGC

The I&B ministry said the AVGC sector in the Country had the potential to become a torchbearer of **"Create in India" and "Brand India"**

India has the potential to capture 5% of the global market share by 2025 with an annual growth of around 25-30% and creating jobs 1, 60, 000 new jobs annually

Cyber attacks



Like enterprises, the government and the public rely increasingly on digitisation; cyber security has become important to their basic functioning

Cyber-attacks have been rising for the past 12-18 months, affecting businesses which depend on the data network for their operations. Now it has become a prime position in the company's governance list

Due to COVID-19, more companies have opted to work from home. since then, there were more database breaches and hacking which led to the loss of revenue opportunities across industries.

Reports say almost 26,000 websites have been hacked in 10 month period which ended in October; hackers have been sitting in different parts of the world with fake identities

Hackers Target:

1. Users with a weak password
2. Systems with unprotected and Unchanged passwords are highly vulnerable
3. Malware take advantage of different types of expired antivirus software
4. Working in an unsecured location with a common Wi-Fi network to access private emails as well as USB drives

Types of Threats:

- Ransom ware attacks have been evolving in the market lately, with the past 10 months witnessing the highest number of threats of sensitive data exposure
- Leading Social media platforms was suffered from this, where millions will have personal data, email, date of birth and phone numbers are sold in the dark web
- Insurers have become the target, so there have been crime policies for the Insurance

THERMOPHOTOVOLTAIC CELL

1. About

- **Thermophotovoltaic (TPV)** energy conversion is a direct conversion process from heat to electricity via photons.
- A basic thermophotovoltaic system consists of a **thermal emitter and a photovoltaic diode cell**.
- The temperature of thermal emitters varies from about 900 °C to about 1300 °C, although in principle TPV devices can extract energy from any emitter with a temperature elevated above that of the photovoltaic device (forming an optical heat engine).
- The **emitter can be a piece of solid material or an engineered structure. Thermal emission is the spontaneous emission of photons due to the thermal motion of charges in the material.**
- At TPV temperatures, this radiation is mostly at near-infrared and infrared frequencies.
- The photovoltaic diode absorbs some of these radiated photons and converts them into electricity.
- Thermophotovoltaic systems have few to no moving parts. They operate quietly and require little maintenance. These properties make thermophotovoltaic systems suitable for remote-site and portable electricity-generating applications.

- Their efficiency-cost properties, however, are often poor compared to other electricity-generating technologies. Current research in the area aims at increasing system efficiencies while keeping the system cost low.

2. Principle behind Thermo photovoltaic Energy

- The basic principle is similar to that of traditional photovoltaic (PV) where a p-n junction is used to absorb optical energy, generate and separate electron/hole pairs, and in doing so convert that energy into electricity.
- The difference is that the optical energy is not directly generated by the Sun, but instead by a material at high temperature (termed the emitter), which causes it to emit light. In this way, thermal energy is converted to electrical energy.
- The emitter can be heated by sunlight or other techniques. In this sense, TPVs provide a great deal of versatility in potential fuels.
- Solar TPVs require large concentrators to provide adequate temperatures for efficient operation.

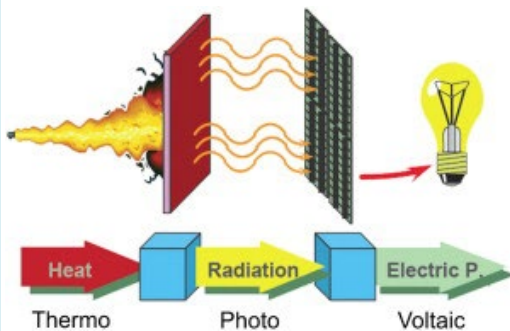


Image Source- [Science Direct](#)

3. Applications

- PV systems can supply electricity in locations where electricity distribution systems (power lines) do not exist, and they can also supply electricity to an electric power grid.
- PV arrays can be installed quickly and can be any size.
- The environmental effects of PV systems located on buildings are minimal.

SARMAT



The **RS-SARMAT**, often colloquially known as "Satan II" is a Russian liquid-fuelled, MIRV (multiple independently targetable re-entry vehicles) equipped, super-heavy intercontinental ballistic missile (ICBM). It is among Russia's next-generation missiles which include Kinzhal and Avangard hypersonic missiles. **This missile can hit a target that is 6000km away.**

FACTS ABOUT SARMAT MISSILE:

- Sarmat is an **intercontinental ballistic missile** capable of nuclear charges. (Ballistic missile is a rocket-propelled self-guided strategic-weapons system that follows a ballistic trajectory to deliver a payload from its launch site to a predetermined target).
- The nuclear-capable missile can be deployed with 10 or more warheads on each missile.
- Sarmat is Russia's next-generation missile which includes the Kinzhal and Avangard hypersonic missiles.
- The Sarmat super heavy ballistic missile is designed to elude anti-missile defence systems with a short initial boost phase, giving enemy surveillance systems a tiny window to track.
- Weighing over 200tonnes and able to transport multiple warheads, this missile can hit any target on earth.

Sarmat is the most powerful missile with the longest range of destruction of targets in the world, which will significantly increase the combat power of Russia's strategic nuclear forces.

About:

Gyratory seizures are of rare occurrence but have been reported in focal seizures of frontal and temporal origins as well as generalised epilepsies

These are characterized by rotation around the body axis in a circular or spiral manner, typically by at least 180° or 360°

Given the Concurrence of findings on structural and functional neuroimaging, the patient underwent resection of the temporal encephalocele with interior temporal resection and amygdalohippocampectomy (ATL+AH).

The unique feature of this case is the presence of gyratory seizures as a manifestation of a temporal encephalocele

Genetically Modified Mosquitoes

Mosquitoes are genetically modified to control vector-borne diseases.

A **vector** is an organism that transmits a pathogen or disease without being affected.

We all know mosquito acts as a vector for many diseases like malaria, chikungunya, dengue, Zika, yellow fever etc., one such dangerous species is *Aedes aegypti*.

With an aim to suppress a wild population of virus-carrying mosquitoes, Oxitec-a United Kingdom-based biotechnology firm in Florida, the United States showed promising results.



MECHANISM-

- A lethal gene was engineered that will kill the female offspring.
- This lethal gene is introduced into males and engineered males are released into environment.
- These males, when mated with wild females, their female offspring will die before they can reproduce.
- Male offspring will carry the gene and pass it on to half of their progeny.
- As each generation mates, more females die and the *Aedes aegypti* population should dwindle.

Observation- All female mosquitoes are observed show that the lethal gene is inherited and died before reaching adulthood. This lethal gene also persisted in the wild population for 2-3 months or about three generations of mosquito offspring, before disappearing.

Result- When field-tested in Brazil, Panama, and the Cayman Islands of Malaysia, the female population is reduced and the lethal gene continued for three generations.

Limitations-

- Though the results are positive, it took a decade for public acceptance and regulatory approvals.
- Larger studies are needed to understand whether the goal can be achieved or not.
- Harm to the human race and to the mosquito-eating species is yet to know.

Inference-

As this is new emerging technology we cannot trace its path or the chemical in the food chain.

Genetically modified insects control their population as a means to curb the spread of a disease is not a novel idea. Similar efforts began a decade ago, with scientists now attempting to engineer ticks to prevent diseases.

POSSIBLE 4TH WAVE-NEW OMICRON VARIANT



Concerns

around the Covid-19 pandemic increased, after the emergence of a highly contagious sub-variant of the Omicron variant of coronavirus, known as BA.2.

BA.2 is about 60% more transmissible than Omicron but does not seem to be severe.

DETAILS AND SYMPTOMS OF THE VARIANT:

- The BA.2 variant has the same severity as the original omicron strain, according to World Health Organization(WHO).
- WHO emphasized that BA.2 should be monitored as a sub-lineage of Omicron.
- Studies show that the reinfection with BA.2 following infection with BA.1 provides strong protection against reinfection with BA.2.
- It is difficult to detect BA.2 variant, which misses the key mutations in spike protein, that are necessary for rapid PCR tests.
- BA.2 variant affects the upper respiratory tract like DELTA, eliminating the symptoms like loss of taste n smell.
- Symptoms like dizziness, extreme fatigue, fever, coughing, sore throat, cold, muscular fatigue, and elevated heart rate are observed.

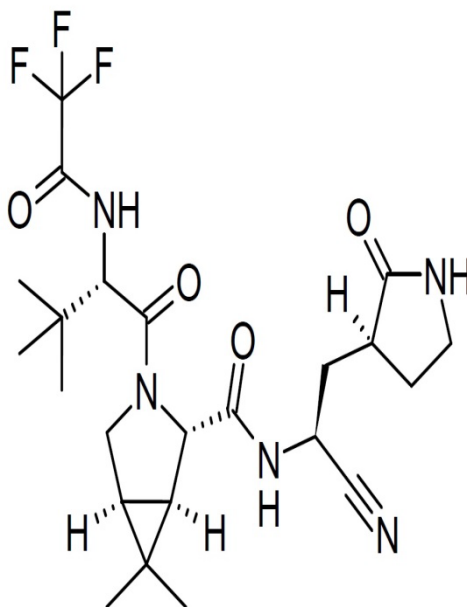
REINFECTION:

A recent study shows that previous infection with BA.1 sub-lineage provides strong protection against BA.2. It is also that, if BA.2 arrives in a community late, when the BA.1 Omicron wave is nearly over, immunity by omicron infection or by boosting keeps BA.2 away.

PAXLOVID:

The World Health Organization (WHO) strongly recommended Pfizer Inc.'s Covid-19 pill PAXLOVID, a combination of medicines nirmatrelvir and ritonavir, for unvaccinated/older/immunosuppressive patients. The antiviral medicine remdesivir is recommended for high-risk patients.





RECOMMENDATIONS:

- Paxlovid may prevent more hospitalizations than its alternatives.
- Paxlovid has less potential harm than the antiviral drug, Molnupiravir.
- It shows trivial benefits for the low-risk population.
- It is easy to administer than intravenous remdesivir and antibody treatments.
- Fewer hospitalizations were observed in patients who took nirmatrelvir / ritonavir.
- Molnupiravir for high-risk patients with non-severe COVID-19 and monoclonal antibody treatments is recommended.
- Sotrovimab or casirivimab, and imdevimab are used in selected patients.

Access to these drugs is tied to the access to SARS-CoV-2 diagnostic tests, especially for those targeting the early phase of the disease. These living guidelines were developed to provide trustworthy guidance on the management of COVID-19 and help doctors to make better decisions.

The use of convalescent plasma, ivermectin and hydroxychloroquine is the popular choice of treatment in the early stages of the pandemic.

Scaling up of antivirals may result in 80-90% fewer deaths from future variants more severe than omicron. So making sharing antivirals to make sure that they are available to everyone is necessary.

PHOBOS

Why in News?

NASA rover 'Perseverance' captures eclipse involving Mars' satellite 'Phobos'

1. Background

- Phobos is the innermost and larger of the two natural satellites of Mars, the other being Deimos.
- Both moons were discovered in 1877 by American astronomer Asaph Hall.
- Phobos is a small, irregularly shaped object with a mean radius of 11 km (7 mi).

- Phobos orbits 6,000 km (3,700 mi) from the Martian surface, closer to its primary body than any other known planetary moon.
- It is so close that it orbits Mars much faster than Mars rotates, and completes an orbit in just 7 hours and 39 minutes.
- As a result, from the surface of Mars it appears to rise in the west, move across the sky in 4 hours and 15 minutes or less, and set in the east, twice each Martian day.
- Phobos is largely believed to be made up of carbonaceous chondrites.



Image Representing PHOBOS

2. About Natural satellite

- A natural satellite is an object that orbits a planet or other body larger than itself and which is not man-made.
- Such objects are often called moons. The term is normally used to identify non-artificial satellites of planets, dwarf planets, or minor planets.

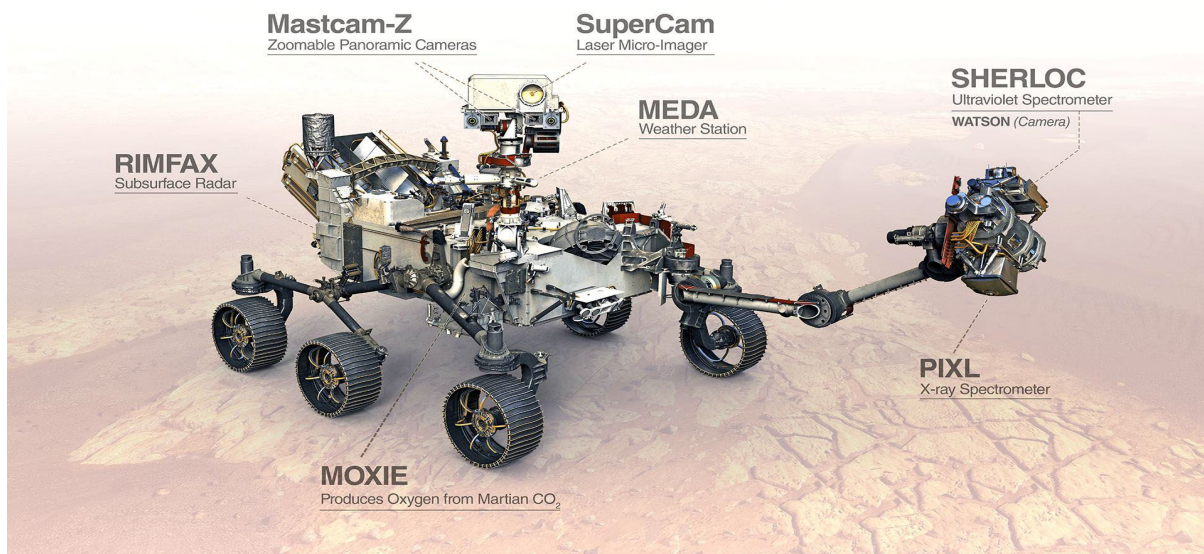
3. India's exploration across mars

- The MOM also called Mangalyaan is a space probe orbiting Mars since 24 September 2014. It was launched on 5 November 2013 by the Indian Space Research Organization (ISRO).
- It aims at studying the Martian surface and mineral composition as well as scans its atmosphere for methane (an indicator of life on Mars).
- It is India's first interplanetary mission and it made it the fourth space agency to reach Mars, after Roscosmos, NASA, and the European Space Agency.
- It made India the first Asian nation to reach Martian orbit and the first nation in the world to do so on its maiden attempt.

- It was initially meant to last six months, but subsequently, ISRO had said it had enough fuel for it to last “many years.”

4. about perseverance

- **Perseverance**, nicknamed **Percy**, is a car-sized Mars rover designed to explore the crater Jezero on Mars as part of NASA's Mars 2020 mission. It was manufactured by the Jet Propulsion Laboratory and launched on 30 July 2020, at 11:50 UTC.
- As of 22 April 2022, Perseverance has been active on Mars for **416 sols (428 Earth days)** since its landing.
- Following the rover's arrival, NASA named the landing site Octavia E. Butler Landing.
- Perseverance has a similar design to its predecessor rover, Curiosity, from which it was moderately upgraded. It carries seven primary payload instruments, **nineteen cameras, and two microphones.**
- The rover also carried the mini-helicopter Ingenuity to Mars, an experimental aircraft and technology showcase that made the first powered flight on another planet on 19 April 2021.
- The rover's goals include identifying ancient Martian environments capable of supporting life, seeking out evidence of former microbial life existing in those environments, collecting rock and soil samples to store on the Martian surface, and testing oxygen production from the Martian atmosphere to prepare for future crewed missions.



ELECTRIC VEHICLES

1. Background

- India's commitment to the EV30@30 initiative - to reach a 30 per cent sales share for EVs by 2030 - presents a cumulative investment opportunity

- Central and state governments have approved fiscal incentives for EVs, charging infrastructure, and manufacturing that are helping achieve parity in the total cost of ownership with **internal combustion engine (ICE) vehicles for several segments and use cases.**
- **Original equipment manufacturers (OEMs) and component** manufacturers are investing in indigenous manufacturing and supply chains.
- EV startups are attracting significant venture funding due to their **product and business model innovation, capturing as well as creating the market opportunity presented by EVs.**

2. Advantages associated with electric vehicles

- **Reduced greenhouse gas emissions-** petrol and diesel are important sources of carbon dioxide emissions. CO₂ is a leading source of global warming. EVs can help in reducing GHG emissions.
- **Reduced air pollution-** Petroleum fuels are also a source of NO_x, SO₂ and particulate matter along with photochemical smog. With EVs, this pollution can be addressed.
- **Reduced noise pollution-** EV vehicles produce less noise as compared to petrol or diesel vehicles. This will be helpful to transport in urban areas, forested areas etc.
- **Use of renewable energy-** with EVs there will be a rise in electricity demand. This will give scope for more renewable energy like solar and wind.
- **Easier to maintenance** -An internal combustion engine usually contains more than 2,000 moving parts. An electric motor on board an EV on the other hand contains around 20 moving parts.
- **Low cost of ownership** -It is a proven fact by many researchers that EVs offer a way lower cost of ownership in their lifecycle compared to fossil fuel-powered vehicles.

3. Challenges associated with electric vehicles

- **Less Range:** Electric engines provide only limited mileage. Complete battery recharge takes up to 8 hours and there is a lack of quick charge plug-in stations available across the country.
- **Range anxiety:** Range anxiety is one of the crucial challenges ahead of the growth path for electric vehicles in India. The EV customers are often worried about the vehicle's capability to reach point B from point A before the battery runs out.
- **Lack of battery technology and available local resources:** The lithium-ion battery is the most popular and widely used energy source for EVs. India doesn't produce lithium. The country doesn't produce li-ion batteries either.
- **Majority of EVs are not covered under the FAME scheme** -The Indian government took an attempt to promote electric mobility in the country via incentivizing and discounts for EVs. The terms and conditions of the FAME scheme don't support the majority of electric vehicles.
- **Lack of products:** Only a few options are there and the majority of them are not from established trustworthy brands.
- **Lack of spare parts components-** The spare parts associated with electric vehicles are barely available at a scale of that of Fossil fuel-run vehicles
- **Less Power:** The top speed of electric cars is 70 mph (even less for smaller electric vehicles) which makes them a poor bet with highway driving.
- **Costly:** Electric vehicles are costlier than gasoline-powered vehicles within the same range due to the hefty price of lithium-ion batteries.



4. What drives electric vehicles opportunity in India

- Thirteen out of 20 cities in the world with the highest air pollution are in India. It is envisaged that the Low carbon scenario with the **'highest' EV penetration shows a 50 per cent drop in PM 2.5 by 2035 (UNEP, DTU and IIM- A).**
- Master plans for most cities in India target **60 - 80 per cent public transport ridership by 2025 - 2030 (Centre for Science and Environment)**
- With the Government of India targeting 100 GW of solar by 2022, **electric vehicles can improve reliability and utilization of renewable by acting as storage**
- However, there needs to be proper planning concerning monitoring and control of charging infrastructure as an unplanned increase in penetration of EVs in an area can lead to an increase in **peak load of an already stressed distribution network.**
- Large scale penetration of EVs will require both demand-side incentives (e.g., tax incentives) and improved charging infrastructures as well as **integrated planning for distribution Grid management.**
- EVs offer the opportunity to act as a **distributed storage in the urban energy system** which could help in better integration of intermittent renewables like wind and solar and can feed the grid at peak timings if price incentives are designed in terms of **the dynamic tariff as part of Smart Grid implementation.**

5. Government policies and intervention

- **FAME (faster adoption of electric and hybrid vehicles)** scheme in phase 2 has been going on. Under this scheme, advanced battery and registered vehicles will be incentivized under the scheme. With greater emphasis on providing affordable & environment-friendly public transportation options for the masses, the scheme will apply mainly to vehicles used for public transport or those registered for commercial purposes
- **EV policy** - individual states are coming up with EV policies. Eg. Recently the Maharashtra government came up with its policy till 2025.
- **Green coloured number plates** - the government has decided to use green coloured number plates for EVs.
- The Ministry of Power has issued a policy on charging infrastructure and has issued a notification **clarifying that charging electric vehicles will be a service, not a sale of electricity.**
- Decision to promote aluminium batteries as an **alternative to lithium batteries.**
- Electricity regulatory commissions have also brought out **special tariffs for EV charging**, and ARAI has introduced standards for AC & DC charging.
- MoHUA has amended Building Bye-laws and Urban and Regional Development Plans Formulation and Implementation Guidelines to make **charging infrastructure development an integral part of urban planning, development and construction.**
- The Government of India announced the **Deendayal scheme** in June 2014, which would help in the **financing and procurement of the battery rickshaws in the country.**
- In March 2015 the **Motor Vehicles (Amendment) Bill** was cleared establishing battery-powered **e-rickshaws** as a valid form of commercial transport,
- **Production-Linked Incentive (PLI) scheme** approved for automotive manufacturing focusing on EVs and hydrogen fuel cell vehicles.



BLUE STRAGGLER

1. About

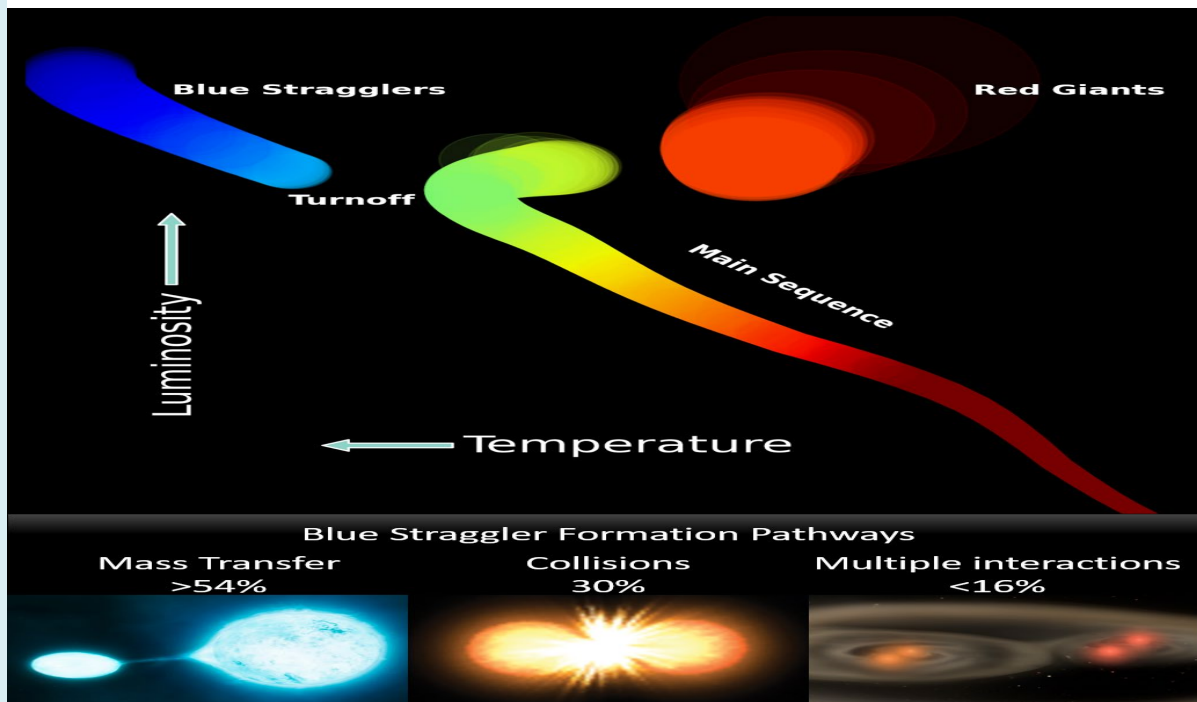
- In general a bunch of stars are born at the same time from the same cloud that forms a **star cluster**.
- As time passes, each star evolves differently depending on its mass.
- The most massive and **bright stars evolve and move off the main sequence creating a bend in their track, known as the turnoff**.
- Stars above this bend or brighter and hotter stars are not expected in a cluster, as they leave the main sequence to become red giants.
- But in 1953, Allan Sandage found that **some stars seem to be hotter than the turnoff of the parent cluster**.
- Initially, these blue stars, still straggling above the turnoff, were not part of these clusters.
- However, later studies confirmed that these stars are indeed cluster members, and they were termed **“Blue Stragglers”**.

2. Indian Research on Blue straggler

- **Indian researchers have found that:**
 - Half of the blue stragglers are formed through mass transfer from a close binary companion star.
 - One third are likely formed through collisions of two stars.
 - Remains are formed through interactions of more than two stars.

3. Importance of the Study

- The study will help improve understanding of these stellar systems to uncover exciting results in studies of large stellar populations, including galaxies.
- Following these findings, the researchers are conducting detailed analyses of individual blue stragglers in the catalogue to obtain their stellar properties.
- Furthermore, interesting clusters and blue stragglers identified in this study will be followed up with an ultraviolet imaging Telescope on *AstroSat*, **India’s first dedicated space observatory**, as well as the 3.6 m **Devasthal Optical Telescope in Nainital**.



ENERGY FROM BANANA PEEL

Peels of various fruits and vegetables are commonly considered waste products and are thrown away. Some may be used as fertilizer, but most are left to rot.

Banana (*Musa paradisiaca*), a globally known fruit is rich in nutrients and has a lot of health benefits. The peels are usually discarded; however, different studies conducted on peels revealed the presence of important constituents that could be repurposed.

Many types of research are being conducted to reduce the usage of non-renewable fossil fuels. Due to the demand for electricity in industries, global warming and the increase in carbon dioxide levels, an alternate source of energy is required, preferably renewable sources.

MFCs or Microbial Fuel Cells are capable of producing respiring electric current from respiring cells.

If MFCs produce electricity on a large scale, this solution could benefit the environment. Another such benefit is producing energy from bananas.

A research group working at the Swiss Federal Institute of Technology conducted experiments on a banana peel, orange peel, and coconut shells. Their version of the banana split involved the splitting of biomass, by flashes of light emanating from a xenon lamp.



APPEAL OF HYDROGEN-

- Before looking at this innovative approach, it is necessary to know that hydrogen is an attractive energy source.
- Hydrogen has an impressive energy storage capacity.
- While classifying fuels in terms of their energy value/heating value, the deciding elements are carbon, hydrogen and oxygen.
- Hydrogen has an energy level that is seven times that of carbon.
- Burning of hydrogen gives us only water and heat.
- A smarter way to harness the energy in hydrogen is to get electricity with it.
- This is achieved in a proton exchange membrane fuel cell where, in the presence of a metal catalyst, a hydrogen molecule is split into protons and electrons, with the electrons providing the current output.

TRANSPORT VEHICLES-

Unlike electric cars, hydrogen-powered cars have a refuelling time of only about 5 minutes. Commercially available hydrogen-powered cars have fuel tanks that can carry 5-6 kg of compressed hydrogen, with each kilo providing a range of about 100 km and emitting 9 litres of water as steam.

The limited popularity of hydrogen as a fuel is due to production and distribution restraints. It is safer than domestic cooking gas.

Industrial-level quantities of hydrogen gas are used in processes such as the production of ammonia for fertilizers. 90% of the world's hydrogen is produced from fossil fuels.

Biomass is a catch-all term for organic waste material of plant and animal origin. It is a rich source of both hydrogen and carbon.

Dried banana peel has 5% hydrogen and 33% carbon.

An important goal of all climate change-curbing protocols is to sequester as much carbon as possible, not letting it become a gas.

PROCESS-

- The Swiss group used pyrolysis, where the organic matter is decomposed using small bursts of intense heat under inert conditions.
- Flashes of irradiation from a xenon lamp provide heat.

- A total of 15 milliseconds of irradiation are enough to heat the system to 600 degrees Celsius and decompose a kilogram of banana peel powder, liberating 100 litres of hydrogen gas.
- This short burst of photo thermal energy also produces 330 grams of biochar, a solid residue that is rich in carbon.

It has to be noted here that, if the biomass is burnt, gaseous carbon would have escaped as carbon monoxide and carbon dioxide. But Pyrolysis ensures that carbon remains sequestered as solid.

BENEFITS OF BIOCHAR-

- Apart from safekeeping carbon, biochar has several uses in agriculture.
- Agricultural leftovers like husk are a major source of biomass, and the biochar it forms has significant mineral content, adding enrichment to plant nutrients.
- The porous nature of biochar makes it suitable for remediation and adsorption of toxic substances in polluted soils, thus reducing the potency of contaminants in soil.
- Biomass, be it from the banana peel or tree bark or poultry manure, improves the air quality and adds value to agricultural produce.

COVID-19 SURGE PREPAREDNESS WITH AI

New and emerging variants of the SARS-CoV-2 virus continue to pose a threat to the health of populations across the globe. Counting the unique and observable changes in the sequences available till January 2022 shows more than 6,000 mutations have accumulated in the spike gene of the virus.

Initial studies claimed SARS-CoV-2 to be a fast-mutating virus which may make the virus fitter over time. A preprint claimed that the fitness of the SARA-CoV-2 virus is increasing because of the natural phenomenon of purifying selection of the spike protein.

GENOME-BASED APPROACH TO PREDICT COVID-19 SURGE-

- Delta and the Omicron surges highlight the crucial need to use genomic features to predict surges.
- Most of the currently available models predict future trends based on the reported infections and deaths.
- These models do not incorporate features from the virus sequences in a predictive manner.
- The strain flow model plugs this gap by taking a sequence-driven approach to predict future surges using a novel AI pipeline.
- The three-base codons in these sequences were treated as words in the document with each nucleotide base as a letter.
- The best model compressed the viral sequence in 36 dimensions, and the authors proposed that some of these may encode the patterns that make the virus spread faster.
- The models were trained to extract the dimensions that predicted the number of cases in the 17 countries with a two-month lead time.

- These models were accurate in predicting the surges during the Delta, omicron and the current surges happening in India.
- The Strain flow model does not predict the actual number of cases but we do get an accurate sense of how sharp the surge might be.

OPEN-DATA INITIATIVES-

These observations when seen in the light of newer waves of infection such as in Delta and the Omicron surges highlight the crucial need to use genomic features to predict surges.

Consortia and open-data initiatives across the globe, such as the Indian SARS-CoV-2 Genomics Consortium (INSACOG) and Global Initiative on Sharing Avian Influenza Data (GISAID) have been instrumental in the identification of new variants. However, most of the inferences from genomic surveillance have so far been retrospective in nature, explaining the past rather than predictive of the future.

Most of the currently available predictive models are variations of standard epidemiological models such as compartmental or agent-based models, which predict the future trends based on the reported infections and deaths. These models do not incorporate features from the virus sequences in a predictive manner.

A recently published model, Strainful, plugs this gap by taking a sequence-driven approach to predict future surges using a novel **ARTIFICIAL INTELLIGENCE** pipeline.

- It is based on a simple hypothesis-virus sequence and can be treated as documents that can be read like books by Natural Language Understanding (NLU) models. These models can discover the underlying grammar patterns which are casually predictive of future surges.
- The three-base codons in this sequence were treated as words in the document with each nucleotide base as a letter.
- A caveat with NLU models is that these need millions of documents for training.
- Fortunately, GISAID plugged this gap. More than 2.8 million high-quality sequences are processed.
- These included data from 16 countries and India.
- Experiments were done with several NLU models optimised for efficiently learning the grammar of the spike gene.
- The best model compressed the viral sequences in 36 dimensions, technically known as low-dimensional embedding's.
- Each of these 36 dimensions is a different cocktail mix of codon level relationships.
- These 36 cocktail mixtures may encode the patterns that make the virus spread faster.

CLEAR TEMPORAL PATTERNS-

- The models are trained to extract the dimensions that predicted the number of cases in the 17 countries with a two-month lead time.
- Surprisingly, these models were accurate in predicting the surges during the Delta, Omicron and current situations.
- The features of these cocktails mixes were examined and found that the diversity of some of these, technically captured as a quantity known as entropy showed clear temporal patterns predictive of surges.
- The entropy was seen to start dipping sharply up to two months before the cases surge.

- This might be a biological plausible because the virus strain evolution takes an explore-exploit pattern, exploring the possible combinations of mutations and then exploiting some to establish itself as the dominant strain.
- Although the Strain flow approach does not predict the actual number, the accurate sense of how sharp the surge can be known.
- The Strain flow model has proven to be effective for predicting whether there is a likely surge with a 2-month lead time, which could help the healthcare systems to be prepared.

DE-NOVO APPROACH-

A key feature of Strain flow was its data-driven, de-novo approach without the need for expert understanding.

The strongest learning from this exercise has been the power of open data and interdisciplinary thinking. Strain flow is just one piece in the puzzle for solving the surge-preparedness of COVID-19 which could lay the foundation for general infectious disease preparedness.

Let's imagine the future as multiple signals such as Strain flow, traditional epidemiological models, testing results and non-conventional sources such as mobility, demographics, and social media signals feeding into a unified model for preparedness.

This is exactly our current endeavour, with projects geared towards district level preparedness in collaboration with ICMR and understanding the relationship between mobility patterns and strain emergence in collaboration with Meta (formerly Facebook) as a part of the data for the good initiative.

Energy independence through hydrogen

Hydrogen plays a major role in the decarbonisation of India's transport sector. Hydrogen, a new age fuel, is touted as India's gateway to energy independence. Hydrogen has a multifaceted role in the energy landscape of the future, whether it is energy storage, long-distance transportation, or the decarbonisation of the industrial sector.

India's per capita energy consumption is about one-third of the global average and one-twelfth that of the USA.

Green Hydrogen Policy-

- Green hydrogen is defined as hydrogen produced by splitting water into hydrogen and oxygen using renewable electricity.
- It was issued on February 17, 2022, addressed several key challenges like Open access, Waiver of inter-state transmission charges, Banking, and Time-bound approvals and is expected to boost India's energy transition.

Hydrogen-A game changer

the two major fuels are hydrogen and electricity. Although both are energy carriers, hydrogen can be stored on larger scales and for longer periods. This clearly says to be a great balance for the growing supply of convertible renewable energy.

The advantages of fuel cell vehicles over battery electric vehicles are-

1. Faster refuelling
2. Longer driving range
3. Long-distance transportation

In the industrial segment, hydrogen can de-carbonize 'hard-to-abate' areas like iron and steel, aluminium, and copper etc., It has great potential to produce fuels such as methanol, synthetic kerosene, green ammonia etc.,

- India's hydrogen consumption stood at around 7 million tonnes in 2020 and may increase to 28 million tonnes in 2050, according to The Energy and Resources Institute (TERI).
- Assuming 25% export capacity, the requirement may reach 35 million by 2050.
- India may need an electrolyzer capacity of 640 to 750 times the current global capacity by 2050.
- This would lead to a rapid increase in electricity demand to around 1,500 to 1,800 TWH, meaning only for hydrogen production. India will need 110-130% of its current total electricity generation by 2050.

LIMITATIONS-

- In addition to the ever-increasing demand for electricity, the high cost of hydrogen manufacturing and water scarcity may also pose a challenge.
- About 9 litres of water is required to produce 1kg of hydrogen by electrolysis.
- Hydrogen projects should be targeted in water-rich areas.
- Consumers want low costs that may be possible with scalability and large investments, but producers want assured demand from them.

FIVE-STEP STRATEGY-

IN TERMS OF DEMAND

- Firstly a mantle should be given to the industries like refining and fertilizers, with adequate incentives, to generate initial demand.
- Second, industries manufacturing low-emission hydrogen-based products are to be encouraged by the government.
- Third, blending hydrogen with natural gas could serve as a big booster shot, which could be facilitated by framing blending mandates, and regulations, and promoting H-CNG stations.
- In addition to promoting FCEVs, hydrogen fuelling stations may be planned on dedicated corridors where long-distance trucking is widespread.
- Finally, the concept of carbon tariffs needs to be introduced.

IN TERMS OF SUPPLY-

- Investment in R & D must be accelerated so that its cost can be at par with fossils.
- The Sustainable Alternative towards Affordable Transportation (SATAT) scheme aims to produce 15 MMT of compressed biogas, which can be achieved by exploring biogas conversion to hydrogen.
- A Viability Gap Funding (VGF) scheme may be introduced for hydrogen-based projects for the commercialization and enhancement of emerging technologies.
- To secure affordable financing, electrolyzer manufacturing and hydrogen projects need to be brought

under Priority sector Lending (PSL).

- Since the two major factors for green hydrogen are renewable energy tariffs and electrolyzer costs, and India has the advantage of one of the lowest renewable tariffs; the emphasis should be on reducing the cost of electrolyzer by implementing the Production Linked Incentive (PLI) scheme.
- This can help India become a global hub for electrolyzer manufacturing and green hydrogen.

On the transportation front, ammonia with energy density could be promoted as a means of transportation. A hydrogen transportation system could be built on a foundation for natural gas using its existing infrastructure.

Hydrogen could completely transform India's energy ecosystem by shifting its trajectory from an energy importer to an exporter.

With hydrogen, India could lead the world in achieving the Paris Agreement goal of limiting global warming to 2 C compared to pre-industrial levels.

INTERNATIONAL SOLAR ALLIANCE



More than 20 countries signed a Framework Agreement of the international solar alliance which will take the shape of a separate international treaty once it is implemented. On November 30, 2015, India and France established the international solar alliance at the 21st meeting of 'The United Nations Convention Framework on Climate Change ' in Paris.

KEY POINTS

- ISA-International Solar Alliance is an alliance of more than 120 countries, which lie between the Tropic of Cancer and the tropic Capricorn.
- The primary objective is to work collectively for efficient exploitation of solar energy to reduce the dependency on fossil fuels.
- This initiative was proposed by the Prime Minister of India, during one of his speeches at London.
- It is a treaty-based intergovernmental organization.

- The agreement will be operational only after, a minimum of 15 countries have ratified it.
- ISA aims to develop cost-efficient solar technologies and applications.
- ISA is making an effort to ensure that as the developing countries increase their electricity production, they should predominantly use solar energy and avoid fossil fuels.
- There are approaches to bring down the costs of technology as well as of finance needed for a solar project.
- ISA seeks to boost global demand, which will result in further reduction of prices of solar energy deployment.
- To promote standardization in the use of equipment and process for generating electricity, this further makes it more accessible.

ISA IN INDIA-

ISA gives India an opportunity to take global leadership in the fight against climate change. India has promised to contribute nearly \$30 million to creating building infrastructure and recurring expenditures for five years.

ISA is headquartered in Gurugram, Haryana

MALEFICENTS-

- Raising a large amount of money is a difficult task.
- The ISA have to devise mechanisms to mobilize private finances.
- The alliance has to work in tandem with other bodies such as the International Renewable Energy Agency.

MAGNONIC CRYSTALS

A Magnonic crystal is a magnetic meta-material with alternating magnetic properties.

Researchers found ways for broader design and engineering of reconfigurable functional magnonic crystals, which can show the way for magnon based computing systems and bring about a paradigm shift in computing and communication devices.

SIGNIFICANCE-

- Electrons, the lightest known particles, are carriers of information in all "electronic devices."
- Electrons are almost two thousand times lighter than protons.
- As the electrons drift in the semiconducting device of the CPU, the signal moves almost at the speed of light.
- This drift generates heat in the device, which has to be fanned out of the CPU.
- There is a search for materials in which magnetic spin waves can be used to transport information without heat generation.
- Magnons are particle avatars of spin waves which can ripple through a lattice of tiny ferromagnetic particles of nano dimensions.
- Recently magnonics was merged with "Artificial Spin Ice", creating ways for broader design and engineering of reconfigurable functional magnonic crystals.
- Artificial spine ice (ASI) are meta-materials made up of coupled Nano magnets arranged on different lattices.

- The word 'ice' comes from the similarity in molecular structure with tetrahedron shaped ice crystals in which two hydrogen atoms are close to the central oxygen atom.

As magnons are quasiparticles, their movement through the material does not generate heat.

- The spin ice material is made of corner linked tetrahedra.
- Each vertex of the tetrahedron is a magnetic ion which has a magnetic moment.
- In their low energy state, they follow a two in-two out an arrangement.
- ASI systems replicate the principles of the spin ice systems.

BRILLOUIN LIGHT SCATTERING (BLS)-

BLS is an inelastic light scattering phenomenon of light quanta photons from quasiparticles like magnons or phonons, which can help in understanding spin-wave propagation and dispersion under the influence of an external magnetic field.

Earlier experiments had mainly used the ferromagnetic resonance technique (FMR), which helped in studying the global or large scale behaviour of ASI.

Hence, the BLS method is a breakaway from the earlier experimental methods. Experimental observations using BLS are consolidated and extrapolated through simulations.

The ASI system can potentially give rise to a huge variety of magnetic micro-states, which can be globally or locally controlled by a magnetic field. This would lead to the effective formation of different magnonic crystals by subtle changes in the external magnetic field, more like origami or kaleidoscope. Therefore, different functions of magnonic circuit components can be performed in the same active element or magnonic crystal only by externally tuning a modest magnetic field, saving huge cost and energy.

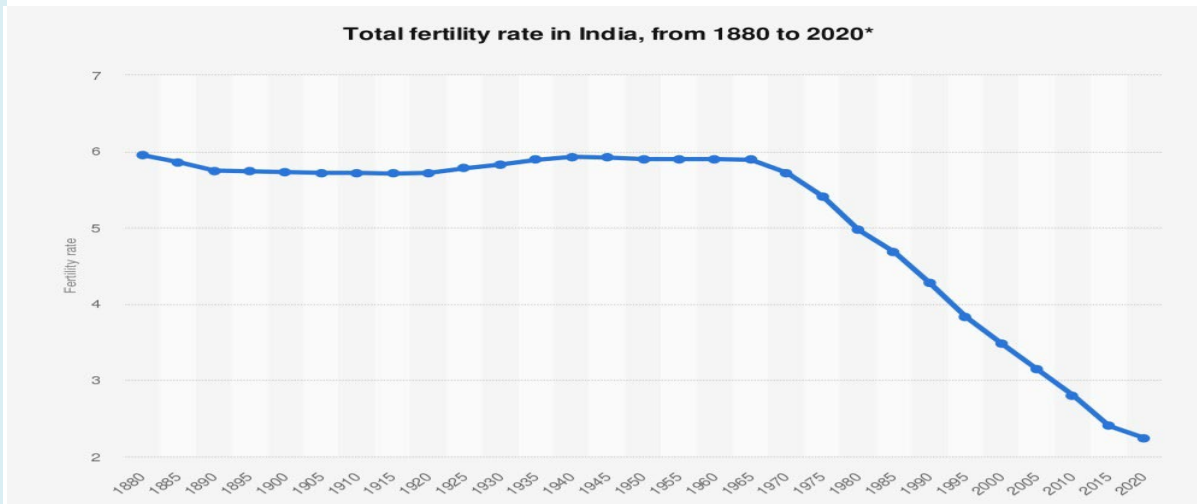
CONCLUSION

The successful use of ASI as a functional magnonic crystal will depend upon the efficient reconfigurability of their magnetic micro-states and the ensuing spin-wave properties.

TOTAL FERTILITY RATE

The Total Fertility Rate (TFR) is the average number of children per woman. There is a decline in TFR from 2.2 in 2015-16 to 2.0 in 2021.

A population explosion is a sudden increase in the number of individuals in a particular species.



NFHS-National Family Health Survey

- NFHS is the most thorough survey on the health and nutrition indicators of citizens of India.
- From 1992-to 93, the NFHS provided various health, nutrition, family welfare and social indicators at regular intervals.
- NFHS serves as a mirror of India's achievements in maternal and child health when compared with other countries.
- It is a major exercise as it surveys antenatal care, institutional delivery, child immunization, malnourishment, age at marriage, fertility, contraception, sexual behaviour, gender-based violence, women's empowerment and access and utilization of health care services.
- The key highlights of this survey include the institutional birth rate increased from 79% to 89%.
- More than 77% of the children ageing between 12 and 23 months were fully immunized.
- The level of stunting among children less than 5 years has marginally declined from 38% to 36%.

.The data in NFHS shows that the fertility rate at 1.6 in urban areas and 2.1 in rural India.

According to the United Nations population division, countries experiencing below-replacement fertility lower than 2.1 children per woman, indicate that a generation is not producing enough children to replace itself, eventually leading to an outright reduction in population.

With the above mentioned TFR, in long run, we may have a potential growth rate of zero. Experts highlighted three key points from the TFR declining to 2.0 :

1. A diminished challenge to development
2. The importance of investing in public health and education with skills
3. The need to focus on environmental protection

India has been aiming for a TFR of 2.1 and a fall to 2.0 means, the goal of population stabilization is achieved.

The numbers also tell us that there is stabilization in Human Resources. The younger population profile for the next 2-3 decades will provide an opportunity for accelerated economic growth.

TFR IN DIFFERENT STATES

STATE	TFR;NFHS-4	TFR; NFHS-5
BIHAR	3.4	3.0
MEGHALAYA	3.0	2.9
UTTAR PRADESH	2.7	2.4
JHARKAND	2.6	2.3
MANIPUR	2.6	2.2
ANDHRA	1.8	1.7
KARNATAKA	1.8	1.7
MAHARASHTRA	1.9	1.7
WEST BENGAL	1.8	1.6
PUNJAB	1.6	1.6

GENDER EMPOWERMENT-

- Although there is an improvement to earlier surveys, a large gap continues to exist between men and women in terms of owning properties, operating bank accounts or having mobile phones, showing that patriarchal norms are still prevalent.
- According to NFHS-5, nearly one-third of women have experienced spousal violence.
- The poor nutritional indicators of women and children have pointed out.
- The discrimination one faces in childhood, manifesting in lack of medical care, nutrition and education, continues in adulthood.
- Nearly half of all pregnant women are anaemic, despite many large-scale incentive schemes like Pradhan Mantri Matru Vandana Yojana (PMMVY).

REASONS FOR DECLINE IN TFR-

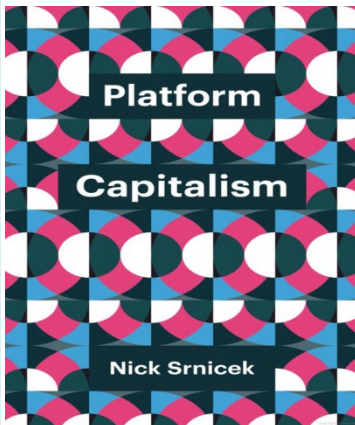
- NFHS-5 found that there has been a significant increase in the current use of any modern contraceptive method, which stands at 56.5% in 2021 against 47.8% in 2016.
- The share of condoms is 9.5% against 5.6% in 2016.
- The uptake of female sterilization has gone up to 38% against 36% in 2016.
- Increase in cost of education of children is also compelling in the restricting the number of children.

Since the fertility levels have gone down below the replacement level in the country, population explosion is not a concern now.

Platform Capitalists

Source: The Hindu

Context: The Internet and its data lie in the hands of very large tech companies. Ownership of data has become the currency of the future



About Platform Capitalists

Platform capitalists are those who take advantage of their first-mover privilege by rapidly expanding across the digital landscape.

- They offer themselves as a platform for the third party players for a price like Amazon, Meta, and Microsoft etc.
- These companies retain and expand their control through data accumulation and extraction, the importance of data accumulation in the digital economy cannot be overstated
- With the advent of the Internet of Things (IoT), smart devices and related technologies, the possibility of data goes beyond that of the virtual to even physical and social
- Control of this type of data can even predict the **behavioural patterns**
- Platform capitalists have unbridled control over the data economy leading to exclusion and under-optimisation of the data for the Common good
- Since most of these companies are in the west, which leaves developing countries to fend for themselves, left out their own data's immense possibilities and uses
- State regulators have been trying to find a solution to better re-distribute and govern data structures

Data

Data has three layers

1. **Semantic layer**-has Encoded information
2. **Syntactic layer**-represents information as machine-readable datasets
3. **Physical layer**-Infrastructure through which one extracts data

An ideal data governance structure should prevent the processors of the syntactic and physical layers from having exclusive rights over the semantic layer

A semi-commas approach to data governance seeks to balance public and private claims to data; it fundamentally recognises data as social commons where first movers do not get exclusive rights

Data holders	Data seekers
Be it private, public or altruistic organisations can only have non-exclusive rights over the base of the base layer data	They have access to non-professional data and aggregate non-personal data
They can use and generate profit through it but are required to share data as others	Data seekers are entitled to accessibility in a semi commons approach

W-BOSON

Why in News?

- Recent findings on the most precise measurement of the W Boson mass ever made have stunned scientists, as it could potentially **rewrite particle physics**

1. About

- Discovered in 1983, the W boson is a fundamental particle.
- Together with the Z boson, it is responsible for the weak force, one of four fundamental forces that govern the behaviour of matter in our universe. **Particles of matter interact by exchanging these bosons, but only over short distances.**
- The W boson, which is electrically charged, changes the very make up of particles.
- It switches protons into neutrons, and vice versa, through the weak force, triggering nuclear fusion and letting stars burn.**
- This burning also **creates heavier elements and, when a star dies**, those elements are tossed into space as the **building blocks for planets and even people.**
- The weak force was combined with the electromagnetic force in theories of a **unified electroweak force in the 1960s, in an effort to make the basic physics mathematically consistent.**
- But the theory called for the force-carrying particles to be massless, even though scientists knew the theoretical W boson had to be heavy to account for its short range.
- Theorists accounted for the **mass of the W by introducing another unseen mechanism.**
- This became known as the Higgs mechanism, which calls for the existence of a Higgs boson.
- Both W and Z bosons are carriers of the weak nuclear force, and they are formed through radioactive processes.**
- The collider at CDF smashed trillions of protons and antiprotons (antimatter doubles to protons, carrying the same mass but opposite charge) into each other at high velocities as one such process, which produces a **W-Boson once every 10-million collisions.**

Internet addiction in Children

Context

10 children have been admitted to the Government Omandurar Medical College Hospital for Internet De-addiction in Tamil Nadu

Breaking the habit | A table showing the number of persons who attended the Internet Deaddiction Clinic at the Government Omandurar Medical College Hospital

Age group	Male	Female	Total
5-10	7	3	10
11-18	8	5	13
19-25	21	5	26
26-40	12	1	13
41-60	5	0	5
Grand total			67



WHAT PARENTS CAN DO

- Encourage a more active lifestyle for children
- Offer them interesting pastimes or involve them in activities such as sports or art classes, where they will interact with peers under adult supervision
- Talk to children face-to-face, spend time outdoors

and engage in reading. Then, children model their behaviour on the parents (**parent modelling**)

- Be watchful when children use any kind of device — gaming, computer or mobile phone
- Look out for abnormal behaviour, identify symptoms early and seek medical help immediately

Key points

- The use of gadgets became a necessity for children and adolescents due to online classes during the pandemic.
- Overuse of the Internet in various forms. This includes video games, social media, online shopping, online gambling and online pornography and victims of cyber bullying.
- It results in depression, anxiety, strained interpersonal relationships and work performance.
- Speech delay occurs in toddlers due to high internet use.
- There is a delay in saying even the basic words.
- Reduced interaction with family members.
- Gadget use was restricted to one hour per day.

Complaints

- Abnormal hand movements
- Staying awake late at night to play mobile games
- Academic decline and lack of interest to write the board exams.
- weight loss and hunger had reduced
- Avoiding eye contact and answering monosyllables

Solution

- Encourage a more active lifestyle for children.
- Offer them interesting past times or involve them in activities such as sports or art classes.
- Interact with peers under adult supervision.
- Talk to children face to face spending time outdoors and engage in reading.
- Children model their behaviour on their parents.
- Be watchful when children use any kind of device, gaming, computer or mobile phone.
- Look out for abnormal behaviour and identify symptoms early and seek medical help immediately.

Gaganyaan Mission

Context

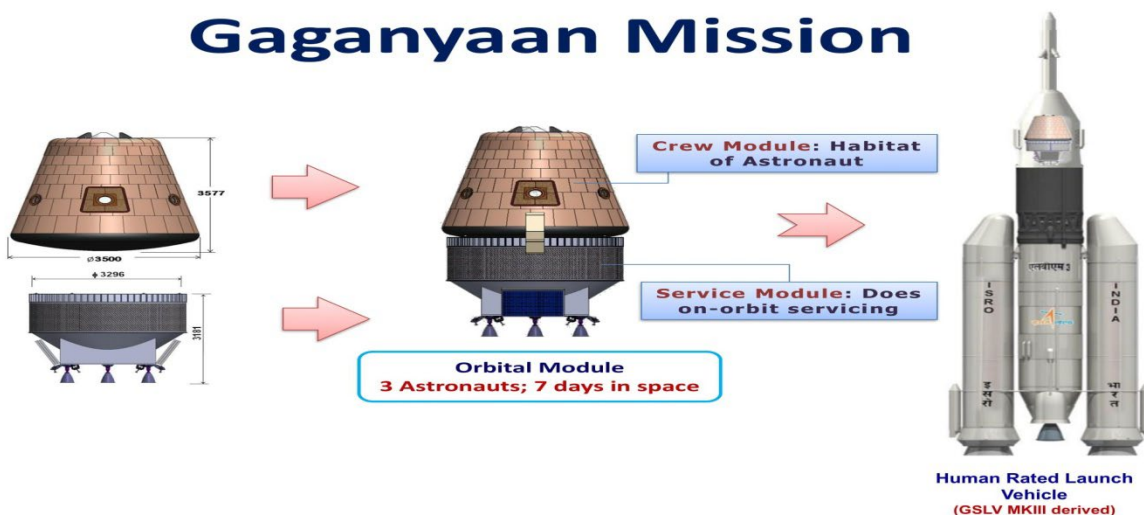
The Indian Space Research Organisation completed the static test of a human-rated solid rocket booster for the Gaganyaan Programme.

Objective

The objective of the Gaganyaan programme is to demonstrate the indigenous capability to undertake human space flight missions to LEO.

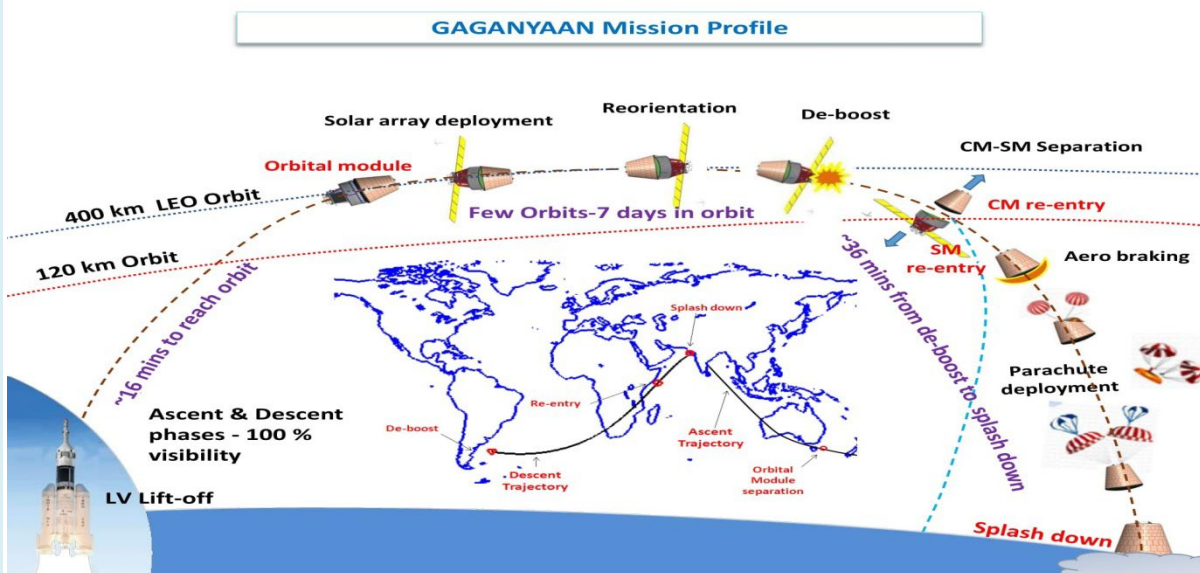
As part of this programme, two unmanned missions and one manned mission are approved by the Government of India.

Gaganyaan Mission



About Gaganyaan Mission

- The Gaganyaan Programme envisages undertaking the demonstration of human spaceflight to Low Earth Orbit (LEO) in the short term and will lay the foundation for a sustained Indian human space exploration programme in the long run.
- Prime Minister Narendra Modi announced the Gaganyaan programme during his Independence Day address on August 15, 2018.
- The target was to launch the human spaceflight before the 75th anniversary of India's independence.
- It is delayed due to the pandemic.
- With this launch, India will become the fourth nation after USA, Russia and China.
- Four Indian astronauts have already undergone training in Russia as part of the Gaganyaan Programme.
- The HS 200 is the human-rated version of the S200 rocket booster of satellite launch vehicle GSLV Mk III (LVM3).



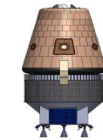
Key Points

- The Gaganyaan Programme is going to be a major National effort.
- The overall programme coordination, systems engineering and implementation will be carried out by ISRO
- Further, the Human-rated launch vehicle, crew escape system, Orbital module and essential infrastructure will be realised by ISRO utilizing the in-house expertise and with the participation of industry, Academia and National agencies.
- The private players in the country have developed significant expertise in niche areas and this will be effectively utilized in the programme.
- Astronaut trainees are selected from a pool of test pilots, based on selection criteria jointly defined by ISRO and the Indian air force which comprises flying experience, fitness, psychological and aeromedical evaluation.
- After the successful completion of the Gaganyaan programme, the next step will focus on achieving the capability for a sustained human presence in space.
- The HS 200 booster loaded with 203 tonnes of solid propellant was tested for 135 seconds.
- The 20 metres long and 3.2 diameter booster is the world's second-largest operational booster with solid propellant

- Out of the three propulsion stages of LVM3,
- The human-rated versions of the second stage known as L110-G loaded with liquid propellant.
- The third stage C25-G with cryogenic propellant is in the final phase of qualification, including tests with static firing.
- The total cost of the Gaganyaan is 9023 crores.

Indian Perspective on Sustained Human Space Flight Programme

- Technology development phase
- Two unmanned and one manned flights
- Capability to launch humans and stay in space for 7 days



Orbital Module



Major collaborating partners

- Indian Armed Forces,
- Defence Research Development Organisation,
- Indian maritime agencies- Indian Navy, Coast Guard, Shipping Corporation of India, National Institute of Oceanography, National Institute of Ocean Technology.
- Indian Meteorological Department,
- CSIR Labs,
- Academic institutes and
- Industry partners.

New technologies

- The human-rated launch vehicle,
- Crew escape systems,
- Habitable orbital module,
- Life Support System and
- Crew selection and training and associated crew management activities.



Advantages of Gaganyan's Mission

- Progress towards a sustained and affordable human and robotic programme to explore the solar system and beyond.
- Advanced technology capability for undertaking human space exploration, sample return missions and scientific exploration.
- Future capability to actively collaborate in global space station development and to carry out scientific experiments of interest to the nation.
- Unique opportunity to inspire and excite Indian youth and steer many students toward careers in science and technology towards challenging jobs that encourage knowledge, innovation and creativity.
- Create a broad framework for wider Academia-industry partnership in taking up development activities for national development.
- Ample scope for employment generation and human resource development in advanced science and R and D activities.
- The programme will strengthen international partnerships and global security through the sharing of challenging and peaceful goals.

Having a vibrant human spaceflight programme can be leveraged as a potent foreign policy tool.

Electric Vehicles: rare minerals



Top producers of rare minerals 2020

Metal	Share of key producers	India's production share
Lithium	Australia (49%), Chile (22%), China (17%), Argentina (8%), Brazil (2%)	-
Graphite	China (65%), Brazil (10%), Madagascar (5%), India (3%), Mozambique (2%)	3%
Cobalt	Congo (68%), Australia (4%), Cuba (4%), Canada (3%), Philippines (3%)	-
Manganese	South Africa (32%), Gabon (16%), China (13%), Australia (10%)	5.32%
Nickel	Indonesia (33%), Philippines (13%), Russia (9%), New Caledonia (8%) Australia (7%)	-

Expected mineral demand of the EV sector (in thousand tonnes)

	2020	2030	Growth (%)
Graphite	141.03	2,499.25	1,672
Nickel	80.47	1,566.94	1,847
Copper	110.32	1,632.63	1,380
Lithium	19.83	358.39	1,707
Cobalt	21.12	256.64	1,115
Manganese	25.34	246.28	872

EVs need more minerals than a conventional vehicle

	Conventional vehicle	Electric vehicle
Graphite	-	66.3
Nickel	-	39.9
Copper	22.3	53.2
Lithium	-	8.9
Cobalt	-	13.3
Manganese	11.2	24.5



Source: UK, British Geological Survey, IEA, India Exim Bank Research,

Context

India's automotive industry is experiencing a paradigm shift as it tries to shift to alternative and less energy demanding options like electronic vehicles.

Key Points

- The change from petrol to EV is a significant step in the move to the significant step to achieve net-zero emissions in future.
- EVs like other carbon technologies use several toxic metals in their design.
- Lithium, Nickel, Cobalt, Manganese and Graphite are required for the effective functioning of EVs.
- India is not endowed with Lithium, Nickel, and Cobalt metals used to make lithium-ion batteries.
- The anode in Li-ion batteries required graphite and there is no substitute for it.

The cathode and Nickel deliver high energy density allowing the vehicle to travel further.

Cobalt prevents the cathode from overheating and extending the life of the batteries.

Manganese contributes 61 per cent of the cathode needs of the battery.

International Energy Agency states that the metals for Electric cars require six times more than conventional cars.

- The rising demand for the process of manufacturing EVs causes cost escalation.
- The semiconductor shortage could not resolve completely and hindered multiple industries.

Top producers of rare minerals

- In 2020 Australia 49 per cent of the global lithium production.
- 65 per cent of the graphite is produced in China.
- 68 Per cent of the cobalt in Congo.
- 33 per cent of Nickel in Indonesia.

- Apart from the graphite and nickel India has a 3 and 5.32 per cent share globally.

Measures

- Similarly, the hiccup can impact India's upcoming EV industries in a big way.
- State form companies form joint ventures to secure mineral assets.
- Indian exploring companies may look at the opportunities for international companies for joint exploration and refining and trading of critical minerals.
- A dedicated cell could be created to regularly monitor the availability of the rare earth and other critical metals under the ministry of mines.
- India may like to have bilateral engagement under new platforms like QUAD to secure its needs.
- Explore the possibility of the formation of an intergovernmental body amongst the developing south something akin to the OPEC of 1960.

Artificial Intelligence (AI) - Chips

Introduction

The Artificial Intelligence (AI) Chips have risen, with chipmakers designing different types of these chipmakers designing different types of chips to power AI applications.

It includes **natural language processing (NLP), Computer vision, and robotics and network security across a wide variety of sectors, including automotive, IT, healthcare and retail.**

AI Chips with their **hardware architectures and complementary packaging, memory storage and interconnect technologies**, make it possible **to infuse AI into a broad spectrum of applications to help turn data into information and then into knowledge.**

AI Chips

- These are built with specific architecture and have integrated AI acceleration to support deep learning-based applications.
- Deep learning is known as an **active neural network (ANN) or Deep Neural Network (DNN).**
- It is a **process of collecting, analysing and interpreting enormous amounts of data faster and easier.**
- It is a subset of machine learning and comes under the broader umbrella of AI.
- **It combines a series of computer commands or algorithms that stimulate activity and brain structure.**

Types of AI Chips

1. **Application-specific integrated circuits (ASICs)**
2. **Field-programmable gate arrays (FPGAs)**
3. **Central processing units (CPUs) and GPUs**
4. **Designed for diverse AI applications**

Different from Traditional Chips

- These contain processor cores and memory, performs computational tasks, and continuously moves commands and data between the two hardware components.
- These are not ideal for AI due to higher computational necessities and workloads of huge volumes of data.
- Some of the higher-end traditional chips may be able to process certain AI applications.
- AI Chips contain processor cores as well as several AI- optimised cores (depending on the scale of the chip) designed to work in computational tasks.
- Its cores are optimised for the demands of heterogeneous enterprise-class AI workloads with low-latency inferencing.
- Due to close integration with the other processor cores are designed to handle non-AI applications.
- AI Chips essentially, reimagine traditional chips architecture, enabling smart devices to perform object detection and segmentation in real-time with minimal power consumption.

Applications

- Semiconductor firms have developed various specialised AI chips for a multitude of smart machines and devices to deliver the performance of a data centre-class computer to edge devices.
- Some of these **chips support in-vehicle computers to run state-of-the-art** AI applications more efficiently.
- AI Chips are also powering applications of computational imaging in **wearable electronics, drones and robots.**
- The use of AI Chips for NLP applications has increased due to the rise in demand for chatbots and online channels such as Messenger, Slack and others.
- NLP is used to analyse user messages and conversational logic.
- NVidia Corporation, Intel Corporation, Alphabet Inc., Samsung Electronics Co., Ltd and Apple Inc. are some of the key players in the AI chip market.
- AI processors with on-chip hardware acceleration are designed to help customers achieve **business insights at scale across banking, financial, trading, insurance applications and customer interactions.**
- Nvidia announced its H100 GPU (graphics processing unit), which is said to be one of the world's largest and most powerful AI accelerators, packed with 80 billion transistors.
- Intel launched new AI chips to provide training and inferencing data centres.

What can be expected in the future?

- AI Company Cerebral Systems set a new standard with its brain-scale AI solution paving the way for more advanced solutions in the future.
- Its CS-2 powered by the Wafer Scale Engine (WSE-2) is a single wafer-scale chip with 2.6 trillion transistors and 8, 50,000 AI optimised cores.
- The human brain contains on the order of 100 trillion synapses, the firm said, adding that a single **CS-2 accelerator can support models of over 120 trillion parameters** (Synapse equivalents) in size.
- Another AI chip design approach, neuromorphic computing, utilises an engineering method based on the activity of the biological brain.
- The increasing adoption of AI chips in data centres leads to the growth of the market.
- The worldwide AI chip industry accounted for \$8.02 billion in 2020 and is expected to reach \$194.9 billion by 2030, an annual growth rate of 37.4 per cent 2030.

India Hypertension Control Initiative (IHCI)

Cardiovascular diseases (CVD) are the leading cause of death among adults in India. One of the major drivers of heart attack and stroke is untreated high blood pressure or hypertension.

India registers success with high blood pressure (BP) treatment.

KEY POINTS-

- IHCI is a multi-partner initiative, which was started in 26 districts in 2018, and by 2022 it is expanded to more than 100 districts.
- India has more than 200 million people with hypertension but only 14.5% of individuals are on treatment.
- Since 2018, more than two million patients have been started on treatment and tracked for BP control.
- The project has demonstrated that blood pressure treatment and control are feasible in PHC settings in the diverse health system.
- Over three years, health staff at PHCs health wellness centres has been trained to provide treatment and follow-up services.
- Nearly half (47%) of the patients under care have achieved control over blood pressure.
- Availability of medications in the peripheral facilities made it easier for the patient to continue treatment and achieve BP control.
- Based on the positive experience, several states have begun expanding the reach of the initiative beyond project districts.

FIVE SCALABLE STRATEGIES-

1. A simple treatment protocol with three drugs was selected in consultation with the experts and non-communicable disease programme managers.
2. The supply chain was strengthened to ensure the availability of adequate antihypertensive drugs.
3. Patient-centric approaches were followed, like refills for at least 30 days and assigning the patients to the closest primary health centre to make follow up easier.
4. The focus was on building the capacity of all health staff and sharing tasks like BP measurement, documentation and follow-up.
5. Finally there was minimal documentation using either paper-based or digital tools to track follow-up and BP control.

DATA-DRIVEN APPROACH-

The list of people who did not return for treatment was generated through a digital system by health workers. Patients were reminded either over the phone or by home visit (if feasible). This strategy motivated a large number of patients to continue treatment.

Health wellness centres under Ayushman Bharat Yojana have specially trained nurses to check blood pressure and provide refills for patients initiated on treatment by doctors at the higher health facility.

MAKING PROGRESS-



- IHCI has worked hand in hand with the state health department to strengthen the hypertension component, to control non-communicable diseases
- Several states have started implementing the strategies beyond project districts.
- Many people with hypertension are not aware of their high BP. All health facilities can measure BP at the entry point for people who visit the doctor for any health problem.
- This strategy also known as opportunistic screening does not require additional resources.
- Extended refills up to 60 days can reduce visits to health facilities.

We must overcome the challenges to ensure early detection and treatment of hypertension to reduce preventable deaths and disability due to heart attack, stroke and chronic kidney disease.

5G

Context

Prime Minister Narendra Modi inaugurated the country's first indigenous test bed to help support the ecosystem around 5G.

The Government reiterated its plans to conduct auctions for 5G Spectrum in June and expected Services to be rolled out by the third quarter of the year.

Key points

- Service providers have been conducting 5G trials and 5G ready phones have been flooding the market.
- Radio electronics refers to a broad range of technologies that can transmit, receive and process wireless signals.
- These technologies can utilise electromagnetic spectrum that goes all the way up to 300 GHz, the lower frequencies of this spectrum are particularly attractive.
- Lower frequency signals can travel longer distances and penetrate obstacles with lesser attenuation.
- Electronic components (amplifiers, transmitters, receivers) operating at lower frequencies are also easier to design and manufacture.
- Consequently, much of the bandwidth in the lower frequencies of this spectrum has already been allocated for several applications (mobile communications currently use the spectrum from 800 MHz to 2.5 GHz).

New spectrum for 3GHz

- With the increasing demand for mobile services, the currently allocated spectrum is proving inadequate.
- At the simplest level, 5G represents the allocation of a new spectrum to increase capacity.
- Since most of the spectrum at lower frequencies is already being utilised much of this new spectrum is being allocated at higher frequencies.

- The first deployments in India will be around 3GHz but will expand to 25 GHz and beyond.
- As 5G services evolve to occupy higher frequencies, it will significantly increase the bandwidth available for mobile services.
- At these frequencies, the design of the transmitting and receiving equipment becomes more complex.
- Signal attenuation also increases. So, the coverage area of each cell tower will decrease which will require the towers to be more closely spaced.
- The physics of signal transmission is that at higher frequencies it becomes easier to direct a signal in a specific direction.
- The signals transmitted from a cell tower can be more precisely directed at a specific user.
- This enhanced directivity results in less interference between signals meant for different users which directly translate to increased capacity.
- While operating at higher frequencies has some fundamental challenges, it offers some unique opportunities as well.

Evolving communication needs

- The 5G infrastructure is being built from the ground up, there is a chance to redesign the technology to make it more suitable for the evolving communication needs of the future.
- 5G places special emphasis on low latency, energy efficiency and standardisation.
- Existing wireless communication infrastructure is primarily designed around the needs of mobile phones.
- Several emerging applications in factory automation, gaming and remote healthcare have more stringent latency requirements. The self-driving car is an illustrative example.
- Low delays between transmission and reception of messages are extremely critical when these cars have to co-operate with each other to avoid accidents.
- To ensure that there is not a corresponding increase in energy usage, 5G places a lot of importance on energy efficiency and longer battery life for mobile devices.
- Today most of the components that make up wireless telecom interact with each other using vendor-specific, proprietary protocols.
- To enable the rapid deployment of 5G infrastructure there is an industry-wide effort to standardise interaction between components.
- Greater standardisation would enable service providers to build their infrastructure, mixing and matching components from multiple vendors.
- Switching vendors would also be easier which would foster competition and lower costs.

Advanced R & D

- Positioning, Sensing and Communication technologies involve the transmission and reception of radio signals.
- Hence it is possible for positioning and sense on the back of 5G infrastructure that is primarily meant for communication.
- Traditionally, Positioning, Sensing and Communication have been seen as technologies.
- 5G is expected to significantly improve the state of the art.
- It turns out that some of the key features of 5G such as increased bandwidth availability and antenna directionality are useful for improved accuracy of positioning and sensing.
- There is also a lot of research around cost and energy-efficient electronic devices that can transmit and receive high-frequency signals.

- This involves delving into the fundamental physics of semiconductor technologies and is expected to lay the foundation for the growth of wireless technology into higher frequency bands.
- Engineers are already busy prototyping a 6G system which would utilise the large amounts of available spectrum at frequencies above 100 GHz.

5G Spectrum Auction-TRAI

Modern History

DANDI

Dandi, 16km from Navsari district is not only India's most talked about the village, but it also has a 92-year global identity which will never fade

It's the pilgrimage of the Indian national movement, where Bapu said after just making a handful of salt, "with one handful of salt, I am beginning to shake the roots of British rule"

All about Dandi March

When the British levied a tax on salt, Bapu led a nationwide salt Satyagraha with his nonviolent path. The **Civil Disobedience movement or Dandi march** as we call it

Mahatma Gandhi referred British government's salt tax as the "**most horrible levy**" 'as he defied the law, British tax on salt was extremely high and unreasonable at the time

On March 11, 1930, a gathering of over 10,000 people collected at Sabarmati for an evening prayer, where Mahatma Gandhi gave a remarkable speech about his march

He was 61 years at that time and by the time he reached Dandi; he was accompanied by 50 thousand people

When Mahatma Gandhi decided to hold a march to Dandi, he decided not to include women in this march. Mahatma Gandhi decided women would play an important role in the movement by spinning the spinning wheel and laying siege to liquor stores

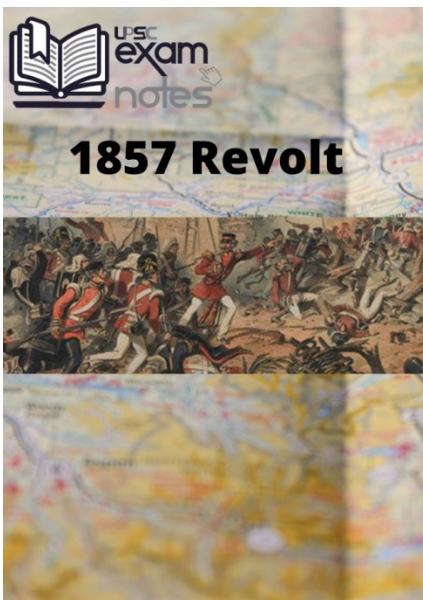
Kamala Devi Chattopadhyay met Gandhi and persuaded him to include women in this **Salt Satyagraha**

In 1936, Kamala Devi Chattopadhyay made connections outside India to help India's independence; she was elected as the President of the All India Women's conference



1857 WAR OF INDEPENDENCE

Context: It was on 1st August 1857, the day Eid Al-Adha, which gave Fredric cooper, the then deputy commissioner of Amritsar to send his Muslim men away



1. Background

- The year 1857 witnessed the first war of independence, which is perhaps one of the defining moments of the Indian freedom struggle.
- Scholars and historians ascribe many causes and among these causes, one that triggered the chain of incidents was the reaction of the Indian soldiers of the East India Company's army, to the grease of the new kind of cartridge they were compelled to use.
- Perhaps the more important causes were people's discontentment with the land taxes taken by the British government, the seizure of many kingdoms and princely states by the British, and above all, people's desire for freedom from foreign rule.
- One of the early incidents of protest by soldiers took place in Barrackpur near Kolkata.



- Soon after in May 1857, Indian soldiers of the East India Company, called by the British "Native sepoys", revolted. On March 10 they marched to Delhi and declared the Moghul King Bahadurshah II, the Emperor.
- The fire soon spread to Kanpur, Lucknow, Jhansi, Bareilly and many other parts of the Gangetic heartland, and the storm centres were spearheaded by Nana Saheb, Diwan Azimullah, Tantia Tope, Kunwar Singh and Rani Laxmi Bai.
- The big battles between the British and the rebels took place mainly in the region between the Narmada and the Ganga.
- But reverberations were felt in distant parts such as South Maratha country, some parts of South India, parts of Gujarat and Rajasthan and even in North East India in Khasi-Jaintia hills and Kuchhar.
- The significance of 1857 is that unlike many a battle against the British earlier, for the first time, simultaneously there were rebellions in many regions, imparting an all-India character to the uprising. 1857 was remarkable not only due to its unprecedented scale, covering almost half of India but also due to its impact on the popular mind everywhere. It was a source of inspiration for the freedom struggle that followed.
- Moreover, the unity that was displayed between the different communities during the uprising was quite remarkable.
- Another significant aspect of 1857 was the unity under the Mughal Emperor. The allegiance to the emperor was accepted by almost every leader in the rebellion and thus it can be said that this loyalty brought about a measure of political unity among those who were in the struggle against foreign rule.

2. Prominent leaders and their contribution to the 1857 WAR

2.1 NANA SAHEB

- Nana Sahib, the adopted son of Baji Rao II, the last Peshwa, was refused a pension by the British.
- This created indignation in the Maratha community.
- During the earlier phases of the First War of Independence in 1857, Nana Sahib pronounced his devotion to the British.
- In June 1857, Nana Saheb attacked the British entrenchment at Kanpur and captured it.
- In July 1857, the British successfully recaptured Kanpur by defeating Nana Saheb's forces.
- It is said that Nana Saheb escaped to Nepal after this.



2.2 RANI LAXMIBAI

- Rani Laxmibai also became the fierce enemy of the British after her kingdom of Jhansi was annexed by the British on the principle of the Doctrine of Lapse.

2.4 KUNWAR SINGH

- Kunwar Singh was a leader during the Indian Rebellion of 1857. He belonged to a family of the Ujjainiya clan of the Parmar Rajput's of Jagdishpur, currently a part of Bhojpur district, Bihar, India. At the age of 80, he led a selected band of armed soldiers against the troops under the command of the British East India Company. He was the chief organiser of the fight against the British in Bihar.
- He is popularly known as Veer Kunwar Singh.
- Singh led the Indian Rebellion of 1857 in Bihar. He was nearly eighty and in failing health when he was called upon to take up arms. He was assisted by both his brother, Babu Amar Singh and his commander-in-chief, Hare Krishna Singh. Some argue that the latter was the real reason behind Kunwar Singh's initial military success.
- He gave a good fight and harried British forces for nearly a year and remained invincible until the end. He was an expert in the art of guerilla warfare. His tactics left the British puzzled.



2.3 BEGUM HAZRAT MAHAL

- In Jhansi, the revolt was laid by Rani Laxmibai, whose state was annexed by Lord Dalhousie based on the Doctrine of Lapse. She rose against the British and joined the revolt. By June 1857, the English had lost control over many parts of Jhansi. When the English forces under Hugh Rose laid a siege to the fort of Jhansi, Laxmibai valiantly fought against the English troops. When it became impossible for her to hold the fort any longer, she escaped to Kalpi with lightning speed. At Kalpi she was joined by another remarkable Indian leader Tanya Tope, the commander of the forces of Nana Sahib. Both marched to Gwalior. Rani Laxmibai fell to a large number of British troops and was killed while fighting. Tanya Tope managed to escape, but he was later captured and killed by the British troops.

2.1 BAKHT KHAN

- Bakht Khan, (born c. 1797—died 1859), commander in chief of rebel forces in the early stages of the anti-British Indian Mutiny (1857–58).
- Related on his mother's side to the ruling house of Oudh, which was deposed by the British in 1856, Bakht Khan served for several years as a field battery commander in the army of the British East India Company.
- When the rebellion broke out in May 1857, he led his troops to Delhi, where he emerged as the dominant figure in the independent Indian government proclaimed by the rebels.
- To control the figurehead Mughal emperor, he established a court of administration, the members of which were elected by the army and the government departments. Forced out of Delhi by the British in September, he is said to have been killed in battle during the last days of the mutiny.



2.2 TANTIA TOPE

- Tanta Tope, also spelt Tanya Tope or Tanta Topi, original name Ramchandra Panduranga, (born 1813–19, Pune, India—died April 18, 1859, Shivpuri), a leader of the Indian Mutiny of 1857–58. Although he had no formal military training, he was probably the best and most effective of the rebels' generals.
- Tanta Tope served the former *Peshwa* (ruler) of the Maratha confederacy, Baji Rao, and of his adopted son Nana Sahib, who was also prominent in the mutiny.
- He was present at Nana Sahib's massacre of the British colony in Kanpur; in early November 1857, he had taken command of the rebel forces of the state of Gwalior and driven Gen. C.A. Windham into his entrenchments at Kanpur on November 27–28. Tanta Tope was defeated by Sir Colin Campbell (later Baron Clyde) on December 6 but remained at Kalpi, the scene of his defeat. In March 1858 he moved to the relief of Jhansi, whose rani (queen) Lakshmi Bai was besieged by British forces.
- Again defeated, he welcomed the escaping rani at Kalpi and then made a successful dash to Gwalior on June 1.
- His forces were broken up on June 19, but he continued resistance as a guerrilla fighter in the jungle until he was betrayed the following April. He was tried and executed at Shivpuri.



Raja Rammohan Roy (RRR)

Context: The government of India celebrates the 250th birth anniversary of Raja Rammohan Roy; he is also called the Father of Modern India, or Father of Indian Renaissance

About Raja Rammohan Roy:

Raja Rammohan Roy (RRR) was born on May 22nd, 1774 in Radha nagar village, Hooghly district, Bengal Presidency (now West Bengal)

He has pursued his education in Persian and Urdu in Patna, Sanskrit in Varanasi, and English in Kolkata

He was given the title of Raja by Akbar II, the Mughal emperor.

Rammohan entered the services of the East India Company as a clerk. He worked in the Collectorate of Rangpur, under Mr John Digby. He was eventually promoted to be a Dewan, a post that referred to a native officer entrusted with the role of collecting revenues.



RRR Contributions

- **RRR** efforts were instrumental in eradicating the purdah system and child marriage.
- In 1814, he started the **Atmiya Sabha (Society of Friends)**, to nurture philosophical discussions on the idea of monotheism in Vedanta and to campaign against idolatry, casteism, child marriage and other social ills. The Atmiya Sabha would make way for the Brahmo Sabha (later Brahmo Samaj) in 1828, (to institutionalize his ideas and mission), set up with Debendranath Tagore, Rabindranath Tagore's father, a group of people, who had no faith in idol-worship and were against the caste restrictions
- The principles of the samaj were defined in the Trust Deed
- Prayers, meditation and readings of Upanishads were to be a form of worship and no graven image, statue or sculpture, carving, or painting was allowed in the samaj building.

His ideas and activities were aimed at the political upliftment of the masses

- He advocated the introduction of an English Education System in the country teaching scientific subjects like Mathematics, Physics, Chemistry and even Botany.
- He paved the way to revolutionizing the education system in India by establishing Hindu College in 1817 along with David Hare which later went on to become one of the best educational institutions in the country producing some of the best minds in India. His efforts to combine true to the roots theological doctrines along with modern rational lessons saw him establish the Anglo-Vedic School in 1822 followed by the Vedanta College in 1825.
- RRR efforts were rewarded in Bengal Sati Regulation or Regulation XVII, A. D. 1829 of the Bengal Code was passed, which declared the practice of Sati a crime.
- Roy attacked polygamy and demanded the right of inheritance and property of the widow.
- He demanded the abolition of taxes on tax-free land.
- He demanded a reduction of export duties on Indian goods abroad and the abolition of East India Company trading rights.

Also demanded the Indianisation of superior services, and judicial equality between Indians and Europeans

Publications: Tuhfat-ul-Muwahhidinor, A Gift to Monotheists (1905), Vedanta (1815),

Ishopanishad (1816), Kathopanishad (1817), Moonduk Upanishad (1819), The Precepts of Jesus - Guide to Peace and Happiness (1820), Sambad Kaumudi - a Bengali newspaper (1821), Mirat-ul-Akbar - Persian journal (1822), Gaudiya Vyakaran (1826), Brahmapasona (1828), Brahmasangeet (1829) and The Universal Religion (1829)

FIRST PRESS FREEDOM MOVEMENT-

He brought out a newspaper in Persian called '**Miratul- Akhbar**' (the Mirror of News) and a Bengali weekly called 'Sambad Kaumudi' (the Moon of Intelligence). Sambad Kaumudi first Indian newspaper edited published and managed by Indians.

In those days, items of news and articles had to be approved by the Government before being published. Ram Mohan protested against this control by arguing that newspapers should be free and that the truth should not be suppressed.

His '**Gaudiya Byakaran**' in Bengali is the best of his prose works.

A polyglot, Roy knew Bengali and Persian, but also Arabic, Sanskrit, and later, English. His exposure to the literature and culture of each of these languages bred in his scepticism toward religious dogmas and social strictures. In particular, he chafed at practices such as Sati that compelled widows to be immolated on their husband's funeral pyre. Roy's sister-in-law had been one such victim after his elder brother's death, and it was a wound that stayed with him.

In an exposition of the Revenue and Judicial systems in India-In he raised some very important questions on the administration system and also urged the government to separate the legislative and judicial powers.

He suggested 22 years as the minimum qualification age for the appointment to the civil services. He advocated the Jury system also.

ARCHITECTS OF MODERN INDIA

1. Introduction

- In today's fast-moving world and tough competitive day-to-day life, the youth hardly find time for remembrance of our rich heritage and past.
- This becomes most crucial whilst the nation celebrates Azadi ka Amrit Mahotsav (commemoration of 75 years of Indian Independence).

- The fight against colonial rule in India constitutes a unique narrative, one which is not marred by violence.
- Rather a narrative that is full of variegated stories of valour, bravery, Satyagraha, dedication, and sacrifice across the length and breadth of the subcontinent.
- These stories compose the rich Indian cultural heritage and traditions.
- Thus, the unsung heroes need not necessarily define the lesser-known freedom fighters.
- They may, at times, be the leaders whose ideals delineate the Indian value system.

2. Sheel Bhadra Yajee:

- **Sheel Bhadra Yajee** joined Subhash Chandra Bose to found the **All India Forward Bloc** and **actively associated with the INA movement**.
- **Sheel Bhadra Yajee** was a social activist from **Bihar** who was associated with the **non-violent and violent form of the Indian independence movement**.
- Pandit Sheel Bhadra Yajee's birth took on **22 March 1906** at **Bhaktiarpur village in Patna district of Bihar**.
- He was the only child of **Pandit Shivtahal Yajee and Smt. Reshma Yajee**.
- **Sheel Bhadra's mother** died when he was just **10-years-old**.
- Yajee's involvement in the **freedom movement** began in 1928 when, as a student, he attended the **Calcutta Session of the Indian National Congress**.
- He affixed to the **Congress Socialist Party** four years later and became involved in the **Kisan movement**.
- Later, he came in near touch with **Subhash Chandra Bose and Mahatma Gandhi**.

3. Chandraprabha

- The inaccessibility of education for girls perturbed Chandraprabha and prompted her to take up this cause.
- Chandraprabha Saikiani was deeply affected by how ingrained the caste system was in India.
- When she saw that evils were not being eliminated, she took the matter into her own hands and started the *Hajo Hayagriva Madhava* temple, which was open to every person irrespective of caste, gender and class.

4. Laxman Nayak- The Gandhi of Malkangiri

- The tribal society of Odisha has made an immense contribution to the national cause.
- With their courage and patriotism, they constantly challenged the foreign rulers.
- Laxman Nayak is one such great tribal hero who sacrificed his life for the country during the Quit India Movement.
- Nayak followed Gandhian principles of truth, non-violence and peaceful non-cooperation throughout his life to oppose the cycle of repression by the British and strengthened the principle of Swaraj by advocating the use of Charkha through door-to-door campaigns.
- He spread the message of Quit India among the tribal of Odisha, which helped in intensifying the movement.

- In such a scenario, the administration framed Laxman Nayak in a murder case, and eventually, he was sentenced to death.
- He was so sure about the country's independence that he always used to say, "If the sun is true, the moon is also true, then it is equally true that India will also be free."

5. Basanti Devi

- She was born on 23 March 1880 and was married to the fiery nationalist Chittranjan Das at the age of 17 years.
- She also took part in the freedom struggle and was arrested in the non-cooperation movement of 1921.
- She was President of Bengal Congress during 1921-22.
- After the death of her husband C R Das, she took care of the journal Bangaler Katha.
- It was she who exhorted Indian youth to assert Indian dignity after the British police attack on Lala Lajpat Rai.
- Netaji Subhas Bose considered her as an 'adoptive mother'.
- She was honoured with Padam Vibhushan in 1973 and passed away on 7 May 1974 at the age of 94 years.

6. MA IYENGAR

- Ayyangar was drawn into the freedom movement at a very early age. Within his home state, he was one of the leading figures of the Indian National Congress which were spearheading the National Movement against British colonialism.
- Responding to Gandhi's call for 'Non-cooperation' with the British establishment, Ayyangar suspended his legal practice for one year from 1921-to 22.
- When the Congress withdrew its policy of boycott of Councils and decided to contest the elections for the Central Legislative Assembly in 1934, Ayyangar was elected to the House with an overwhelming majority. The objective of the Congress in contesting the election was to fight the Government from within.
- Ayyangar initiated several programmes for the economic and social uplift of the Harijans.

ARCHITECTS OF MODERN INDIA-II

LAL BAHADUR SHASTRI

- He was the second PM of India
- Made call for Green revolution and White revolution which ensured food security and production of milk increased.
- He was only sixteen years old when Mahatma Gandhi called for joining the non-cooperation movement.
- Raised slogan Jai Jawan Jai Kisan (former PM Atal Bihari Vajpayee added to this Jai Vigyan), PM Narendra Modi added to this Jai Anusandhan.
- First person to posthumously awarded Bharat Ratna 1966.

- He was a minister in the Union cabinet from 1951 to 1956 when he resigned taking responsibility for the railway accident.
- Two major challenges the country faced during his Prime Ministerial ship – failed monsoon, drought and war with Pakistan 1965

VEER CHANDRA SIGH GARHWALI

- He was leading Garhwal Regiment and refused to open fire on unarmed Pathans in Peshawar protesting against foreign cloth and goods fighting for freedom of the country under the leadership of Khan Abdul Gaffar Khan.
- Mahatma Gandhi honoured him by giving him the name Garhwali.
- He participated in the Quit India movement in 1942
- In 1994 Government of India issued a postage stamp in his honour.

UTKALMANI GOPABANDHU DAS

- Eminent social reformer from Orissa, the people of Orissa knows him as Darida Sakha that is a friend of the poor.
- He was a social worker, freedom fighter, journalist, and litterateur.
- He brought out the newspaper Samaj in 1919

ANNIE BESANT

- She joined Indian National Congress, and became President of Congress in 1917.
- She worked for the upliftment and education of the masses.
- She started Central Hindu College which became one of the first colleges of Banaras Hindu University.
- She was awarded the Doctor of Letters degree for her outstanding contribution in the field of promoting education in India.
- She founded the newspaper Common Ville in 1914 and bought Madras Standard and named it New India.
- She was converted to Theosophy after meeting Helena Blavatsky in 1889.
- She came to India for the first time in 1893 as part of the Theosophical society
- She was president from 1907-to 1933.
- She launched the All India Home rule league in 1916 along with Bal Gangadhar Tilak, this was the first Indian political party that advocated self-rule
- She tried to remove social evils spread in India like child marriage, and the caste system and advocated for widow remarriage.
- She was president of the Theosophical Society for life.
- She was cremated at Ganga ghat in Banaras.

MUNSHI PREMCHAND

- In 1905 his first story collection Soz e Watan was published in Urdu, these stories contained the voices of rebellion against the British rule.
- His uncle used to call him Nawabai and he published his first story collection under the same name, the British banned his book and copies were burnt, and an order was issued by the collector to restrain him from writing after which he started writing under the name Premchand.
- Participated in the non-cooperation movement.

- Storybooks- Kafan, Lottery, Poos Ki Raat, Balidan, Saut, Cricket Match, Boodhi Kaki, Durga Mandir, Duniya ka sabse Anmol Ratan
- Novels- Soz e Watan, Pream, Vardaan, Bazar e Husn, Karmabhoomi, Gaban, Godaan, Bewa, Premashram.

LOKMANYA TILAK

- Slogan –Swaraj is my birth right- that inspired every Indian.
- He was called the father of Indian unrest by British authorities
- Started two dailies MARATHA DARPAN (English) and KESARI (Marathi)
- Also published articles on the trial of revolutionaries Khudiram Bose and Prafulla Chaki in his newspaper Kesari.
- Tilak along with N.C Kelkar edited Maratha
- Founder of Deccan Education society 1184 along with associate Gopal Ganesh Agarkar and others
- One of the founders of Fergusson College in Pune through the Deccan education society.
- Joined INC in 1890
- He used Hindu scriptures to arouse people to fight against oppression
- He was part of Lal Bal Pal trio (Lala Lajpat Rai , Bipin Chandra Pal, Bal Gangadhar Tilak
- His Gita Rahasya was written during his stay in Mandalay jail regarding the interpretation of Shrimad Bhagavad Gita considered his most prolific work, it has been translated into many languages
- He spent six years in Mandalay jail for defending the actions of revolutionaries Khudiram Bose and Prafulla Chaki.
- Besides Gita Rahasya also wrote Arctic Home of the Vedas
- Started Ganesh Utsav and Shivaji Utsav in Maharashtra to complete the program of public awareness the purpose of these festivals are to instil patriotism and courage in the people.
- SURAT SPLIT reasons-
- BETWEEN Moderates and Extremists, Extremists wanted Tilak or Lajpat Rai to be president finally Rash Bihari Ghose was appointed as president.
- While Extremist wanted to end tyranny rule of the British through protest, Moderates were aimed at administrative and constitutional reforms
- All India Home Rule League was founded by Tilak in 1916 at Belgaum, it worked in Maharashtra (except Bombay), Central province, Karnataka, and Berar.
- Luck now pact 1916 between the INC headed by Tilak and All India Muslim League led by Muhammad Ali Jinnah for Hindu Muslim unity in the nationalist struggle.

Indian Heritage & Culture

Mahavir Jayanti

Mahavir Jayanti is celebrated every year on the 14th of April to celebrate the birth anniversary of the 24th thirthankara, the last spiritual leader of the Jain community.

It is a very important festival in Jainism; people observe fast and do prayers in remembrance of Lord Mahavira.

This is a gazetted holiday for India, this festival falls on the 13th day of the Chaitra month of Hindus which is the 14th of April

The festival falls on the 13th 'sud' day of the Jain calendar Chaitra month which is also called Veer Teras

Rishbanatha:

Rishbanatha is the first thirthankara of 24 thirthankara; he is also called **Lord Bull**.

Rishabha (Bull) appeared in his mother's dream before his dream, so they named him **Rishabhanatha**

Chakravartin is the son of Rishabanatha, some treat him as the first thirthankara, and he has a monolithic structure at shravanabelagola, Karnataka

Parshvanatha (Ford Maker - Saviour):

Parshvanatha is the 23rd thirthankara of 24 thirthankara. He is the only thirthankara who gained the title of **Kalikalkalpataru**

In Jainism, three jewels also Known as **ratnatraya** are the following

1. Samyagdarshana-Right faith
2. Samyagnana-Right Knowledge

3. Samyakcharitra-Right Conduct

Metaphysics of Jainism

According to Jain thoughts, the basic constituents of reality are

1. Souls-jiva
2. Matter-pudgala
3. Motion-dharma
4. Rest-adharma
5. Space-akasa
6. Time- Kala

Space is understood to be infinite in all directions, but not all of space is inhabitable

Anekantavada

It is a Jain metaphysical doctrine, which holds that reality is many-sided and that all entities are endowed with innumerable characteristics

Anekantavada affirms the **multifaceted not one-sided reality of truth**

It is explained by the ancient Indic story of a Blind man with an Elephant

Five blind men had never seen an elephant, one day elephant was brought to the village. These five blind men went and touched it in attempting to describe it.

First man: Standing by the Trunk describes it as a thick branch of a tree

The second man: standing by its tail describes it as a rope disagrees with the first man

Third man: standing by the side of an elephant describes it as a great wall

Fourth man: standing by the elephant's leg describes it as a Pillar

Fifth man: touching the ear of it describes it as a huge fan

Sixth Man who is nearby and can see disagrees and quotes "All are right but partially right"



Baisakhi Festival

Reference: Indian express

Baisakhi festival, also called Vaisakhi is the harvesting festival of Punjab, which people across the region celebrate

Religious importance

Apart from harvest, the day has special religious importance too.

On March 30, 1699, Guru Gobind Singh established the **Khalsa**. Who was the 10th and last Sikh guru of this religion?

It is also known as Vaisakha Sankranthi, it marks the beginning of the solar New Year, based on the Hindu Vikram Samvat Calendar

On the Day of Baisakhi Guru Gobind asked people to sacrifice their life for Guru and Lord? Soon, five people volunteered they are known as Panj Piaras

Auwat Pauni: this is the tradition associated with harvesting, which involves people getting together to harvest the wheat



Muziris (Musiri)

Pattanam excavations were the first-ever multidisciplinary excavations undertaken in Kerala state

The main objective of this excavation is to find archaeological evidence that would help to identify/locate an early urban settlement and the ancient Indo-Roman port of **Muziris or Musiri on the Malabar Coast**



Key Findings

- The excavation suggests that the site was first occupied by the indigenous "Megalithic" (iron age) people, followed by the roman contact in the early historic period
- Site was completely occupied at least from the 2nd BC to the 10th century AD
- The maritime contacts of this region during the Early Historic period seem to be extensive
- Found a large number of Roman amphora shreds, a few terra sigillata shreds, Sassanian, Yemenite and other west Asian Potteries
- Proliferation of roulette ware probably made in the Bengal-Gangetic region signifies the site's importance in the pan Indian context as well
- Human bones, storage jars, gold ornaments, a glass beads, early Chera coins, brick wall, and brick platform, were all the important things found at the site

Basavanna

Context: Basava Jayanti was celebrated on the day of the agrarian festival Akshaya Triti

Basava Jayanti is a Hindu festival celebrated by Lingayats in Karnataka, Telangana, and Andhra Pradesh to honour the Birthday of Lord Basavanna

The main objective of the celebration is to share the ancient wisdom of universal brotherhood, "Vasudhaiva Kutumbam"



About Basavanna

Basavanna is a 12th-century poet and Philosopher, who is celebrated and held in high regard, especially by the **Lingayat Community**, since he is the founder of this **Lingayatism**

He married his maternal uncle's daughter Sharane Neelganga, took a position as an accountant in the palace of King Bijjala

Basavanna became Finance Minister and Prime Minister in the King's Court

- Basavanna made a significant contribution to developing the **Sharana Community**
- Sharana community has produced great poets like **Akka Mahadevi** and **Allam Prabhu**
- Basavanna fought against the bad practices of society and tried to change with his deep social knowledge and poetry known as **Vachanas**
- He rejected gender or social discrimination, superstitions and rituals but introduced Ishtalinga with an image of the Shiva Linga, to every person regardless of his or her birth, to be a constant reminder of one's Bhakti to shiva
- He established **Anubhava Mantapa**-a place where Allamprabhu and Akka Mahadevi were being a part, it is a spiritual and socio-religious academy
- He championed devotional worship, rejected temple worship and rituals led by brahmins and replaced it with personalized worship of Lord Shiva



Nalanda

Nalanda, the ruins of one of the world's most prestigious seats of learning, which is located 95 kilometres from Bodhgaya, the place where Buddha gained enlightenment

- Rajgir, a place closely associated with many prominent dynasties like Mauryas, Guptas, and Nandas lies within a radius of 12 km
- Nalanda is declared a World Heritage site in 2016
- Nalanda is the most ancient University, established much before the Europeans University Bologna which came into existence in the 11th or 12th century
- The site is described as **Mahavihara**, a great monastery
- Nalanda was a premier monastic-cum-scholastic establishment in medieval India



Archaeology references vs. Literature references

- **Archaeological excavations** conducted in 1915-37 and 1974-82 brought to light monuments, sculptures, and artefacts. which gave an idea of the layout of the site, phase of construction and achievements
- With **Literary sources**, most of the information on the history, functioning and layouts of Mahavihara

Travellers Insight

- Chinese Buddhist monks such as Xuanzang (Hiuen Tsang) and Yijing (I Tsing), both travelled to India and stayed in the great monastery complex in the 7th century
- Xuanzang account links to both Buddha and the Mauryan king Asoka with Nalanda
- He writes that the monastery was originally a mango grove, which 500 merchants purchased for 100 million coins and gifted to Buddha
- Chinese monks state that Asoka constructed Stupa in honour of **Sariputra**, one of the Buddha's closest disciple

The Dynasties

1. Guptas (300-600E)

- The rulers of the Gupta dynasty are in general patronising Brahman cults, but some of them supported Buddhism
- Gupta king Vikramaditya sent his wife and son Baladitya to study under the famous Buddhist scholar Vasubandhu, who was based at Nalanda
- Tests mention that Narasimhagupta become a monk and gave up his life through meditation
- Xuanzang mentions the special royal connection with Nalanda
- Soon after Buddha's demise king Shakraditya built a monastery at the site, and his son Buddhagupta built one south of the earlier one
- Succeeding Gupta kings also built monasteries near Shakraditya monastery (Tatagatagupta)

2. Vardhana Dynasty (606-647CE)

- Harshavardhana, the king of Kanauji who ruled over modern Bihar, West Bengal and Bangladesh, Xuanzang visited Nalanda during Harshavardhan's reign
- Seals and inscriptions were found at the Monastery

3. Palas

- Palas were known to be Buddhists
- Dharma Pala, the second pala has helped to construct two monasteries: **Somarpura** and **Vikramshila**
- An inscription from Nalanda records his gifting of a village to the upkeep of monasteries
- Devapala, Dharmapala's Successor helped a ruler Suvarnavipa (Sumatra), Balaputra, to build a monastery at Nalanda, and acquired five villages to support Monastery
- Palas Period is all about the production of Sculptures and images and gave lot of gifts to Mahavihara

Mahavihara as a University

Xu Li, biographer of Xuanzang writes that there were 1000 monks at the Nalanda who could explain 20 collections of Sutras and Shastras (religious texts)

Xuanzang claims there were 10,000 students at the Mahavihara, but Yijing claims 3,000

Outsiders were often allowed inside after an Oral Examination conducted by the gatekeeper

Nalanda attracted students from China, Korea, and Japan and Countries like South East Asia and Central Asia

PHILOSOPHY OF JAINISM THROUGH ECONOMIC LENS

ECONOMICS OF JAINISM

1. Background

- The world is juxtaposed with all kinds of people like happiness with **misery, rich and poor, health and diseases, peace with miseries, comforts and discomforts and the like.**
 - Human sufferings **are inevitable and pervasive.**
 - The human beings through the practice of virtues should identify the peace and potentialities. **The growth of mankind and individuals i.e. human development leads to sustainable economic development.**
 - The latter is guided by the virtues prescribed in all **religions, especially Jainism.**
 - The great religion Jainism contributed significantly to sustainable economic development through **human development.**
- **Religion and economics are converging.**
 - But science and technology have created a new world of **materialistic prosperity. Material gain has been purchased with a spiritual loss.**

2. Jain philosophy on Economics

- The Jain view of life-based on Ahimsa is extremely close to the theory of sustainable economic development which is needed in the present consumer-oriented economic system.
- Mahavira's economics accepts **both materialism and spiritualism.**
- While the ultimate goal of modern economics is for its citizens to become **wealthy (that is, wealth = happiness)**, the objective of the economics of Jainism is to live life peacefully and **happily (that is, limit to wealth = peace + happiness).**
- It acknowledges one of the ignored tenets during the accumulation of wealth — that is, **happiness comes through peace.**
- Jainism is one of the most ancient religions which came into existence as a result of the most **non-violent approach and humanitarian** viewpoint towards all creatures.
- They preached silently the virtues of **non-violence, non-attachment and non-consumerism**, where less importance is given to individual interest.
- Jainism forces one to find out the meaning of the essence of reality, Awareness of reality with trust developed in the right view combines with a willingness to practice self-discipline which controls mind thought, speech, action and passions. **This awareness produces an attitude of detachment and non-possession.**
- The philosophy of Jainism correlates economy towards the total living of a country that has got the **right to survive with co-existence.**

3. Emphasis of Jainism on sustainable economic development

- Sustainable Economic Development In this context Ācharya Mahapragya in their book Economics of Mahāvīra expounds on Mahāvīra's idea of sustainable development. While thinking about sustainable economic development, the following points are to be considered.
 - Ahimsa and purity of means
 - Non-erosion of moral values
 - Limits to self-interest
 - Ahimsa and purity of means

- Bhagwan Mahaveera said that **nobody can object to economic development in society**. But it should be achieved through **ethical means** of ahimsa and not by unethical means of violence.
- In modern society there is a dichotomy of **economic performance and ethical performance**.
- Ethical performance implies that earning income by honest means is relatively low. On the other hand, high **economic performance will contain a tinge of unethical means**. Ahimsa based on three jewels advocates ethical performance and discards high **economic performance for the wellbeing of society** on a sustainable basis in the long run.

4. Jainisms ethical approach toward economics

- Lord Mahaveera proposes that in the **name of earning wealth human values should not be sacrificed**.
- In achieving economic development value should not be allowed to vanish. But nowadays in **earning wealth human values and ethics are sacrificed in the name of economic development**.
- This kind of development leads to the impoverishment of crores of people. Thus the development of **compassion and sensitivity is more important than mere economic development**.
- Hence in **Jainism greater importance is given to sacrifice and charity**.
- It is said that in India **62% of the total charity fund is contributed by Jains**.

5. Self-interest aspect in economics

- Lord Mahaveera speaks of **three possible kinds of lifestyles**.
- **Limited desires – limited possession – limited violence**
 - Unlimited desires – unlimited possession – unlimited violence Free from desires – non-possession – non-violence.
 - Thus desires, possession (aparigraha) and violence cannot be segregated.
- The greed for possession has no bounds and causes great economic discord in society and is responsible for various conflicts.
- According to Jainism, **Aparigraha or putting limits to accumulation** is the only way that will reduce the gap between rich and poor and fair distribution of wealth is also possible.
- This is how Relative economics based on the philosophy of non-violence and Aparigraha helps to attain sustainable economic development. Hence the lure of economic development is not the exclusive function of economic motivations alone, but it has much to do with the religious beliefs of the people.

6. Approach of Jainism towards Socio-Economic Development

- This means the setup of society based on **egalitarianism** is free from all sorts of discrimination.
- The complexities of inferiority and superiority created inequality that resort to violence.
- Violence brings disharmony, polluting individuals as well as society.
- For example, Naxalites, Maoists, and terrorists are indulging in violent activities in India because of social and economic inequality.
- A non-violence man finds all are equal despite external differences. **Thus Jain view of non-violence gives all happiness**.
- This noble idea of nonviolence can be the solid foundation of an egalitarian society and lead to a better special social order.

- Thus religion is the bedrock for ethical and economic performance especially when it comes to the philosophy of Jainism.

7. Way Forward

- Finally it can be concluded with valuable suggestions about **ethical Jain religion and sustainable economic development.**
- Set Up an unbiased international Centre for Relative economic system to look into the pros and cons of the **present economic system.**
- The Government should adopt **Relative economic policies to come out of the present economic system.**
- For sustainable development importance is to be given to **Gross National Happiness rather than Gross National Product.**
- Resources possession should be in a **judicious way because excess of anything is dangerous to him, to the society and to the environment ultimately leading to violent activities.**

Acts and Policies of Environment & Ecology

In the recent years, numerous environmental problems have become threatening for human welfare. An important aspect of environmental problems is that their impact is not confined to the source area but spills over wide area.

- To curb the destructive practices of unscrupulous people, forest mafia groups, poachers, polluters and over-exploitation of environmental resources, effective legislation is necessary. Pollution is an important factor and it does not observe legislative jurisdictions.
- To avoid these problems environmental legislation is necessary in international level.
- Most of the International legislations are agreements to which nations adhere voluntarily. These agreements are finalized through international conventions or treaties.
- Nations that are bound by the conventions are called Parties.
- Convention provides a framework to be respected by each party, has to adopt its own national legislation to make sure that convention is implemented at the national level.
- A protocol is an international agreement that stands on its own but is linked to an existing conventions.

WETLAND CONVENTION-

It is an international convention came in force in 1975. It deals with international cooperation for the conservation of wetland habitats. The UNESCO(United Nations Educational, Scientific and Cultural Organisation) serves as the depository for convention, its secretariat, Ramsar Bureau, is in Gland, Switzerland. India became signatory to this convention in 1981.

- This convention aims to halt the loss of wetlands, to ensure the conservation of fauna-flora and their ecological process.
- 6 Ramsar wetlands in India are included in this convention.
- Promoting wise judicious use wetlands, including mangroves; managing wetlands for the benefit of water fowl.

MONTREAL PROTOCOL-

The United Nations Environment Program(UNEP) addressed about the Protection of Ozone Layer in Vienna in 1985. Through this convention, nations committed to protect the ozone layer and to cooperate with each other in scientific research to improve understanding of the atmospheric processes and serious consequences of ozone depletion.

To pursue the objectives of convention for the protection of ozone layer the Montreal Protocol on substances that deplete the ozone layer was agreed by nations in 1987 and was amended five times so far. The five amendments were-

1. Protocol adopted in London(1990)
2. Copenhagen(1992)
3. Vienna(1995)
4. Montreal(1997)
5. Beijing(1999)

Another amendment it was implemented in Kigali(2016) but not in force.

The protocol aims to reduce and eventually eliminate that emissions of man-made ozone depleting substances. The Vienna convention and Montreal protocol are considered as highly effective regime for reducing the emission of chemicals causing ozone depletion.

CLIMATE CONVENTIONS-

- Global warming (green house effect) is probably the greatest threat to the future of the planet.
- It is mainly caused by gases like carbon dioxide, methane, nitrous oxide, CFCs emitted by industrialized countries on burning of fossil fuels(coal, oil, gas) for electricity, heating and transport.
- At the global level, countries around the world have expressed a firm commitment to stop climate change under the auspices of the UNFCCC(United Nations Framework Convention on Climate Change).
- UNFCCC is the landmark international treaty unveiled at the United Nations Conference on Environment and Development in Rio de Janeiro, June 1992.
- The UNFCCC commits signatory countries to limit anthropogenic(man made) greenhouse gas emissions two levels that would prevent dangerous anthropogenic the climate system.
- In pursuance with the objectives of the convention on climate change the Kyoto Protocol was agreed in December 1997 in Kyoto, Japan.
- The protocol's first commitment period started in 2008 and ended in 2012.
- A second commitment period was agreed in 2012 known as Doha amendment to the Kyoto Protocol.
- Negotiations were held in the framework of the yearly UNFCCC climate change conferences on measures to be taken after the second commitment period ends in 2020.
- This resulted in the 2015 adoption of the Paris agreement, which is a separate instrument under the UNFCCC rather than an amendment of the Kyoto protocol.
- The Paris agreement deals with greenhouse gas emissions mitigation, adaptation and finance, starting in the year 2020.
- The agreement rose negotiated by representatives of 196 state parties at the 21st conference of the parties of the UNFCCC near Paris and adopted by consensus on 12th December 2015.
- As of November 2018, 195 UNFCCC members have signed the agreement, and 184 have become party to it.

- The Paris agreement's long term goal is to keep the increase in global average temperature 2 below 2⁰ centigrade, above preindustrial levels; and to limit the increase to 1.5⁰ centigrade, as this would reduce the effects of climate change.
- Countries furthermore aim to reach "global peaking of greenhouse gas emissions as soon as possible."
- The Paris deal is the world's first comprehensive climate agreement.

BIOLOGICAL DIVERSITY CONVENTION(CBD)-

- CBD was adopted during The United Nations Conference on Environment and Development(UNCED) in Rio de Janeiro on 5th of June 1992.
- More than 150 states have signed the convention on 29 December 1993.
- India ratified the convention in 1994.

ENVIRONMENTAL LEGISLATIONS IN INDIA-

- After the United Nations Conference on Human Environment, held in Stockholm 1972, The Indian constitution was amended to include protection of the environment as a constitutional mandate.

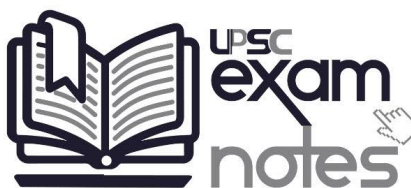
IMP(M(TEGRATE D MAINS & PRELIMS MENTORSHIP)

Price-1000/Year

- **Prelims & Mains Test Series(Every Sunday)**
- **Mentor (Subject Expert)**
- **Notes Making Platform**
- **Compilation of Books**

.....

Upscexamnotes
Abode for Affordable
Success



Mission 2023
From August 1st
2022

Upscexamnotes.com

OPTIONAL SUBJECT MENTORSHIP (OSM)

PRICE 5000/YEAR

- **Prelims & Mains Test Series**
- **Mentor (Subject Expert)**
- **Notes Making Platform**
- **Compilation of Books**
- **Optional Subject Test Series**

OPTIONAL SUBJECT MENTORSHIP

**Optional Subject
Notes**

