LAST MILE FACTS

KARMAYOGI IAS ADITYA SIR

Dear friends,

This Last Mile Facts Book is for all those who struggle to make short notes or don't have any factbook to revise important themes. I know how hard it can be when facts are scattered or too long. That's why I made this—so your last-mile prep becomes easier.

This book is possible only because of the love and support of my team and the sacrifices of my mother. I'm here today because of them.

With heart,
Aditya Sir

YOUTUBE CHANNEL- KARMAYOGI IAS

Emergency Provisions

Aspect	National Emergency (Article 352)	President's Rule (Article 356)	Financial Emergency (Article 360)
Grounds for Declaration	• War• External Aggression• Armed Rebellion (earlier termed 'Internal Disturbances' until 44th Amendment Act, 1978).	• Failure of constitutional machinery in a state. • Breakdown of law and order or inability of the state to operate as per the Constitution.	• Threat to financial stability or creditworthiness of India.
Parliamentary Approval	• Must be approved by both Houses of Parliament within **1 month** by a **special majority**.• Further approval required every 6 months.	• Must be approved by both Houses of Parliament within **2 months** by a **simple majority**. • Can be extended every 6 months, up to 3 years.	• Must be approved by both Houses of Parliament within **2 months** by a **simple majority**.
Revocation	Can be revoked by the **President** at any time.	Can be revoked by the **President** at any time.	Can be revoked by the **President** at any time.
Implementation History	• Invoked three times: - **1962**: India-China War - **1971**: Indo-Pakistan War - **1975**: Internal Emergency.	• Invoked over 125 times.Notable instances: - **1980**: Dissolution of 9 state governments. - **1994**: Used in Uttar Pradesh (SR Bommai case).	Never invoked in India.
Effects	• Centralization of power; unitary structure prevails. • Suspension of Fundamental Rights under **Article 19**. • Term of Lok Sabha and State Legislatures can be extended by 1 year at a time. • Laws inconsistent with Fundamental Rights cannot be challenged in court (Article 359).	• Central government assumes control over the state's executive and legislative powers. • State Legislature may be dissolved or kept in suspended animation. • Judicial review allowed (SR Bommai case, 1994).	• Central government directs financial matters in states. • Salaries and allowances of state officials, including judges, can be reduced. • Money Bills passed by state legislatures may require Presidential approval.
Judicial Review	Judicial review is limited but courts can examine the basis for the proclamation (Minerva Mills Case, 1980).	Subject to judicial review; misuse of Article 356 was curbed by the **SR Bommai judgment, 1994**.	Not yet tested judicially as it has never been invoked.
Key Amendments	• 44th Amendment Act, 1978: - Changed 'internal disturbances' to 'armed rebellion'. - Strengthened safeguards by requiring special majority approval. - Restored Fundamental Rights under Articles 20 and 21.	• 42nd Amendment Act, 1976: - Extended the duration of emergency without parliamentary approval.• SR Bommai Judgment, 1994: - Restricted misuse of Article 356.	No significant amendments, as Article 360 has never been implemented.

Recent Developments	• Discussions on misuse of emergency provisions during **1975 Emergency** continue. • Concerns raised over potential overreach of executive power during crises like COVID-19.	• President's Rule imposed in **Maharashtra (2019)** and **Jammu & Kashmir (2018)**. • Calls for reviewing Article 356's application in politically sensitive situations.	Discussions on potential reforms in financial decentralization in light of federal challenges.
PYQ References	• **CSE 2019**: Role of the President during a National Emergency. • **CSE 2021**: Fundamental Rights during Emergency. • **CSE 2023**: Article 352 and its amendments.	• **CSE 2020**: SR Bommai case implications on President's Rule. • **CSE 2022**: Grounds for invocation of Article 356.	• No PYQs as Article 360 has not been invoked.

Scheduled and Tribal Areas

Aspect	Details
Constitutional Basis	**Article 244** governs the administration of Scheduled and Tribal Areas.
Scheduled Tribes (STs)	• Represent **8.6%** of the population (Census 2011). • Scheduled Areas cover **11.3%** of India's land area, inhabited by ST communities who are socially and economically backward.

Fifth Schedule: Administration of Scheduled Areas

Aspect	Details
Applicability	Applies to **states other than Assam, Meghalaya, Tripura, and Mizoram**.
Declaration of Scheduled Areas	The **President** can declare areas as Scheduled Areas in consultation with the Governor of the respective state. *(CSE 2023)*
Governor's Role	• Submits annual reports to the President regarding administration. • Can make regulations, in consultation with the Tribes Advisory Council, to: - Restrict land transfer among Scheduled Tribes *(CSE 2022)*. - Regulate money-lending in tribal areas. *(CSE 2022)* • Can amend or repeal Parliamentary or state acts for Scheduled Areas (with Presidential assent).
Tribes Advisory Council	• Consists of **20 members**, three-fourths of whom must be representatives of STs in the state legislature. • Can be constituted even in states with STs but no Scheduled Areas if directed by the President. *(CSE 2023)*
Executive Powers	The Centre's executive powers extend to giving directives to states for the administration of Scheduled Areas. *(CSE 2023)*
Special Commissions	• President must appoint commissions to report on administration in Scheduled Areas: - **U.N. Dhebar Commission (1960)**. - **Dilip Singh Bhuria Commission (2002)**.

KARMAYOGI IAS

Sixth Schedule: Administration of Tribal Areas (Assam, Meghalaya, Tripura, Mizoram)

Aspect	Details
Applicability	Applies to tribal areas in **Assam, Meghalaya, Tripura, and Mizoram**. *(CSE 2015)*
Autonomous Districts/Regions	• Tribal areas are designated as **autonomous districts**, under the **executive authority of the state**. • **Governor** can organize, reorganize, or divide districts into **autonomous regions** based on tribal populations.
Councils	• **District Council**: 30 members (26 elected for 5 years + 4 nominated by the Governor). • **Regional Council**: Formed for autonomous regions. • Both councils can legislate on specific matters with the Governor's assent.
Judicial Powers	• Councils can establish **village councils or courts** to adjudicate tribal disputes. • Jurisdiction of High Courts over such disputes is specified by the Governor.

Revenue and Taxes	• Councils can assess and collect **land revenue** and impose certain taxes. *(CDS 2018)*
Regulation Powers	• Councils can regulate money-lending and trading by non-tribals (subject to Governor's assent).
Legislative Exemptions	Acts of Parliament or state legislatures do not apply, or apply with modifications, to autonomous districts/regions.
Governor's Oversight	• Governor can annul or suspend Acts/Resolutions of councils. *(CDS 2018)* • Can appoint commissions to examine and report on administration matters. • May dissolve councils based on commission recommendations.
CAG Audit	The **CAG** audits accounts of District and Regional Councils. *(CDS 2018)*

Key Differences Between Fifth and Sixth Schedules

Aspect	Fifth Schedule	Sixth Schedule
Applicability	States other than Assam, Meghalaya, Tripura, Mizoram.	Assam, Meghalaya, Tripura, and Mizoram. *(CSE 2015)*
Governance	Governors submit reports and administer areas with President's guidance.	Autonomous District/Regional Councils with legislative and judicial powers under the state's executive authority.
Legislative Powers	Regulations require **Presidential assent**.	Councils can legislate but require **Governor's assent**.
Revenue and Taxes	Handled by state governments under Central directives.	Councils can impose and collect taxes and land revenue.
Judicial Powers	Not specified.	Village courts handle tribal disputes; appeals go to District/Regional Councils. Jurisdiction of High Courts is specified by the Governor.

PYQs and Key Facts

Year	Question
CSE 2015	Differential treatment of tribal areas under Sixth Schedule.
CSE 2022	Role of Tribes Advisory Council and Governor's regulatory powers in Fifth Schedule areas.
CSE 2023	Presidential powers in declaring Scheduled Areas and directives for state administration under the Fifth Schedule.

Constitutional Body	Article	Composition	Appointment	Tenure	Removal	Functions	Additional Notes
Election Commission (ECI)	Article 324	Chief Election Commissioner (CEC) + other Election Commissioners (number decided by the President)	By the President	6 years or until 65 years of age	CEC: Same as SC judge Other ECs: On CEC's advice	Conducts elections for Parliament, State Legislatures, President, and Vice President Adjudicates disputes related to political parties Implements the Model Code of Conduct	- Decisions by majority - Equal powers for CEC and ECs - Reports directly to the President - Advisory nature in certain matters
Comptroller and Auditor General (CAG)	Article 148	Single member	By the President (warrant under hand & seal)	6 years or until 65 years of age	Same as SC judge	Audits all expenditures from Consolidated, Contingency, and Public Funds of the Centre and States Prepares audit reports for Parliament Guides PAC	- Bar on further employment - Plays a key role in enforcing accountability of the government - Acts as an external auditor for several international agencies
Finance Commission	Article 280	Chairperson + 4 members (appointed every 5 years) Members must have expertise in public finance, administration, or economics	By the President	5 years	President (no specific process mentioned)	Recommends distribution of net proceeds of taxes between Centre and States Suggests principles for Grants-in-Aid Reviews fiscal consolidation	- Recommendations are advisory and not binding - Plays a critical role in fiscal federalism
Union Public Service	Articles	Chairperson + Members (number	By the President	6 years or until	By the Presiden	Conducts recruitment for All-India	- Recommendations are not

Commission (UPSC)	315-323	determined by the President) Half the members must have at least 10 years of experience in government service		65 years of age	t after SC inquiry	and Central Services Advises on promotions, disciplinary matters, and service rules Assists in framing rules for appointment	binding but require explanation if rejected - Annual reports tabled in Parliament - Cannot be assigned temporary tasks beyond one year
State Public Service Commission (SPSC)	Articles 315-323	Chairperson + Members (number determined by the Governor) Half the members must have at least 10 years of experience in government service	By the Governor	6 years or until 62 years of age	By the President after SC inquiry	Conducts recruitment for State Services Advises on promotions, disciplinary matters, and service rules Assists in framing rules for judicial appointments	- Similar role to UPSC but at the state level - Reports are submitted to the Governor and tabled in the State Legislature
National Commission for Scheduled Castes (NCSC)	Article 338	Chairperson + Vice-Chairperson + 3 members	By the President	3 years (conditions determined by the President)	By the President	Monitors implementation of safeguards for SCs Advises on socio-economic development programs Investigates complaints related to rights violations	- Reports are directly submitted to the President - Advisory powers only
National Commission for Scheduled Tribes (NCST)	Article 338A	Chairperson + Vice-Chairperson + 3 members	By the President	3 years (conditions determined by the President)	By the President	Same as NCSC, but specific to STs Oversees implementation of PESA and ownership	- Bifurcated from NCSC by the 89th Amendment Act, 2003

						rights over MFPs	
National Commission for Backward Classes (NCBC)	Article 338B	Chairperson + Vice-Chairperson + 3 members	By the President	3 years (conditions determined by the President)	By the President	Considers inclusion/exclusion of communities in the OBC list Advises on socio-economic development programs	- Gained constitutional status through the 102nd Amendment Act, 2018
Attorney General of India	Article 76	Single member	By the President	At the pleasure of the President	At the pleasure of the President	Advises the Government of India on legal matters Represents the government in SC and HC cases Can participate in Parliament without voting rights	- Not a member of the government - Bar on representing against the government in criminal cases
Special Officer for Linguistic Minorities	Article 350B	Commissioner (assisted by Deputy and Assistant Commissioners)	By the President	At the pleasure of the President	At the pleasure of the President	Safeguards the rights of linguistic minorities Oversees implementation of constitutional provisions related to language	- Reports submitted to the President and tabled in Parliament
Official Language Commission	Article 344	Chairperson + Members (representing all languages in the Eighth Schedule)	By the President	As determined by the President	Not mentioned	Recommends measures to promote Hindi as the official language Ensures the progressive use of Hindi while preserving regional languages	- Reports reviewed by a Parliamentary Committee

Non-Constitutional Body

Non-Constitutional Body	Establishment	Composition	Appointment	Tenure	Removal	Functions	Additional Notes
Central Bureau of Investigation (CBI)	1963 (on recommendation of Santhanam Committee)	Director + Officers (as per Delhi Special Police Establishment Act, 1946)	Director appointed by a 3-member committee (PM, LoP, CJI)	2 years	As per service rules	Investigates corruption, economic offenses, and special crimes Provides assistance to Interpol Monitors corruption cases for CVC	- Not a statutory body - Operates under the Department of Personnel and Training (DoPT) - Known as India's premier investigative agency
Central Vigilance Commission (CVC)	Statutory body under CVC Act, 2003	1 Chief Vigilance Commissioner + 2 Vigilance Commissioners	By the President based on PM-led committee recommendations	4 years or until 65 years of age	By the President after SC inquiry	Advises the government on vigilance and anti-corruption measures Oversees CBI investigations in corruption cases	- Independent apex vigilance body - Cannot directly investigate cases; relies on the CBI
Lokpal	Lokpal and Lokayuktas Act, 2013	1 Chairperson + 8 Members (50% judicial, 50% from SC/ST/OBC/Women categories)	By the President based on PM-led committee recommendations	5 years or until 70 years of age	By the President after inquiry	Investigates corruption complaints against PM, MPs, and Group A-D officials Monitors and ensures adherence to the UN Conventio	- Excludes judiciary and armed forces from jurisdiction - Lacks suo-motu powers

						n Against Corruption	
National Human Rights Commission (NHRC)	Protection of Human Rights Act, 1993	1 Chairperson (Retired CJI) + 5 Members (including SC/HC judges, human rights experts)	By the President based on high-powered committee recommendations	3 years or until 70 years of age	By the President after SC inquiry	Investigates human rights violations Promotes human rights awareness Advises governments on policies related to human rights	- 2019 amendment expanded eligibility for Chairperson - Cannot investigate cases older than one year
National Investigation Agency (NIA)	NIA Act, 2008	Director-General + Investigative Officers	Appointed by the Central Government	As per government service rules	As per government service rules	Investigates offenses threatening national security (e.g., terrorism, counterfeit currency, cybercrimes) Establishes Special Courts for trials	- 2019 amendment expanded jurisdiction to include human trafficking and cybercrimes - Jurisdiction extended outside India
National Green Tribunal (NGT)	NGT Act, 2010	1 Chairperson (Retired SC/HC judge) + Judicial and Expert Members	Chairperson appointed by a selection committee	5 years	By the President after inquiry	Adjudicates environmental disputes Ensures enforcement of environmental laws Provides compensation for environme	- Binding judgments - Fast-track resolution of environmental cases

						ntal damage	
National Commission for Women (NCW)	NCW Act, 1990	1 Chairperson + 5 Members (must include experts in women's rights and welfare)	By the Central Government	3 years	By the Central Government	Protects and promotes women's rights Investigates gender-based discrimination and violations Advises on legislative measures	- Reports directly to the government - Plays a critical role in recommending women-specific policies
State Human Rights Commissions (SHRCs)	Protection of Human Rights Act, 1993	1 Chairperson (Retired HC judge) + 2 Members	By the State Government	3 years or until 70 years of age	By the President (on grounds of misconduct)	Investigates human rights violations at the state level Advises state governments on human rights-related issues Intervenes in judicial proceedings involving HR violations	- Similar role to NHRC but limited to state jurisdictions - Reports submitted to state governments
National Commission for Protection of Child Rights (NCPCR)	Commissions for Protection of Child Rights Act, 2005	1 Chairperson + 6 Members (at least 2 women)	By the Central Government	3 years	By the Central Government	Monitors child rights implementation Investigates violations of child rights Promotes child-friendly policies	- Protects the rights of children under 18 - Reports directly to the government

KARMAYOGI IAS

						and practices	
Central Information Commission (CIC)	RTI Act, 2005	1 Chief Information Commissioner + Information Commissioners (number determined by the Central Government)	By the President based on PM-led committee recommendations	As determined by the government	By the President	Ensures public access to information under RTI Act Handles appeals and complaints related to RTI Promotes transparency in governance	- RTI Amendment Act, 2019, allowed the government to determine CIC tenure and salary - Not a constitutional body

Created by

ADITYA SIR

FOUNDER KARMAYOGI IAS

APPEARED IN 3 CSE INTERVIEWS

KARMAYOGI IAS

BALANCE OF PAYMENTS, FOREIGN EXCHANGE AND INTERNATIONAL FINANCIAL INSTITUTIONS

Open Economy

- **Definition:** An economy interacting with other nations through trade, services, and financial assets. Opposite of a closed economy.
- **Linkages:**
  - **Output Market:** Trade in goods/services (more choice).
  - **Financial Market:** Investment in foreign assets.
  - **Labor Market:** Firms/workers choose locations globally.
- **Trade & Aggregate Demand:**
  - **Leakage:** Imports reduce domestic demand.
  - **Injection:** Exports increase domestic demand.
- **Need for International Monetary System (IMS):**
  - **Stability:** Reliable currency exchange.
  - **Convertibility & Trust:** Confidence in currency value.
  - **Preventing Imbalances:** Managing exchange rates.
- **Functions of IMS:**
  - **Currency Exchange & Stability:** Regulate exchange rates.
  - **Crisis Prevention:** Resolve payment imbalances (e.g., IMF support).
  - **Liquidity Support:** Provide reserves for currency shortfalls.
  - **Economic Integration:** Foster cooperation and growth.

India's Merchandise Trade Performance

Topic	Details	Facts for Prelims
India's Rising Share in Global Trade	India's **merchandise exports** share in global trade has increased.	- India's **share in global merchandise exports (FY16-FY20 avg): 1.7%**. - India's **share in global services exports (FY16-FY20 avg): 3.3%**.
India's Export Performance (FY24)	India's **merchandise exports** stood at **$448 billion**, declining from **$514 billion** in FY23.	- Top export destinations: **USA, UAE, China, Netherlands, Singapore.**
India's Import Performance (FY24)	Merchandise imports **declined** from **$675 billion in FY23** to **$600 billion in FY24**.	- India's top imports: **Crude oil, gold, electronic goods, machinery.** - **Top import sources:** China, UAE, USA, Saudi Arabia.
Trade Deficit	The **merchandise trade deficit** narrowed to **$238 billion** in FY24.	- FY23 trade deficit was **$264 billion**, indicating improvement.
Composition of Merchandise Exports (FY24)	Capital goods, consumer goods, intermediate goods, and raw materials form the bulk of exports.	- Capital goods: **5.1%** - Consumer goods: **4.7%** - Intermediate goods: **30.2%** - Raw materials: **28.4%**

Balance of Payments (BoP) and Foreign Exchange Reserves (2023-24)

Topic	Details	Facts for Prelims
Balance of Payments (BoP) - Overview	The **Balance of Payments (BoP)** records **all economic transactions** between India and the	- **BoP must always balance** (Deficit/Surplus in one account is

KARMAYOGI IAS

	rest of the world during a particular period. It includes: 1. **Current Account** (Trade in goods, services, remittances) 2. **Capital Account** (FDI, FPI, External Borrowing) 3. **Financial Account** (Foreign Reserves, SDRs, Loans, Investments)	offset by another). - **Deficit in Current Account → Financed by Capital Account/Forex Reserves**.
Current Account (Goods, Services, Transfers, Income)	The **Current Account** includes transactions of goods, services, income, and transfers. **Formula:** **Current Account = (Exports - Imports) + Net Services + Net Income + Transfers** **UPSC PYQ 2011:** Components of Current Account include goods, services, remittances, and transfers.	- **India's Current Account Deficit (CAD) in FY24 → 1.4% of GDP** (Lower than **2.1% in FY23**).
Current Account Deficit (CAD)	A **Current Account Deficit (CAD)** occurs when **imports exceed exports**, meaning India spends more foreign currency than it earns. **UPSC PYQ 2020:** Factors affecting CAD - crude prices, global demand, rupee depreciation.	- **Major reason for CAD in India:** High crude oil & gold imports. - **India's CAD peaked at 4.8% of GDP in FY13**.
Goods Trade (Merchandise)	This includes **exports and imports of physical goods** like petroleum, gold, machinery, electronics, etc.	- **India's Merchandise Trade Deficit in FY24: $238 billion** (Lower than **$264 billion in FY23**).
Services Trade (Net Invisibles)	**Services exports > Imports** → Creates a **services trade surplus**. Major services exports: **IT, software, business services, financial services, tourism.**	- **India's Service Exports (FY24): $330 billion** - **Net Services Surplus (FY24): $138 billion** (Major BoP stabilizer).
Transfers (Remittances, Grants, Foreign Aid)	**Remittances:** Money sent by Indian workers abroad. **Grants & Aid:** Includes financial assistance to India or from India to other countries.	- **India received $120 billion in remittances (2023) → Largest global recipient**.
Income (Factor Income & Interest Payments)	**Factor Income:** Earnings from abroad (profits, interest, dividends). **Interest Payments:** Payments on external debt.	- India **pays high interest on external borrowings** → Contributes to CAD.

Capital Account & Financial Account (Investments, Foreign Borrowing, Forex Reserves)

Topic	Details	Facts for Prelims
Capital Account (FDI, FPI, Loans, Reserves, etc.)	The **Capital Account** records **investment flows, foreign borrowings, and external asset sales**. **UPSC PYQ 2013:** Capital Account includes FDI, FPI, External Commercial Borrowings (ECBs).	- **India's Net Capital Inflows (FY24): $85 billion**.
Foreign Direct Investment (FDI)	FDI is long-term investment in India by foreign companies. **UPSC PYQ 2022:** Which countries are the top sources of FDI in India?	- **FDI Inflows in FY24: $70 billion** (Top Sectors: IT, Pharma, Manufacturing). - **Top FDI sources: Singapore, USA, UAE, Netherlands, Japan.**
Foreign Portfolio Investment (FPI)	FPI is **investment in Indian stocks, bonds, securities** by foreign entities. **UPSC PYQ 2011:** Difference between FDI & FPI.	- **FPI Inflows in FY24: $28 billion** (Volatile due to global interest rates).

KARMAYOGI IAS

External Commercial Borrowings (ECBs)	**Loans taken by Indian companies from foreign lenders** (World Bank, ADB, IMF, foreign banks).	- **India's External Debt (FY24): $663.8 billion** (18.7% of GDP).
NRI Deposits	**Deposits by Non-Resident Indians (NRIs) in Indian banks**.	- **NRI Deposits (FY24): $142 billion**.
Foreign Exchange Reserves (Forex Reserves)	India's **foreign exchange reserves** act as a buffer against external shocks. **Forex Reserves include:** - Foreign currency assets (FCA). - Gold reserves. - Special Drawing Rights (SDRs) with IMF. - Reserve position in IMF.	- **India's Forex Reserves (Feb 2024): $640 billion** (5th largest globally). - **India can cover 10.2 months of imports using forex reserves.** **UPSC PYQ 2015:** Why does RBI maintain forex reserves?

Trends & Recent Developments in Balance of Payments (BoP)

Issue/Trend	Explanation	Impact on Economy
Rising Service Exports	India's **IT, software, financial services exports** are driving **BoP stability**. **UPSC PYQ 2021:** "India's service exports help reduce CAD significantly."	- **$330 billion service exports in FY24**. - **Helps offset merchandise trade deficit**.
Declining Current Account Deficit (CAD)	Strong remittances & service exports reduced India's CAD.	- **FY24 CAD: 1.4% of GDP** (lower than FY23).
FPI Volatility	Foreign Portfolio Investment (FPI) is highly volatile due to global interest rate changes.	- **FPI outflows in 2022 due to US Fed rate hikes**; recovered in 2023-24.
Forex Reserves Stabilization	RBI intervenes in Forex Markets to stabilize the rupee.	- **India's Forex Reserves (Feb 2024): $640 billion**.
Increase in External Debt	India's external debt has **risen to $663.8 billion**, raising concerns over repayment burden.	- **Debt-to-GDP Ratio (FY24): 18.7% (Lowest in 13 years)**.

Remittances into India

Topic	Details	Facts for Prelims
India as the Largest Recipient of Remittances	India received **$120 billion** in remittances in **2023**, **14% of total global flows**.	- **Top remittance sources: USA, UAE, Saudi Arabia, Kuwait, Oman, UK.**
Top Global Remittance-Receiving Countries	India leads global remittances, followed by **Mexico, China, Philippines, Pakistan.**	- **India ranks #1** globally in remittance inflows.
Impact of Remittances	- Boosts **foreign exchange reserves**. - Supports **current account balance**. - Enhances **rural incomes and household consumption.**	- **Remittances account for ~3.5% of India's GDP.**

Classification of Transactions

Transaction Type	Details	Examples & PYQs
Loans and Interest Payments	Loans are **capital inflows/outflows** recorded under the **Capital Account**, while **interest payments are under the Current Account** as they represent earnings or borrowing costs.	- **Example:** A foreign bank lending to an Indian firm is a **capital inflow**, while **interest payments on that loan** are **Current Account outflows**. - **UPSC PYQ 2020:** Capital Account includes loans, FDI, and external assistance.

KARMAYOGI IAS

Gifts & Grants	**Unilateral transactions** recorded under the **Current Account** as transfers.	- **Example:** Foreign aid, NGO funding. - **UPSC PYQ 2011:** Remittances & grants are Current Account items.
Remittances	Money sent by NRIs to India, categorized under **Current Account - Transfers**.	- **India's Remittances in FY24: $120 billion** (highest globally). - **UPSC PYQ 2016:** Remittances impact BoP stability.

Current & Capital Account Convertibility

Aspect	Details	Facts for Prelims & PYQs
Current Account Convertibility	Allows **free exchange of rupees for foreign currency** in trade, services, and transfers. **India has full current account convertibility since 1994**.	- **UPSC PYQ 2013:** "India's Current Account is fully convertible, but Capital Account remains partially convertible."
Capital Account Convertibility	India maintains **partial convertibility** to prevent **capital flight & speculative attacks**.	- **Tarapore Committee (1997, 2006)** recommended phased full convertibility. - **UPSC PYQ 2011:** Capital Account Convertibility is restricted to prevent economic shocks.

Feature	**Autonomous Transactions [UPSC 2013]**	**Accommodating Transactions {UPSC 2020}**
Nature	Independent of Balance of Payments (BoP) balancing needs.	Address gaps or imbalances in the BoP.
Examples	Exports, Imports, Foreign Direct Investment (FDI) inflows.	RBI's reserve transactions (e.g., buying/selling currency to manage exchange rates).
Purpose	Driven by profit motives, investment opportunities, consumer preferences, etc.	Meant to restore equilibrium in the BoP.
Initiating factor(TI)	Regular economic activities	Targeted Intervention by monetary authority

India's Foreign Exchange Reserves- FY24

Component	Details	Facts for Prelims & PYQs
Total Forex Reserves (March 2024)	**$652.87 billion**, providing **12 months of import cover**.	- **UPSC PYQ 2013:** Forex reserves are used for external stability.
Foreign Currency Assets (FCA)	Largest component, **held in USD, Euro, Yen, etc.**	- **UPSC PYQ 2019:** Dominant forex reserves are in **USD**.
Gold Reserves	**Held for financial security** and as a hedge against currency depreciation.	- **India's gold reserves (FY24): $50 billion**.
Special Drawing Rights (SDRs)	**IMF-created reserve asset**, valued based on a **basket of currencies**.	- **UPSC PYQ 2020:** SDRs contribute to reserve liquidity.
Reserve Tranche Position (RTP)	**India's quota in the IMF, available for withdrawal.**	- **UPSC PYQ 2020:** RTP is part of IMF financial assistance.

India's External Debt- FY24

Debt Type	Details	Facts for Prelims & PYQs
Total External Debt	**$663.8 billion (18.7% of GDP)**, reflecting sustainable debt levels.	- **UPSC PYQ 2019:** India's External Debt-to-GDP ratio is moderate.
Short-term Debt	Maturity of **less than 1 year**.	- **UPSC PYQ 2019:** Short-term debt is a financial risk indicator.

KARMAYOGI IAS

Long-term Debt	Maturity of **more than 1 year**.	- **UPSC PYQ 2022:** Most of India's debt is long-term.
Sovereign Debt	**Government bonds issued in foreign currency.**	- **UPSC PYQ 2019:** India raises external debt through sovereign bonds.
Dominant Currencies	USD > Indian Rupee > SDR > Yen > Euro.	

Foreign Exchange Rate Mechanisms

Type	Description	Facts for Prelims & PYQs
Fixed Exchange Rate	Government sets currency value; **Devaluation boosts exports**.	- **UPSC PYQ 2021:** China follows a **managed peg system**.
Floating Exchange Rate	**Market-driven by demand & supply.**	- **UPSC PYQ 2012:** India follows a **managed floating rate system**.
Managed Floating Rate	**RBI intervenes to prevent excessive volatility.**	- **UPSC PYQ 2019:** RBI buys/sells forex to stabilize rupee.

Key Exchange Rate Indicators- FY24

Indicator	Details	Facts for Prelims & PYQs
Nominal Effective Exchange Rate (NEER)	Weighted average of **rupee vs. other currencies.**	- **UPSC PYQ 2022:** "A rise in NEER indicates rupee appreciation."
Real Effective Exchange Rate (REER)	**Inflation-adjusted NEER** that reflects competitiveness.	- **UPSC PYQ 2022:** "If REER > 100, rupee is overvalued."
Purchasing Power Parity (PPP)	Compares currency values **based on the cost of goods.**	- **UPSC PYQ 2019:** "India is the **3rd largest economy** in PPP terms."

Exchange Rate Mechanisms

Mechanism	Description	Facts for Prelims & PYQs
Fixed Exchange Rate	The government **pegs the currency** to a stable foreign currency (e.g., USD) or a commodity (e.g., gold). The central bank intervenes in the forex market to maintain the fixed rate.	- **UPSC PYQ 2021**: China follows a **managed peg system**. - **Example**: Bretton Woods system (1944-1971) fixed USD to gold at $35/ounce.
Flexible (Floating) Exchange Rate	Market-driven exchange rate **determined by demand and supply** without government intervention.	- **UPSC PYQ 2012**: India follows a **managed floating rate** rather than a purely floating rate.
Managed Floating Rate	The central bank **intervenes periodically** to prevent extreme fluctuations but does not fix the exchange rate.	- **UPSC PYQ 2019**: RBI **buys/sells forex** to stabilize the rupee, such as during the **2013 Rupee depreciation crisis**.
Pegged Float	A country's currency is **pegged to another currency or a basket**, but allowed to fluctuate within a band.	- **UPSC PYQ 2019**: Gulf nations like **UAE peg their currency to USD** but allow minor fluctuations.

Determinants of Exchange Rates

Factor	Effect on Currency	Facts for Prelims & PYQs
Demand & Supply of Forex	High demand **appreciates** currency; oversupply causes **depreciation**.	- **UPSC PYQ 2012**: Exchange rate depends on **forex demand-supply dynamics**.
Interest Rates (Monetary Policy Impact)	Higher rates **attract foreign investments (FPI/FDI)**, strengthening currency.	- **UPSC PYQ 2022**: India's **higher interest rates** attract FDI/FPI inflows.
Inflation (Purchasing Power Parity - PPP)	Low inflation **stabilizes currency**; high inflation **reduces currency value**.	- **UPSC PYQ 2022**: India's **higher inflation** weakens the rupee.

KARMAYOGI IAS

Trade Deficit (Imports > Exports)	Persistent trade deficits cause **currency depreciation**.	- **Example**: India's **2022 Current Account Deficit (CAD)** widened due to rising oil imports.
Global Capital Flows (FPI/FDI)	Higher FPI inflows **strengthen currency**; sudden outflows weaken it.	- **UPSC PYQ 2023**: "Hot money" outflows cause currency depreciation (Example: **2013 Taper Tantrum**).

Nominal & Real Effective Exchange Rates (NEER & REER)

Indicator	Description	Facts for Prelims & PYQs
NEER (Nominal Effective Exchange Rate)	**Trade-weighted index** of a country's currency against a basket of other currencies.	- **UPSC PYQ 2022**: A rise in **NEER indicates rupee appreciation**.
REER (Real Effective Exchange Rate)	**Inflation-adjusted NEER** showing currency competitiveness.	- **UPSC PYQ 2022**: If **REER > 100**, rupee is **overvalued**, making exports costly.

Foreign Exchange & External Debt

Concept	Description	Facts for Prelims & PYQs
Forex Reserves (March 2024)	India's forex reserves **stand at $652.87 billion**, covering **12 months of imports**.	- **UPSC PYQ 2013**: Forex reserves **stabilize BoP deficits**.
India's External Debt (2024)	External debt stands at **18.7% of GDP**. Debt service ratio remains **5.5%**, ensuring sustainability.	- **UPSC PYQ 2019**: External debt sustainability depends on **debt-service ratio**.

Foreign Investment Instruments

Instrument	Description	Examples & PYQs
American Depository Receipts (ADRs)	**Issued in US** representing Indian company shares.	- **Example**: **Infosys ADRs on NYSE**.
Global Depository Receipts (GDRs)	**Issued outside US** for Indian company shares.	- **Example**: **Reliance GDRs on London Stock Exchange**.
Participatory Notes (P-Notes)	**Issued by FIIs** for foreign investors to invest in Indian securities.	- **UPSC PYQ 2017**: P-Notes are linked to **money laundering concerns**.
Masala Bonds	**Rupee-denominated bonds** issued abroad.	- **UPSC PYQ 2016**: **HDFC issued Masala Bonds in London**.
External Commercial Borrowings (ECBs)	**Loans raised from foreign lenders** for Indian firms.	- **Example**: **Reliance raising ECBs for expansion**.

Currency Swaps, Forex Swaps & Interest Rate Swaps

Feature	Currency Swap	Forex Swap	Interest Rate Swap
Duration	Medium to long	Short-term	Medium to long
Principal Exchange	**Yes**	**Yes**	**No**
Interest Payments	Different currencies	Single currency	Single currency

Illustrative Swap Examples

Type	Example & Process	Use Case
Currency Swap	**RBI & Bank of Japan** swap ₹10,000 crore (INR) and ¥100 billion (JPY).	- Reduces forex risk for **India-Japan trade**.
Forex Swap	Indian exporter receives **$10M revenue**, swaps for **₹800 crore at ₹80/USD**.	- Provides **immediate liquidity**.
Interest Rate Swap	Indian company with **₹1000 crore loan at floating 8%** swaps to fixed 8.5%.	- Protects against **interest rate hikes**.

Foreign Exchange Rate Mechanisms & Global Examples

Mechanism	Country Examples	Insights
Fixed Exchange Rate	UAE, Hong Kong (pegged to USD)	- Prevents currency volatility but **loses monetary policy autonomy**.

KARMAYOGI IAS

Floating Rate	USA, Eurozone, Japan	- Provides policy flexibility but can cause **high volatility**.
Managed Float	India, China	- RBI **manages INR depreciation/appreciation**.
Dollarization	Ecuador, El Salvador	- Countries **use USD instead of domestic currency** to stabilize economy.

Foreign Investment Methods

Investment Instrument	Description	Examples & UPSC PYQs
American Depository Receipts (ADRs)	ADRs are **negotiable certificates issued by U.S. banks**, representing shares in **foreign companies**. They are **traded on U.S. stock exchanges** like NYSE & NASDAQ.	- **Example**: **Infosys ADRs on NYSE** enable U.S. investors to invest in Infosys. - **UPSC PYQ**: ADRs help Indian companies **raise capital in U.S. markets**.
Global Depository Receipts (GDRs)	GDRs are **certificates issued by international banks** representing shares in foreign companies. **Traded on international stock exchanges outside the U.S.**.	- **Example**: **Reliance Industries issued GDRs** on the London Stock Exchange. - **UPSC PYQ**: GDRs allow Indian firms to **tap European & Asian capital markets**.
Participatory Notes (P-Notes)	P-Notes are **financial instruments used by foreign investors** to invest in Indian securities **without direct SEBI registration**. Issued by registered **Foreign Institutional Investors (FIIs)**, but scrutinized for **money laundering & tax evasion risks**.	- **UPSC PYQ 2017**: Concerns about **misuse of P-Notes** for tax evasion and round-tripping.
Masala Bonds	**Rupee-denominated bonds** issued outside India, allowing Indian companies to raise funds **without currency risk**.	- **Example**: **HDFC & NTPC issued Masala Bonds** in global markets. - **UPSC PYQ 2016**: Masala Bonds help **reduce dependence on foreign currency loans**.
External Commercial Borrowings (ECBs)	**Loans raised by Indian entities from non-resident lenders.** Used for **projects, infrastructure, or overseas acquisitions**. Regulated by **RBI**.	- **Example**: **Reliance raised ECBs** for expansion. - **UPSC PYQ**: ECBs provide long-term funds **cheaper than domestic borrowing rates**.

Trade Agreements

Agreement Type	Description	Examples & UPSC PYQs
Preferential Trade Agreement (PTA)	A PTA involves two or more countries **reducing tariffs on specific products**, providing preferential access to each other's markets.	- **Example**: **India-MERCOSUR PTA (2009)** grants tariff concessions between India and MERCOSUR members. - **UPSC PYQ**: PTAs do **not completely eliminate tariffs** but **reduce them selectively**.
Free Trade Agreement (FTA)	FTAs **eliminate or reduce tariffs** and trade barriers on **most goods and services** between member countries.	- **Examples**: **India-Sri Lanka FTA (2000), SAFTA (South Asian Free Trade Area), India-ASEAN FTA (2010), India-Australia ECTA (2022).** - **UPSC PYQ 2020**: FTAs promote **trade liberalization and economic integration**.

KARMAYOGI IAS

Comprehensive Economic Cooperation Agreement (CECA) & Comprehensive Economic Partnership Agreement (CEPA)	CECA and CEPA **go beyond FTAs** by covering **trade in goods, services, investments, intellectual property, and economic cooperation**.	- **Examples**: **India-Singapore CECA (2005), India-Japan CEPA (2011), India-UAE CEPA (2022).** - **UPSC PYQ 2022**: CEPA includes **investment and services sectors** beyond simple tariff elimination.
Customs Union	A **customs union removes trade barriers** among member countries and **adopts a common external tariff** against non-members.	- **Example**: **EU Customs Union** (India is **not part** of any customs union).
Common Market	Extends a **customs union by allowing free movement of labor & capital** among member states.	- **Example**: **European Economic Area (EEA).** India is **not part of any common market**.
Economic Union	A **common market with harmonized economic policies** and a **common currency** among member countries.	- **Example**: **Eurozone** (India is **not part of any economic union**).

Government Schemes for Foreign Trade

Scheme	Objective	Details & UPSC PYQs
Niryat Rin Vikas Yojana (NIRVIK)	Enhances **loan availability for exporters** and simplifies lending.	- Introduced by **Export Credit Guarantee Corporation of India (ECGC).** - Provides **higher insurance cover**, reduced premiums for **small exporters**, and **faster claim settlements**.
Services Exports from India Scheme (SEIS)	**Incentivizes service exports** by providing **duty credit scrips** to service providers.	- **UPSC PYQ 2018**: SEIS encourages **service sector exports like IT, tourism, and healthcare**.
Special Economic Zones (SEZs)	Establish **export hubs** under the **SEZ Act 2005** to boost manufacturing and services exports.	- **As of 2024**, India's SEZs significantly contribute to **renewable energy & industrial exports**. - **UPSC PYQ 2016**: SEZs provide **tax benefits & infrastructure support** for exporters.
Trade Infrastructure for Export Scheme (TIES)	**Improves export infrastructure** by **funding projects** to enhance trade competitiveness.	- Funds **government agencies** for **building new ports, logistics parks, and warehouses**.
Agriculture Export Policy (2018)	**Aims to double agricultural exports** and increase India's share in **global agri-exports**.	- **Target**: Increase exports to **$60 billion** (extended timeline). - **Focus**: **Removing export restrictions**, promoting **value-added agri-products**.
Remission of Duties and Taxes on Export Products (RoDTEP)	**Reimburses embedded taxes** and duties **not refunded under other schemes** to boost export competitiveness.	- **Replaces Merchandise Exports from India Scheme (MEIS)**. - **UPSC PYQ 2021**: RoDTEP **ensures cost competitiveness** for Indian exports.

KARMAYOGI IAS

INTERNATIONAL ORGANISATIONS

Bretton Woods Conference (1944)

Aspect	Details	UPSC Prelims PYQs & Key Facts
Date & Location	July 1-22, 1944, Mount Washington Hotel, New Hampshire, USA	- **UPSC 2016:** Bretton Woods Conference led to the formation of IMF & World Bank
Key Participants	44 Allied nations, including **John Maynard Keynes (UK) & Harry Dexter White (USA)**	- Keynes proposed an international currency called **Bancor**, but it was rejected.
Major Outcomes	1. **International Monetary Fund (IMF)** – for monetary stability & BoP crises 2. **World Bank (IBRD)** – for post-war reconstruction & development	- **Fixed Exchange Rate System** pegged global currencies to **US Dollar**, which was convertible to **gold ($35/ounce)**

World Bank Group (WBG)

Institution	Year	Purpose	India's Membership	Key Functions
International Bank for Reconstruction and Development (IBRD)	1944	Provides **long-term loans** for middle-income & creditworthy low-income countries	✅ Yes	- Funds large **infrastructure projects** & **economic development**
International Development Association (IDA)	1960	**Concessional (low-interest) loans & grants** for the poorest countries	✅ Yes	- Focuses on **poverty reduction** & **social development**
International Finance Corporation (IFC)	1956	Promotes **private sector** growth in developing nations	✅ Yes	- Provides funding & advisory services to **startups & SMEs**
Multilateral Investment Guarantee Agency (MIGA)	1988	**Political risk insurance** for FDI stability	✅ Yes	- Ensures **FDI flows** in unstable countries
International Centre for Settlement of Investment Disputes (ICSID)	1966	**Arbitration of investment disputes**	❌ No	- India is **not a member** of ICSID

🔹 **Key Reports by the World Bank**:
✔ **Ease of Doing Business Report** (Discontinued in 2021)
✔ **Human Capital Index**
✔ **World Development Report**

🔹 **Shareholding**:

- **US (16.41%), Japan (7.87%), Germany (4.49%), UK (4.31%), France (4.31%)**
- **India holds around 3% of voting power.**

🔹 **UPSC Prelims PYQ 2016: The World Bank Group is not a single entity but consists of five institutions.**

International Monetary Fund (IMF)

Aspect	Details	UPSC Prelims PYQs & Key Facts
Established	1944 (Bretton Woods Conference)	- **UPSC 2022:** IMF was formed **before the United Nations (1945).**
Headquarters	Washington, D.C., USA	- IMF & World Bank share their **Annual Meetings.**
Objectives	1. **Promote monetary cooperation & exchange rate stability** 2. **Provide financial aid for BoP crises** 3. **Encourage economic growth & employment**	- **UPSC 2011:** IMF provides **financial assistance during crises**.

KARMAYOGI IAS

IMF Lending Facilities	1. **Stand-By Arrangement (SBA)** – Short-term support 2. **Extended Fund Facility (EFF)** – Medium-term loans 3. **Flexible Credit Line (FCL)** – For strong economies 4. **Rapid Credit Facility (RCF)** – Emergency relief for low-income nations	- **UPSC 2020:** IMF helps **structural adjustments in developing economies.**
Quota System	- **Quota = GDP (50%) + Openness (30%) + Economic Variability (15%) + Forex Reserves (5%)**	- **Top 5 Shareholders:** US, Japan, China, Germany, France - **India is ranked 8th in IMF Quotas & Voting Power.**

🔹 **Special Drawing Rights (SDRs)**
✔ **Not a currency** but a **reserve asset** created in 1969
✔ Value is based on **USD, Euro, RMB, JPY, GBP**

🔹 **IMF Bailouts**:
✔ **1991 Crisis**: India took a **$2.2 billion loan from IMF**, pledged **67 tonnes of gold**.
✔ **Sri Lanka (2022)**: IMF approved a **$3 billion bailout package** due to economic collapse.

IMF Lending Programs

Facility	Purpose	Conditions	Eligibility	Repayment Period
Stand-By Arrangement (SBA)	Short-term BoP support	Policy adjustments required	All member countries	3¼ - 5 years
Extended Fund Facility (EFF)	Medium-term loans for structural reforms	Requires **structural changes**	All members	4½ - 10 years
Flexible Credit Line (FCL)	Precautionary facility for strong economies	Pre-qualified economies	Selected economies	3 - 5 years
Rapid Credit Facility (RCF)	Emergency support for low-income nations	No ex-post conditions	Low-income countries	5½ - 10 years

World Trade Organization (WTO)

Aspect	Details	Facts for Prelims
Introduction	The WTO is the only global international organization dealing with the rules of trade between nations, ensuring free and predictable trade.	Established on **January 1, 1995**, replacing **GATT (1947)**. HQ: **Geneva, Switzerland**
Membership	Comprises **166 member nations** and **23 observer governments** (as of 2024).	India is a **founding member** (since 1995). The latest member: **Timor-Leste (2024)**.
Principles of WTO	1. **Non-discrimination** (MFN, National Treatment). 2. **Reciprocity** (trade liberalization through negotiations). 3. **Market Access** (reducing trade barriers). 4. **Rule-Based System** (no arbitrary trade restrictions). 5. **Economic Development** (developing and least-developed country (LDC) provisions).	**Most-Favoured Nation (MFN):** No preferential treatment unless part of FTAs/RTAs. **National Treatment:** Foreign and domestic products must be treated equally.

KARMAYOGI IAS

Objectives of WTO	1. Facilitate **trade liberalization**. 2. Promote **non-discriminatory trade practices**. 3. Provide **a dispute settlement mechanism**. 4. Encourage **economic development**. 5. Ensure **predictable and transparent trade policies**.	**Special and Differential Treatment (S&DT):** Provides flexibility for developing nations.
Key Agreements	1. **General Agreement on Tariffs and Trade (GATT, 1994)** – covers trade in goods. 2. **General Agreement on Trade in Services (GATS)** – covers trade in services. 3. **Trade-Related Aspects of Intellectual Property Rights (TRIPS)** – regulates global IP rights. 4. **Agreement on Agriculture (AoA)** – governs agricultural trade and subsidies. 5. **Agreement on Sanitary and Phytosanitary Measures (SPS)** – deals with food safety standards. 6. **Technical Barriers to Trade (TBT) Agreement** – prevents arbitrary technical regulations.	**UPSC Prelims 2016:** Asked about the purpose of the Trade Facilitation Agreement (TFA).
Dispute Settlement Mechanism	The WTO's **Dispute Settlement Body (DSB)** resolves trade disputes. Members can challenge each other's policies.	**Appellate Body (since 1995)** – has been non-functional since 2019 due to U.S. blocking judge appointments.
Challenges to WTO	1. **US-China Trade War** (impact on global trade). 2. **Appellate Body Paralysis** (Dispute settlement crisis). 3. **Failure of Doha Round (2001)** (developed vs. developing country conflicts). 4. **Digital Trade & E-Commerce Regulations** (absence of clear rules). 5. **Rise of Regional Trade Agreements (RTAs)** (diverting focus from WTO negotiations). 6. **Agricultural Subsidies Debate** (conflict over India's MSP program).	**India & WTO Agricultural Subsidies:** India has invoked the **Peace Clause** (Bali Ministerial, 2013) to protect its food security programs.
India's Role in WTO	1. **Agriculture** – India defends its **Minimum Support Price (MSP)** subsidies against developed nations. 2. **TRIPS Flexibilities** – Supports affordable generic medicines against Big Pharma interests. 3. **Developing Country Status** – Advocates for **Special and Differential Treatment (S&DT)**. 4. **Digital Trade Regulation** – Resists WTO-led e-commerce regulations to protect data sovereignty. 5. **Export Subsidies** – Committed to phasing out certain subsidies by 2030.	**India's Recent WTO Cases:** **2019:** India lost a WTO dispute against the U.S. over export subsidies. **2020:** India challenged U.S. tariffs on steel and aluminum. **2022:** India opposed global e-commerce rules.
WTO Agricultural Trade Rules	1. **Market Access:** Reduction of tariffs and non-tariff barriers. 2. **Domestic Support:** Categorization of subsidies into **Green Box (permitted), Blue Box (limited), Amber Box (reduction required).**	**Amber Box Subsidy Limit:** WTO caps India's trade-distorting agricultural subsidies at **10% of production value** (De Minimis Limit).

KARMAYOGI IAS

	3. **Export Subsidies:** Prohibition on trade-distorting subsidies.	
Recent Developments	1. **WTO Ministerial Conference (MC12, 2022):** Agreement on ending **fisheries subsidies** harmful to marine ecosystems. 2. **E-commerce Moratorium Debate:** India opposed indefinite duty-free treatment of digital goods. 3. **TRIPS Waiver for COVID-19 Vaccines:** India and South Africa led efforts to temporarily waive IP rights.	**UPSC Prelims 2020:** Asked about India's stand on the TRIPS waiver proposal.

India's Trade Safeguards at WTO

Safeguard Type	Description	Example	India's Use	Outcome
Anti-Dumping Measures	Imposed when foreign goods are sold below fair market price.	India imposed **anti-dumping duties** on Chinese steel imports in 2015.	India has used **anti-dumping laws** extensively in sectors like steel, chemicals, and textiles.	WTO upheld India's right to impose duties on unfairly priced imports.
Countervailing Measures	Used to offset subsidies given by foreign governments to exporters.	India challenged **U.S. solar panel subsidies** at WTO.	India has imposed **countervailing duties** on subsidized imports, particularly from China.	India lost the case; WTO ruled in favor of the U.S.
Safeguard Measures	Temporary tariffs on sudden import surges harming domestic industries.	**2018:** India imposed **safeguard duties** on Chinese solar panels.	Used to protect **domestic manufacturing** from import shocks.	WTO allowed India's safeguard duties.
General Agreement on Tariffs and Trade (GATT 1994)	Allows **tariffs & quotas** in exceptional cases.	**2018:** U.S. imposed tariffs on **steel imports**, including from India.	India challenged U.S. tariffs at WTO.	WTO ruled **in India's favor**, imposing retaliatory measures.
Sanitary & Phytosanitary (SPS) Measures	Protects human, animal, and plant life from harmful imports.	India **banned Chinese poultry** imports in 2007 over bird flu concerns.	Used in **food safety cases** (e.g., GM crops, pesticide residues).	WTO upheld India's ban.

Key WTO Trade Terms

Term	Definition	Fact for Prelims
Most-Favoured Nation (MFN)	No WTO member can offer better trade terms to one member over another.	Exceptions: FTAs, RTAs.
Dumping	Selling goods below cost price in foreign markets.	**Anti-dumping duties last 5 years** unless extended.
De Minimis Rule	Limits amber box subsidies to **5% for developed nations, 10% for developing nations**.	**India uses this for MSP support.**
Peace Clause	Temporary protection for developing nations breaching subsidy limits.	Introduced in **Bali (2013)** to protect India's food stockpile programs.

United Nations Conference on Trade and Development (UNCTAD)

Aspect	Details	Facts for Prelims (UPSC)

KARMAYOGI IAS

Introduction	UNCTAD is a permanent intergovernmental body of the United Nations, established in **1964**, focused on promoting **inclusive trade and development** in developing nations.	**HQ:** Geneva, Switzerland. **Members:** 195 countries (as of 2024).
Objectives	- Integrate **developing nations** into the global economy. - Address **trade inequalities** and promote fair globalization. - Strengthen **investment and trade policies** in emerging markets. - Support **sustainable development goals (SDGs)**.	UNCTAD is known as the **UN's focal point for trade, investment, and development**.
Structure & Mechanisms	- **Trade and Development Board (TDB):** Governing body overseeing UNCTAD's work. - **Subcommittees:** Focus on **investment, trade, and digital economy**. - **Secretariat:** Produces analytical reports like **World Investment Report, Digital Economy Report, Trade & Development Report**.	UNCTAD conducts research on **trade, FDI, debt sustainability, digital trade, and technology transfer**.
Key Reports (2023-24)	- **World Investment Report (2023):** India remains a top **FDI destination** in **technology and renewable energy**. - **Trade and Development Report (2023):** India's focus on **green energy** and **electric mobility**. - **Digital Economy Report (2023):** India leads in **FinTech & e-commerce**, but digital divides remain a concern.	UNCTAD **publishes data on international trade trends, global supply chains, and trade finance**.
India's Role in Global Trade (UNCTAD Reports)	- **IT & Pharmaceutical Exports:** India is a **top exporter of generic medicines & IT services**. - **FDI Inflows:** India ranks among the **top 5 FDI destinations globally**. - **Global Supply Chain Hub:** India's **"Make in India"** policy strengthens **manufacturing & trade infrastructure**. - **Green Trade:** India is **investing in renewable energy exports**.	**India's digital economy is set to be a major contributor to global trade by 2030**, but regulatory frameworks on **data privacy & AI** are needed.

Intellectual Property Rights (IPRs) and Global Institutions

Category	Description	Facts for Prelims (UPSC)
Copyright	Protects **literary, artistic, and musical works** for **50+ years** after the author's death.	**India's Copyright Act (1957):** Amended in **2012** to include **digital copyrights**.
Trademarks	Protects **logos, signs, slogans, and brand names** to distinguish goods/services.	**The Trade Marks Act (1999):** Provides **indefinite protection** if **renewed every 10 years**.
Geographical Indications (GIs)	Identifies **products with unique geographical origins** (e.g., **Darjeeling Tea, Banarasi Saree**).	**GI Act (1999):** India has **400+ GI tags** (Highest: Karnataka, Tamil Nadu).
Patents	Protects **inventions** for **20 years**, granting exclusive rights to the inventor.	**India's Patents Act (1970, amended 2005):** Shifted from **process patents to product patents** to comply with **TRIPS**.
Industrial Designs	Protects **aesthetic & visual appearance** of a product.	**The Designs Act (2000): 10-year protection, extendable to 15 years**.
Trade Secrets	Protects **confidential business data**, formulas, and marketing strategies.	India does **not have a dedicated law**; trade secrets are protected under **contract & competition law**.

KARMAYOGI IAS

Plant Varieties Protection	Protects **new plant varieties and farmers' rights**.	**The Protection of Plant Varieties and Farmers' Rights Act (2001)**.
Integrated Circuit Layouts	Protects **circuit designs & semiconductor layouts**.	**Semiconductor Integrated Circuits Layout-Design Act (2000)**.

Global Conventions on IPRs and India's Compliance

Treaty/Convention	Objective	India's Status	Prelims Facts
Paris Convention (1883)	Protects **industrial property rights** across countries.	**India joined in 1998**.	Established the **National Treatment Principle** (foreign & domestic applicants treated equally).
Berne Convention (1886)	Protects **copyrights** globally.	**India joined in 1928**.	**No registration required** for copyright protection.
TRIPS Agreement (1995)	Establishes **global minimum standards for IP laws**.	India **complies with TRIPS** via **Patents Act (1970), GI Act (1999), Copyright Act (1957)**.	India **used TRIPS flexibilities** to issue **compulsory licenses for life-saving drugs**.
Patent Cooperation Treaty (PCT)	Allows **global patent applications** through a single filing.	**India joined in 1998**.	WIPO-administered **PCT streamlines international patent filings**.
Madrid Protocol (1996)	Simplifies **global trademark registration**.	**India joined in 2013**.	A single **Madrid application covers 130+ countries**.
Hague Agreement (1925)	Protects **industrial designs internationally**.	**India joined in 2019**.	Reduces **cost of registering industrial designs worldwide**.

India's IPR Laws and Key Features

Legislation	Focus Area	Key Provisions
Patents Act (1970, Amended 2005)	**Patents**	- 20-year patent protection. - Prevents **evergreening** (Section 3(d)). - Allows **compulsory licensing** for public health.
Copyright Act (1957, Amended 2012)	**Copyright**	- Covers **digital works, movies, software**. - Copyright term = **lifetime of author + 60 years**.
Trade Marks Act (1999)	**Trademarks**	- Indefinite protection (renewed every **10 years**).
Geographical Indications Act (1999)	**GI Tags**	- First GI in India: **Darjeeling Tea (2004)**. - GI protection valid for **10 years, renewable**.
Designs Act (2000)	**Industrial Designs**	- Protects **visual appearance** of products. - Protection for **10 years, extendable to 15**.
Plant Varieties and Farmers' Rights Act (2001)	**Agriculture**	- Protects **plant breeders & farmers' rights**. - Farmers can **freely use protected varieties**.
Semiconductor Integrated Circuits Layout-Design Act (2000)	**Electronics & Semiconductor Industry**	- Protects **IC layout designs for 10 years**.

India's Key Trade & IPR Issues

Issue	India's Stance	Recent Developments

KARMAYOGI IAS

Pharmaceutical Patents & TRIPS Flexibilities	India supports **compulsory licensing** for essential drugs.	**2021:** India & South Africa pushed for a **TRIPS waiver on COVID-19 vaccines**.
Agricultural Subsidies & MSP	India demands flexibility in **public stockholding for food security**.	**Peace Clause (Bali, 2013):** Protects India from WTO action on MSP.
E-Commerce & Digital Trade	India opposes **WTO-led digital trade rules** (wants data sovereignty).	**2022:** India opposed indefinite extension of **e-commerce moratorium** at WTO.
Evergreening of Patents	India restricts **patent extensions on minor drug modifications**.	**Novartis Case (2013):** India denied a patent for **Glivec**, citing **Section 3(d)**.

Multilateral Organizations and India's Participation (2024 Updates Included)

Organization	Established	Headquarters	Objective	Founding Members	New Members (Latest Additions)	India's Role & Key Projects
New Development Bank (NDB) **(BRICS Bank)**	2014	**Shanghai, China**	- Infrastructure financing in BRICS & emerging economies. - Sustainable development projects.	**Brazil, Russia, India, China, South Africa (BRICS).**	**Bangladesh, UAE, Egypt (2023).**	- **India's Voting Share:** 18.98% - **Key Projects:** 1. **Mumbai Metro Expansion ($300 million).** 2. **Delhi-Ghaziabad-Meerut RRTS ($500 million).** 3. **Bihar Rural Roads Project.** 4. **Rural Employment Loan ($1 billion, 2020).**
Shanghai Cooperation Organisation (SCO)	2001	**Beijing, China**	- **Security, Counterterrorism, Economic Cooperation**. - Strengthening Eurasian connectivity.	**China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan.**	**India, Pakistan (2017), Iran (2023), Belarus (2024).**	- **India's Focus:** 1. **INSTC (International North-South Transport Corridor).** 2. **Increased trade with Central Asia.** 3. **Hosting SCO Summit (2023).**
Indo-Pacific Economic Framework (IPEF)	2022 (U.S.-led)	No Permanent HQ	- **Trade, Clean Energy, Supply Chains, Fair Economy (Tax, Anti-Corruption).**	**U.S., India, Australia, Japan, South Korea, New Zealand, Singapore, Malaysia, Vietnam, Philippines, Brunei, Indonesia,**	**No new members (as of 2024).**	- **India opted out of the Trade Pillar** but supports **supply chain resilience & anti-corruption measures.**

KARMAYOGI IAS

				Thailand, Fiji.		
Build Back Better World (B3W)	2021 (G7-led)	No Permanent HQ	- **Countering China's Belt & Road Initiative (BRI).** - Infrastructure funding for developing nations.	**G7 (USA, UK, Germany, France, Italy, Canada, Japan).**	**No new additions.**	- **India's Role:** Partnering for **transparent & sustainable infrastructure.**
Blue Dot Network (BDN)	2019	**US, Japan, Australia**	- **Certifies Infrastructure Projects** for sustainability & transparency. - Alternative to **China's BRI**.	**US, Japan, Australia.**	**No new additions.**	- India supports **high-standard global infrastructure projects.**
Organisation for Economic Cooperation and Development (OECD)	1961	**Paris, France**	- Economic policy coordination & trade liberalization.	**European & North American countries.**	**Latvia, Colombia, Costa Rica (2020-21).**	- **India is a key partner, not a member.** Collaborates on **taxation, economic policy.**
Asian Infrastructure Investment Bank (AIIB)	2015	**Beijing, China**	- Infrastructure funding in **Asia & beyond.**	**China, India, UK, Germany, France, Australia, Russia.**	**UAE, Liberia (2024).**	- **India's Share: 7.6% (2nd largest after China).** - **Key Projects: Chennai Metro, Mumbai Urban Transport.**
Bank for International Settlements (BIS)	1930	**Basel, Switzerland**	- **Oversees global monetary stability & financial regulations.**	**USA, UK, France, Germany, Belgium, Italy.**	**No recent additions.**	- **RBI represents India** in global financial risk monitoring.
Financial Stability Board (FSB)	2009	**Basel, Switzerland**	- **Ensures financial stability & crisis prevention.**	**G20 Nations & financial institutions.**	**No recent additions.**	- **India represented by RBI, SEBI, Ministry of Finance.**

Voting Shares in Major Multilateral Financial Institutions (2024-25)

Institution	Top Voting Shareholders (%)	India's Share (%)	Key Feature
IMF	USA (16.5), Japan (6.1), China (6.1), Germany (5.3)	**2.75%**	Quota-based, reflecting economic size.
World Bank	USA (15.5), Japan (7.1), China (5.8), Germany (4.4)	**3.2%**	Capital-based voting system.
New Development Bank (NDB)	Equal for all BRICS (20% each).	**20.0%**	**Egalitarian voting.**
Asian Development Bank (ADB)	Japan (15.6), USA (15.6), China (6.4), India (6.3)	**6.3%**	**Shared leadership between Japan & USA.**

KARMAYOGI IAS

Asian Infrastructure Investment Bank (AIIB)	China (26.6), India (7.6), Russia (5.9), Germany (4.2)	**7.6%**	**India is AIIB's 2nd largest shareholder.**

Major Global Institutions Funding India's Infrastructure & Development (Latest Updates- 2024)

Institution	Key India-Focused Projects (2024-25)	Funding Amount (Approx.)
Japan International Cooperation Agency (JICA)	1. **Mumbai-Ahmedabad Bullet Train ($14 bn).** 2. **Delhi Metro Expansion.** 3. **Ganga Rejuvenation (Namami Gange).**	**India's biggest bilateral donor.**
Asian Development Bank (ADB)	1. **East Coast Economic Corridor (ECEC).** 2. **Chennai-Kanyakumari Industrial Corridor.**	**$7 billion+ investment.**
AIIB (Asian Infrastructure Investment Bank)	1. **Mumbai Urban Transport Project (MUTP).** 2. **Rajasthan Solar Power Project.**	**India is AIIB's largest borrower ($6 billion+).**
World Bank Group	1. **Rural Electrification (PM Saubhagya Yojana).** 2. **National Ganga River Basin Project.**	**$30 billion+ funding in India.**
European Investment Bank (EIB)	1. **Bangalore Metro Phase-II.** 2. **Green Climate Financing.**	**Largest EU lender in renewable energy.**

Place	Context & Details	
Nagorno-Karabakh	Conflict with Azerbaijan led to Russian peacekeepers withdrawing. Known as Artsakh by Armenians, it is a mountainous region rich in Armenian cultural heritage with ancient monasteries and churches. A landlocked mountainous region officially recognized as part of Azerbaijan.	
Armenia (Capital: Yerevan)	**Context: Armenia has officially recognized Palestine as a state.** • **Location:** Landlocked country in Transcaucasia, a region south of the Caucasus Mountains**.** • **Borders:** Azerbaijan, Turkey, Nakhchivan Autonomous Republic (an exclave of Azerbaijan), Georgia, and Iran.	
Ukraine	Faces ongoing conflict with Russia, with recent attacks on Snake Island. Ukraine is strategically located in Eastern Europe with significant natural resources and	

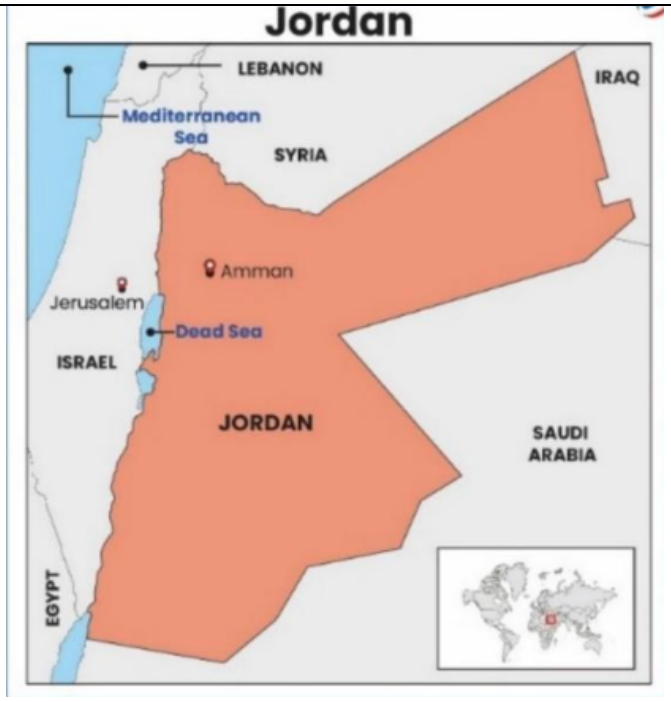
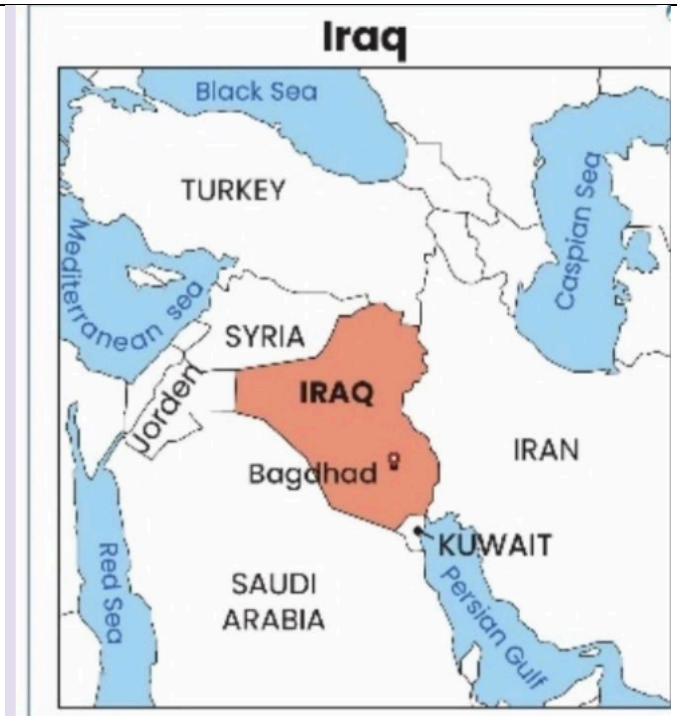
	diverse ethnic groups. • **Land Borders: Belarus** (north), **Russia** (east), **Moldova & Romania** (southwest), **Hungary, Slovakia, and Poland** (west). • **Water bodies: The Sea of Azov** & **Black Sea** are located to the south of Ukraine. Key locations include Snake Island and the cities of Kyiv, Mariupol, and Luhansk	
Nord Stream	Gas pipeline explosions in the Baltic Sea have caused environmental concerns and impact on European energy security. The Baltic Sea connects multiple European countries and is critical for gas transit.	
Kursk Region	Emergency declared due to conflict spillover from Ukraine. Known for its fertile plains and part of the East European Plain. • **River Basins:** Includes the basins of the Dnieper and Don rivers. • Also, armed militants launched an attack in	

	Russia's southern republic of Dagestan	
Lebanon	Intensified conflicts with Israel due to Hezbollah's activities. Lebanon features diverse religious groups and is known for its complex political landscape. • **Location:** Narrow strip of territory along the eastern shore of the Mediterranean Sea, situated in the Northern Arabian Peninsula in West Asia. • **Bordering Countries:** Syria (north and northeast), Israel (south). • **Maritime Boundary:** Cyprus. **<u>Israel and Lebanon have no official border separating them, except the Blue Line.</u>**	

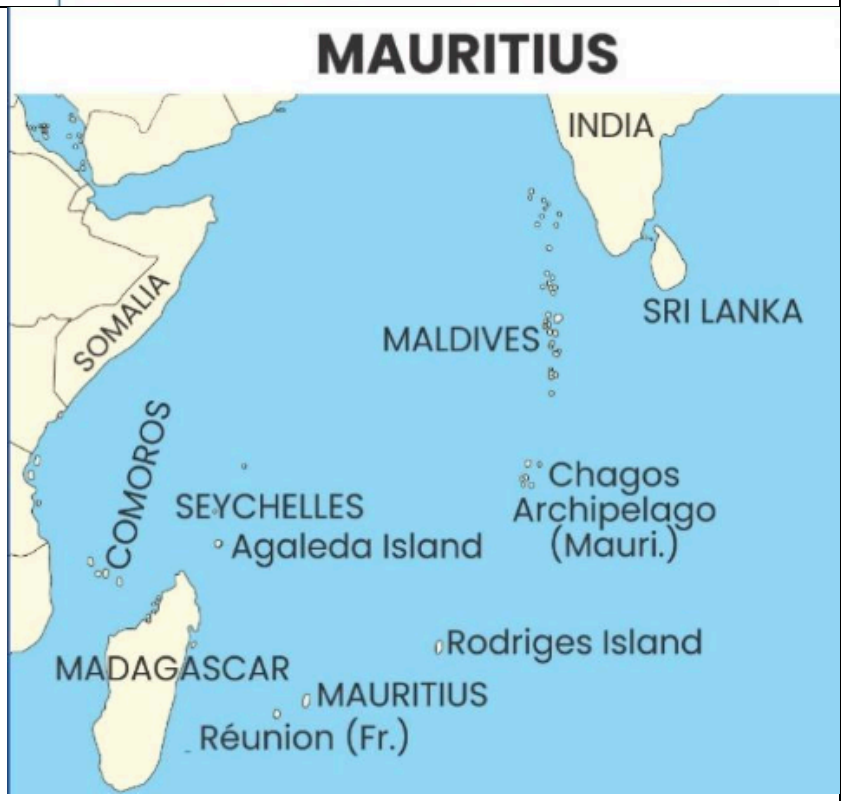
Baltic Sea	Russian military activity near Sweden's Gotland Island highlighted the strategic importance of this major European waterway. • Baltic Sea is an arm of the North Atlantic Ocean, connected to it through the Danish Straits. • The world's largest inland brackish sea, with low salinity due to an influx of river waters.	
Abu Musa Island	Disputed sovereignty issues involving Iran, UAE, and a statement by China. The island is strategically located near the Strait of Hormuz, a vital waterway through which about a fifth of the world's oil passes daily.	
Senkaku/Diaoyu Islands	Territorial disputes between Japan, China, and Taiwan over these uninhabited islands in the East China Sea, significant for their strategic location. About Senkaku Islands: o Also known as Diaoyu in Chinese. o Located in the East China Sea, approximately 410 km west of Okinawa Island.	

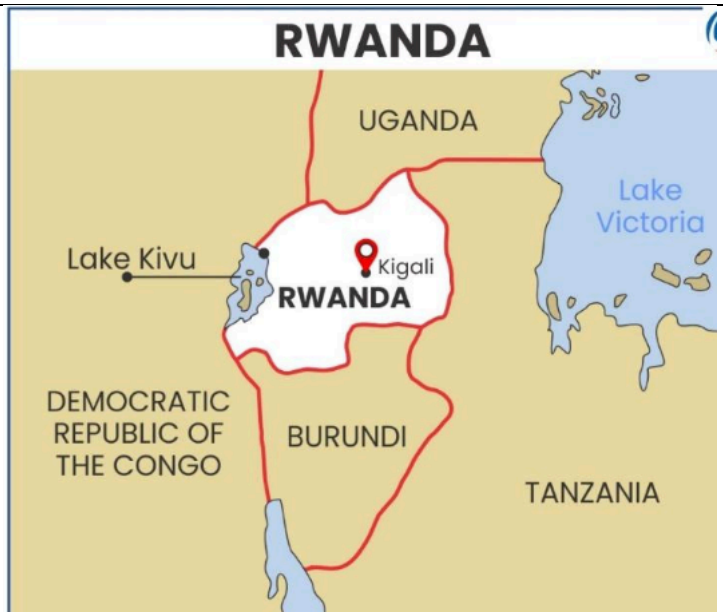
Gulf of Aden	Recent pirate attacks raise concerns in this vital waterway between the Red Sea and the Arabian Sea.	
Turkey	Recent military strikes targeting Kurdish militants in Iraq and Syria by Turkey, which spans Southeastern Europe and Western Asia and is bordered by multiple seas and countries. Location: o The smaller northwestern part of Turkey, including the city of Istanbul, lies in Southeastern Europe (the Balkan Peninsula). This region is known as Eastern Thrace. o The larger portion of Turkey, called Anatolia (or Asia Minor), is located in Western Asia. • Borders: Georgia and Armenia (northeast), Azerbaijan and Iran (east), Iraq and Syria (southeast), Greece and Bulgaria (northwest). • Water Bodies: Bounded by the Black Sea (north), Mediterranean Sea	

	(southwest), and Aegean Sea (west).	
Somalia	A suicide bombing in Mogadishu highlights ongoing security challenges in this Horn of Africa country, bordered by several nations and key water bodies. **Borders**: Djibouti (northwest), Ethiopia (west), and Kenya (southwest). • **Water Bodies**: Gulf of Aden and Indian Ocean.	
Israel (Capital: Jerusalem	[proclaimed capital; **status:** Disputed]; many countries recognize **Tel Aviv** as the **diplomatic capital**). • **Context:** Israel has approved the reopening of the Erez crossing to allow the flow of more humanitarian aid into Gaza. • **Location:** Israel is a country located in the **Middle East.** • **Boundaries: Lebanon** (north), **Syria** (northeast), **Jordan** (east), and **Egypt** (southwest). • **Water Bodies:** The Sea of Galilee; theRed Sea (Gulf of Aqaba); the Dead Sea, and the Mediterranean Sea • **It includes East Jerusalem** and the **Golan Heights**, both areas of territorial dispute. • **About Erez Crossing:** It is a border crossing between **Israel** and	

	the **northern Gaza Strip**.	
Jordan (Capital: Amman)	• **Context: The World Health Organization (WHO) declared Jordan as the first country in the world to eliminate leprosy.** • **Borders:** Syria, Iraq, Saudi Arabia, Israel, and Palestine (West Bank). • **Water Bodies:** Jordan River, Dead Sea, and Gulf of Aqaba.	
Iraq (Capital: Baghdad)	• **Context:** UNSC voted to end the United Nations Assistance Mission in Iraq (UNAMI), established in 2003 following the United States-led invasion**.** • **Territorial Boundaries:** Türkiye (north), Iran (east), Syria and Jordan (west), Saudi Arabia, and Kuwait (south). • **Maritime Boundaries:** Opens into the Persian Gulf.	

Iran (Capital: Tehrān)	**Context: Iran's President dies in a helicopter crash.** **• Land Boundaries: Armenia, Azerbaijan, Turkmenistan (north); Afghanistan and Pakistan (east); Iraq (west); Turkey (northwest).** • **Maritime Borders: Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia.** • **Surrounding Water Bodies: Persian Gulf and Gulf of Oman.**	
United Arab Emirates (Capital: Abu Dhabi)	**Context: The UAE successfully completed the Arab world's first nuclear power plant.** **• Neighbors: Saudi Arabia (west and south), Oman (east and northeast).** **• Maritime Borders: Gulf of Oman, Persian Gulf.**	

Thailand (Capital: Bangkok)	**Context: Thailand's senate has approved a bill to legalize same-sex marriage.** • **Land Borders: Myanmar (northwest), Cambodia (east), Laos (northeast), and Malaysia (south).**	
Mauritius: (Capital: Port Louis)	**Context: India's first overseas Jan Aushadhi Kendra (JAK) inaugurated in Mauritius.** **Location: Mauritius is an island nation in the Indian Ocean, located to the east of Madagascar and off the southeastern coast of Africa.** **• Neighbouring Islands: Reunion Island (France) to the west & Seychelles in the northwest.**	

Rwanda: (Capital: Kigali)	**Context: UK Parliament passed the Safety of Rwanda (Asylum and Immigration) Bill which will give Britain's immigration authorities power to send any asylum seeker entering the UK "illegally" after January 2022 to Rwanda.** • **Location: Landlocked country in Central Africa** • **Border: Uganda (north), Tanzania (east), Burundi (south), and Democratic Republic of the Congo (west).** **• Lake Kivu, which forms part of the western border with the Democratic Republic of the Congo.**	
Democratic Republic of Congo (DRC) (Capital: Kinshasa)	**Location: Largest country in Sub-Saharan Africa, second largest in Africa (after Algeria).** **Borders: Central African Republic, South Sudan, Uganda, Rwanda, Burundi, Tanzania, Zambia, Angola.** **Maritime Boundary: Access**	

	to the Atlantic Ocean.	
Mexico (Capital: Mexico City)	**Context: Mexico became the first country to approve the popular election of judges. o Also, Claudia Sheinbaum elected as the first woman president of Mexico. • Territorial Boundaries: USA (north), Guatemala and Belize (southeast). • Maritime Boundaries: Pacific Ocean (west/south), Gulf of Mexico (east), and Caribbean Sea (southeast).**	
P anama (Capital: Panama City)	**Location: Country of Central America, located on the Isthmus of Panama. o Isthmus of Panama: A narrow bridge of land connecting North and South America. • Borders: Costa Rica (west) and Colombia (east). • Maritime Boundaries: Caribbean Sea (north) and Pacific Ocean (south).**	

Trinidad & Tobago (Capital: Port of Spain)	**Trinidad & Tobago has become the first country in the Caribbean region to adopt India's Unified Payments Interface (UPI) platform.**	

CONFLICTS IN NEWS

Region	Place	Factions Involved	Reasons for Conflict
South East Asia	Southern Thailand	Thai government vs. Malay-Muslim separatists	Ethnic and religious tensions, autonomy demands
	West Papua (Indonesia)	Indonesian government vs. Free Papua Movement (OPM)	Independence movement, resource exploitation, cultural suppression
	Mindanao (Philippines)	Philippine government vs. MILF (Moro Islamic Liberation Front)	Autonomy, Islamic governance, extremism
	Kachin State (Myanmar)	Myanmar military vs. Kachin Independence Army (KIA)	Ethnic autonomy, resource control
Africa	Sahel Region	Governments vs. jihadist groups, ethnic militias	Insurgency, ethnic tensions, weak governance
	Tigray (Ethiopia)	Ethiopian government vs. TPLF	Political power struggle, autonomy demands
	Mozambique (Cabo Delgado)	Government vs. ISIS-Mozambique	Islamist insurgency, resource exploitation
	Sudan	Military vs. civilians, Rapid Support Forces vs. rebel groups	Power struggle, ethnic violence
	Western Sahara	Morocco vs. Polisario Front	Independence dispute over territory
Europe	Transnistria (Moldova)	Moldovan government vs. Transnistrian separatists	Independence declaration in 1990
	Basque Country (Spain)	Spanish government vs. Basque Homeland and Liberty	Basque independence movement

	Cyprus	Greek Cypriots vs. Turkish Cypriots	Ethnic and political division since 1974
	Catalonia (Spain)	Spanish government vs. Catalan independence movement	Autonomy and independence demand
	Chechnya (Russia)	Russian government vs. Chechen separatists	Independence movement, religious extremism
	South Ossetia and Abkhazia (Georgia)	Georgian government vs. Russian-backed separatists	Independence declarations, Russian influence
West Asia	Yemen (Civil War)	Houthi rebels vs. Yemeni government (Saudi-backed)	Sectarian tensions, political power struggle
	Kurdish-Turkish Conflict (Northern Syria/Iraq)	Turkey vs. Kurdish groups (PKK, YPG)	Kurdish autonomy demands, Turkish security concerns
	Red Sea and Houthis	Houthi rebels vs. Saudi Arabia, UAE, etc.	Control over the Red Sea as the Bab el-Mandeb Strait, critical chokepoint for global trade, especially oil shipments. Operation Sankalp by Indian Navy for vessel safety

- **Exons:** Exons are **the coding regions of a gene.** They **contain the genetic information** that is **transcribed into RNA** and **ultimately translated into a specific sequence** of **amino acids** to form a **protein. Exons** are essential for **protein synthesis** because they **provide the blueprint** for the **protein's structure and function.**
- **Introns:** Introns, on the other hand, are **non- coding regions within a gene.** They **do not directly code** for a part of the protein. Instead, **introns are transcribed into RNA along** with exons but are typically **removed during a process called splicing. Function of introns** is **not entirely clear,** but they are **believed to have regulatory roles** and may play a **role in gene expression** and the **evolution of genes.**

Dark DNA

- **Dark DNA** refers to genomic regions that are difficult to detect or interpret using standard sequencing methods, often due to high mutation rates or repetitive sequences.
- While traditionally considered **"junk DNA,"** recent research suggests that dark DNA may play roles in gene regulation, evolution, and species adaptation, though its precise functions remain under investigation.

GENOME SEQUENCING

- It is the process of determining the complete DNA sequence of an organism's genome. It involves identifying the exact order of the four nucleotide bases (adenine, thymine, cytosine, and guanine) across all chromosomes.
- Genome sequencing provides insights into genetic makeup, allowing researchers to study genes, understand hereditary traits, identify mutations linked to diseases, and drive advancements in personalized medicine and biotechnology.

Human Genome Project [UPSC 2011]

- **Initiation**: Launched in 1990 to map all human genes and sequence the entire human genome.
- **Goals**:
  - Map all human genes.
  - Create a detailed physical map of the entire human genome.
  - Sequence all 24 human chromosomes by 2005, involving 3.2 billion nucleotide pairs.

Genome India Project

- **Launch**: Started by the Department of Biotechnology in 2020.
- **Objective**: Sequence the genomes of 10,000 Indians to enhance understanding of disease patterns, support predictive diagnostics, personalized medicine, and preventive care.
- **Collaboration**: Led by the Centre for Brain Research at IISc, Bengaluru, involving 20 institutions.

Human Microbiome Initiative of Select Endogamous Population of India

- **Purpose**: Characterize human-associated microbes in diverse Indian populations, focusing on tribal groups with minimal modern lifestyle influence.
- **Methods**: Uses metagenomic approaches to study the impact of diet, lifestyle, geography, and age on the gut microbiome.
- **Ayurvedic Integration**: Investigates links between microbial enterotypes and Ayurvedic Prakriti types to understand the microbiome's role in health and disease.

Earth Bio-Genome Project [UPSC 2017]

- **Goal**: Sequence, classify, and characterize the genomes of all eukaryotic biodiversity on Earth within ten years.
- **Impact**:
  - Create a global catalogue of life, contributing to a digital library of life.
  - Sequence 1.5 million species, exploring evolutionary relationships across species, orders, and families.

Significance: Aims to revolutionize biology, aid biodiversity conservation, and provide sustainable solutions for society

SEX CHROMOSOMAL ABNORMALITIES

- Turner's Syndrome - XO
- Klinefelter's Syndrome - XXY
- Triple X female - XXX
- Double Y Male - XYY

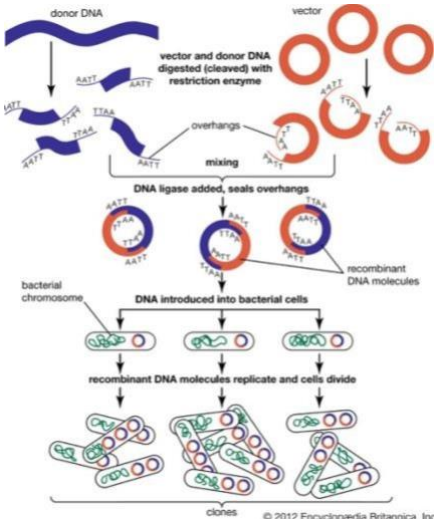
BRANCHES OF BIOTECHNOLOGY

GENETIC ENGINEERING TOOLS

Genetic engineering represents a ground-breaking discipline that encompasses the alteration of an organism's genetic material to generate novel characteristics or enhance existing ones. Utilizing methods such as gene editing and recombinant DNA technology, it holds the promise to transform agriculture, medicine, and numerous other sectors, ushering in a realm of boundless opportunities.

RECOMBINANT DNA TECHNOLOGY

In 1968, Swiss microbiologist Werner Arber uncovered restriction enzymes, a pivotal breakthrough that paved the way for the emergence of recombinant DNA technology. Recombinant DNA Technology involves the synthesis of synthetic DNA by combining genetic material from diverse sources and genetic elements. The broader field encompassing these tech-niques is known as genetic engine-eering.



Endonucleases and Exonucleases:

a. Exonucleases trim nucleotides from the ends of DNA strands. Endonucleases cut DNA within the strand.
b. Restriction endonucleases are specific, cutting DNA at certain sequences, often palindromes.
   - Example: Restriction enzymes like EcoRI cut DNA at specific sequences, DNA at certain sequences, often palindromes.

VECTORS

a. Vectors carry and integrate genes into host organisms in recombinant DNA technology.
b. Common vectors include bacteriophages and plasmids due to their high copy numbers.
c. Example: Plasmids can carry a human insulin gene into bacteria for insulin production.

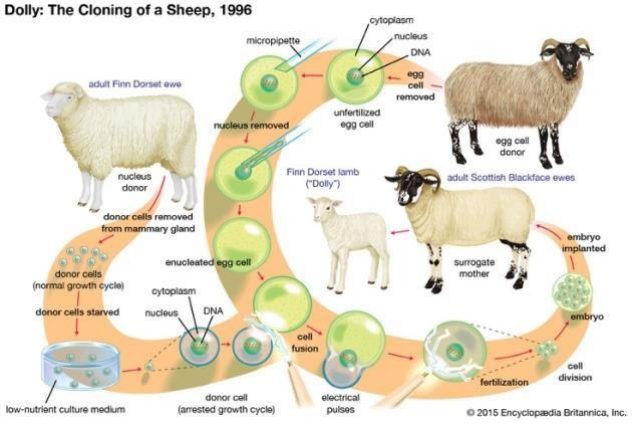
GENE CLONING

Gene cloning involves making a genetic replica of a DNA sequence or an entire organism's genome. This is typically achieved through two methods: Somatic Cell Nuclear Transfer (SCNT) and Artificial Embryo Twinning.

SOMATIC CELL NUCLEAR TRANSFER (SCNT)

1. The nucleus of a somatic cell is removed and retained.
2. The nucleus of a host egg cell is removed and discarded.
3. The retained somatic cell nucleus is fused with the "deprogrammed" egg cell.
4. The egg, now containing the somatic cell's nucleus, is stimulated with an electrical shock, prompting it to start dividing.
5. Through multiple divisions, a single cell develops into a blastocyst, an early-stage embryo with DNA nearly identical to the original organism.

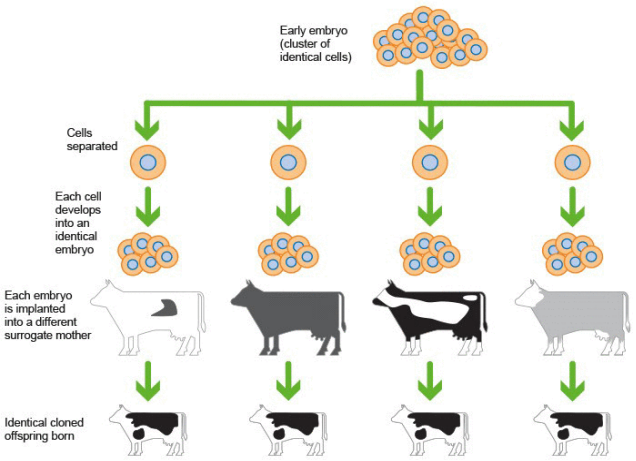
Dolly the sheep was the first cloned animal created using SCNT.



ARTIFICIAL EMBRYO TWINNING

This technology replicates the natural process of producing identical twins. It involves manually splitting an early-stage embryo into individual cells, allowing them to develop independently. These resulting

embryos are then placed into a surrogate mother, where they continue to develop. Since these embryos originate from the same zygote (fertilized egg), they are genetically identical.



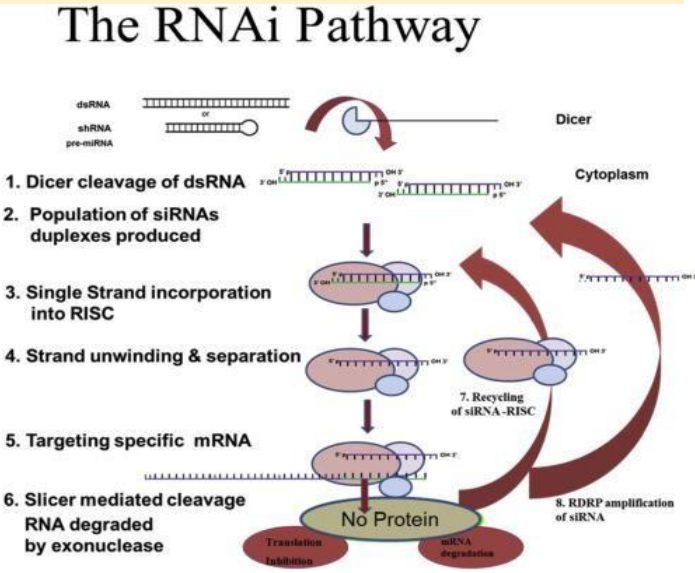
GENE SILENCING

Gene silencing refers to the control or suppression of genes that may be defective and responsible for unwanted traits. Common methods for achieving gene silencing include **RNA Interference (RNAi**) and **Antisense Technology.** These techniques help to regulate the expression of specific genes to mitigate their undesirable effects.

RNA INTERFERENCE (RNAi)

RNA interference (RNAi) or **Post-Transcriptional Gene Silencing (PTGS)** is a well-preserved biological response triggered by double-stranded RNA. It serves as a defence mechanism against both internal parasitic and external pathogenic genetic material, while also controlling the activity of protein-coding genes. This natural process of specific gene suppression holds the potential to transform experimental biology and find valuable applications in fields such as functional genomics, medical treatments, agriculture, and more.

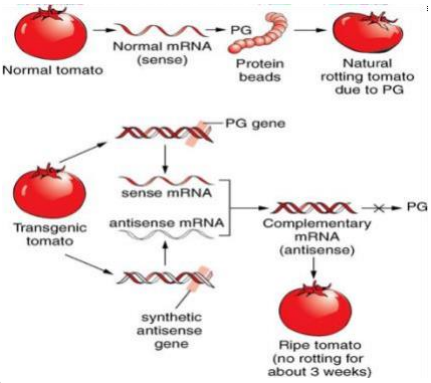
ANTISENSE TECHNOLOGY



This technology operates based on the principle that an antisense nucleic acid sequence binds to its complementary sense RNA strand, blocking its translation into a protein. The complementary nucleic acid sequence can be a synthetic –

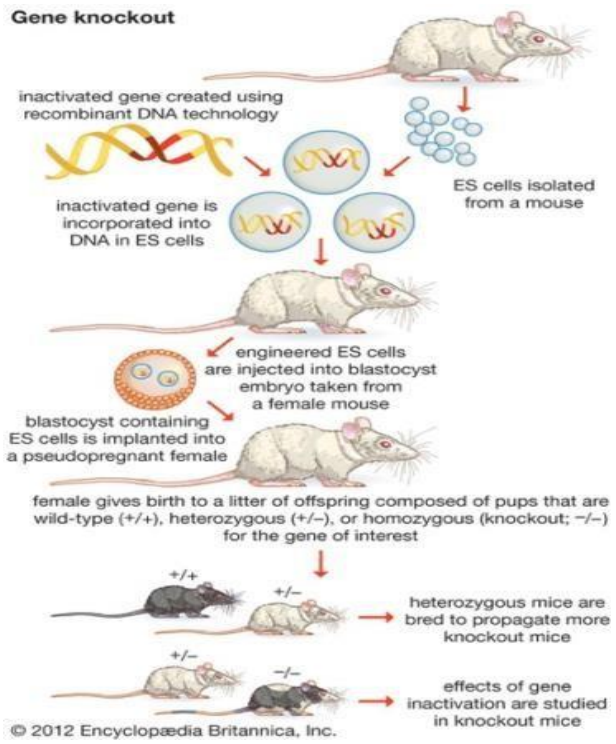
oligonucleotide, often short (less than 30 nucleotides), or longer antisense RNA sequences.

When both complementary sense and antisense RNA molecules are present in the same cell, they can form a stable duplex that disrupts gene expression, affecting transcription, RNA processing, or potentially translation.



GENE KNOCKOUT

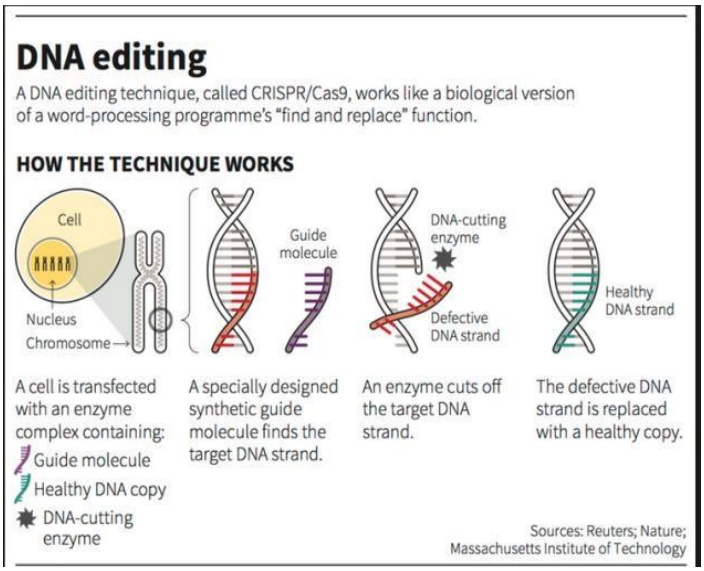
Gene knockout is a process wherein an **active gene is substituted with an inoperative** one generated through recombinant DNA technology. When a gene is **"knocked out,"** the resulting altered observable traits often **unveil the gene's biological role.**



CRISPR- Cas9

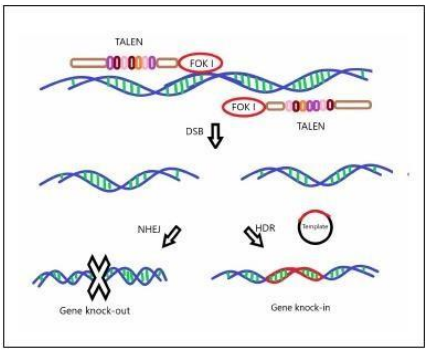
Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) is a gene editing technology inspired by **bacteria's natural defence against viruses. It employs a specialized protein called Cas9. Key points about CRISPR technology:**

- It can introduce new genes or suppress existing ones through genetic engineering.
- CRISPR does not add new genes from external sources.
- It's often referred to as **"Genetic Scissors"** due to its precise **gene-cutting abilities.**
- Its mechanism is likened to the **"cut-copy-paste"** or **"find-replace"** functions in common computer programs.
- CRISPR can locate and remove problematic DNA sequences responsible for diseases and replace them with the correct ones.
- The **tools used are biochemical, including specific proteins and RNA molecules.**
- This **technology mimics a natural defence mechanism found in some bacteria**.



TALENs

TALENs (Transcription Activator-Like Effector Nucleases): TALENs represent an alternative gene editing method that can be **customized to pinpoint precise DNA sequences.** Their function resembles that of **CRISPR-Cas9,** and they have found application in genetic manipulation across different organisms.



APPLICATIONS OF BIOTECHNOLOGY

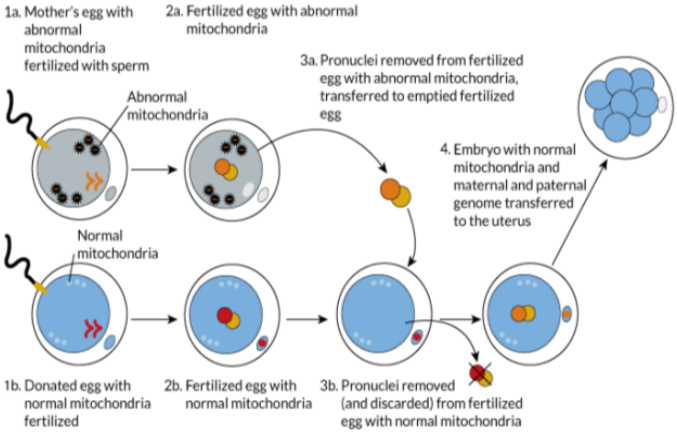
THREE PARENT BABY

Three-parent babies, a notable scientific development, gained attention when the **first such baby was born in Mexico in 2016** to **Jordanian parents. In 2017, the UK became the first nation to grant licenses for the use of this method,** aimed at preventing the **inheritance of incurable genetic diseases.**

Mitochondria, which we briefly discussed earlier, **contains mitochondrial DNA (mtDNA).** Mutations in mtDNA can lead to various genetic disorders. Since **mtDNA is passed from the mother to the child,** these **disorders are maternally inherited.** The **three-parent baby technique addresses this issue by preventing the transfer of mitochondria from the mother to the child.** There are two main methods: **Pronuclear Transfer** and **Spindle Transfer.**

PRONUCLEAR TRANSFER

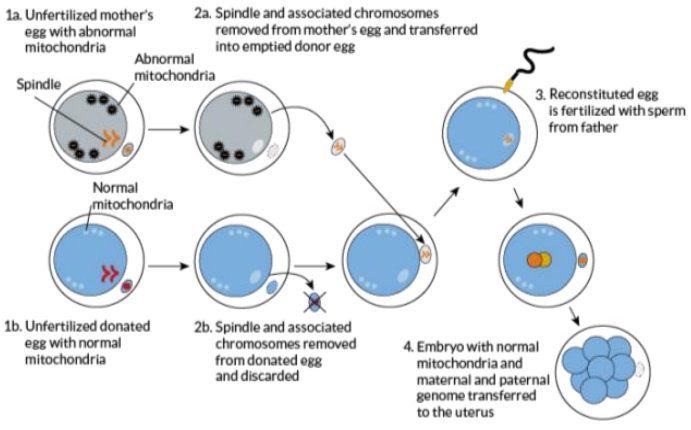
Pronucleus is the **nucleus of a sperm or an egg cell during the process of fertilization.** The **sperm cell becomes a pronucleus only after the sperm enters the ovum.** Under this technique, first **the healthy donated egg/s (provided by the mitochondrial donor)** is **fertilised with the intending male parent sperm.**



SPINDLE FIBRE TRANSFER

Fertility doctors in Greece and **Spain** have successfully used a technique known as **Maternal Spindle Transfer (MST)** to help a woman overcome infertility. **MST is similar to Pronuclear Transfer,** with the **primary distinction being the use of unfertilized eggs instead** of early embryos. Here's how MST works:

1. Chromosomes in a spindle-like structure are removed from the intending mother's egg.
2. These chromosomes are then placed into an enucleated donor egg (an egg with its nucleus removed).
3. The reconstructed egg now contains nuclear DNA from the mother and healthy mitochondria from the donor.
4. This egg can be fertilized with sperm from the intending father.
5. The resulting embryo is implanted into the intending mother, ensuring it remains unaffected by inherited mitochondrial disease.



GENE THERAPY

Gene Therapy is a medical approach where **new DNA is introduced into a patient to treat a genetic disease.** This new **DNA typically contains a healthy gene** to correct the problems caused by a faulty or disease-causing gene. An **example is a four-year-old** girl who was the first gene therapy patient. She had a condition called adenosine deaminase (ADA) deficiency, which made her vulnerable to infections

There are two types of gene therapy:

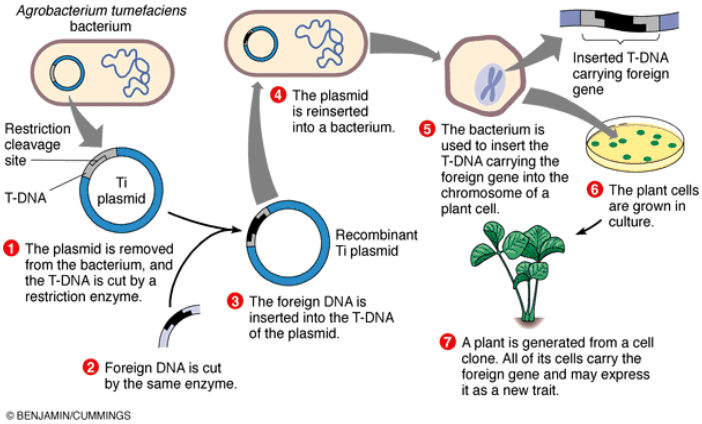
1. **Somatic Gene Therapy:** In this type, genes are introduced into a patient's body cells. Any changes and benefits only apply to that patient and won't be passed on to their children.

2. **Germline Gene Therapy:** Genes are introduced into reproductive cells (sperm or eggs). This

GENETICALLY MODIFIED CROPS (GM Crops)

Plants are modified through two main processes:

1. **Cisgenic Modification:** In this process, **genes are moved between organisms** that **can naturally crossbreed** or **reproduce**. It involves **gene transfer between sexually compatible plants.**
2. **Transgenic Modification: Genes from non-plant species** or **from plants that cannot naturally reproduce** with the recipient plant are inserted. This is a form of horizontal gene transfer, where genes cross species boundaries.



STATUS OF GENETICALLY MODIFIED ORGANISMS (GMOS) IN INDIA:

BT COTTON

- **Indian** farmers **began cultivating Bt cotton,** a genetically modified variety of cotton**, in 2002-03.**
- Bt cotton is engineered to produce an insecticidal protein from the **bacterium Bacillus thuringiensis** (Bt), **providing resistance against cotton bollworm, a common pest.**

- **By 2014, approximately 96% of cotton cultivation in India was Bt cotton.**
- **India** is the **fourth-largest cultivator of GM crops by acreage** and the second-largest cotton producer.
- **Bt cotton is the only transgenic crop approved for commercial cultivation in India.**

GM MUSTARD

- **The Genetic Engineering Appraisal Committee (GEAC)** approved the **commercial cultivation of genetically modified mustard, known as Dhara Mustard Hybrid (DMH-11).**
- **DMH-11** was developed by scientists at **Delhi University,** using genes from a soil bacterium to enhance mustard's characteristics for hybridization.
- **Claims of a 25-30% increase in yield** were made, but these claims were disputed by several NGOs.
- The **GEAC cleared the environmental release** of **DMH-11 for seed production** and testing, subject to existing guidelines and regulations.

BT MUSTARD

- Bt Brinjal, a genetically modified eggplant, **was recommended for commercial release by the GEAC in 2007.**
- It was **developed by the Maharashtra Hybrid Seeds Company** in collaboration with agricultural universities.
- **India banned the cultivation of Bt brinjal in 2010,** and **it has not been approved for commercial cultivation.**

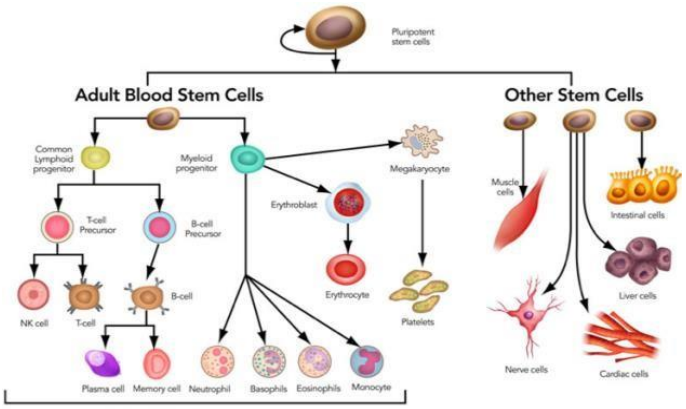
STEM CELL THERAPY

Stem cell therapy, also referred to as **regenerative medicine,** harnesses the **natural healing abilities** of **stem cells** or **their derivatives to stimulate the repair of damaged, dysfunctional**, or **injured tissues.** This approach holds promise for treating a wide range of medical conditions, including **autoimmune, inflammatory,** and **neurological disorders.**

Delhi High Court permitted two children with **autism spectrum disorder (ASD)** to undergo **stem cell therapy** for treatment of their condition. Autism Spectrum Disorder (ASD) is a neurological and developmental condition that impacts how individuals engage with others, communicate, acquire knowledge, and behave. Presently, there is no cure for ASD, so treatments and therapies primarily focus on symptom management and enhancing the quality of life for individuals with ASD, enabling them to lead fulfilling and functional lives

STEM CELL

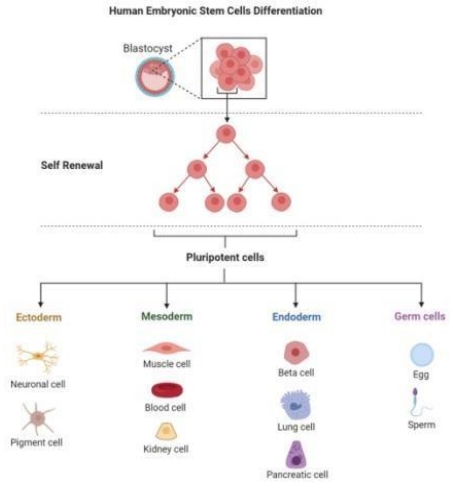
Stem cells, of all origins, are capable of dividing and renewing themselves for long periods of time. These cells **undergo a period of cell proliferation** while **preserving the undifferentiated state. All stem cells are unspecialized** or **undifferentiated.** These are present as **a mass of cells that differentiate** later **during their period of division.** Another essential property of stem cells is their **ability to differentiate into specialized cells** that together make up different tissue types. These cells can be either **pluripotent** or **multipotent**.



Cells of the Immune System

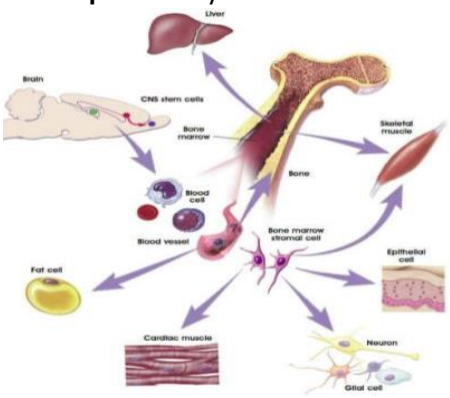
TYPES OF STEM CELL

1. **Embryonic Stem Cells (ESCs):** These originate from the **inner cell mass** of **an embryo** at the **blastocyst stage (4-5 days after fertilization).** They are **pluripotent** and **can differentiate into around 250 cell types.** However, their use is ethically debated and regulated in many countries.



2. **Adult Stem Cells (Somatic or Tissue-specific stem cells):** Found in **specific tissues and responsible for**

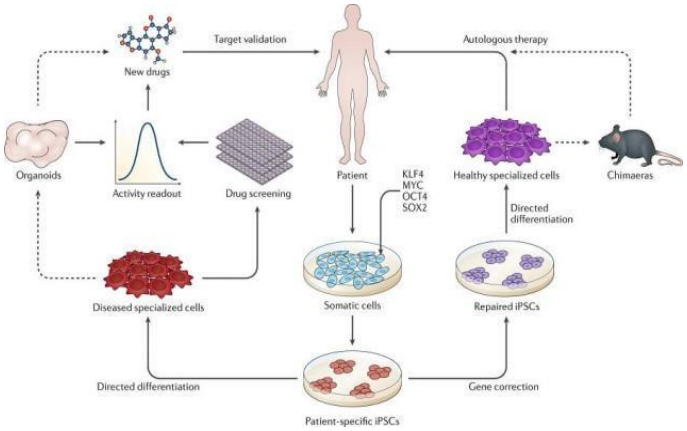
tissue repair. They are **limited** in **their ability to differentiate** into various cell types, and their survival depends on surrounding cells in



nic hes.

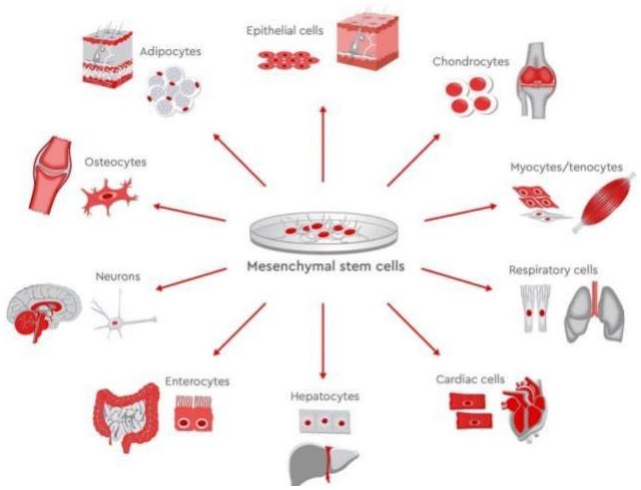
Examples include **hematopoietic stem cells in bone marrow** and **mesenchymal stem cells** in various tissues.

3. **Induced Pluripotent Stem Cells (iPSCs):** Created by **reprogramming adult cells** to behave like **embryonic stem cells.** They can **differentiate into various cell types,** and their generation from a patient's own cells reduces rejection risk. They hold great potential for regenerative medicine and the study of genetic diseases.



Perinatal Stem Cells: Derived from **extra- embryonic** sources **like foetal membranes, umbilical cord, and amniotic fluid.** They exhibit **immune-privileged characteristics**, **multipotent** stem cells are used in research and therapies for conditions like renal disease, cardiac disease, and spinal cord injuries.

5. **Mesenchymal Stem Cells (MSCs):** Found in various tissues, including muscles, liver, and bone marrow. They can differentiate into cell lines of different tissue types. MSCs are particularly important for supporting blood stem cells in the bone marrow. They have immunomodulatory properties and are used in treating chronic diseases and tissue restoration.



DNA PROFILING

DNA fingerprinting, also known as **DNA profiling,** is a technique for **isolating** and **identifying unique elements** in the **DNA's base-pair sequence.** This technology is widely used by law enforcement agencies worldwide to accurately identify individuals who may have left their **DNA at a crime scene during criminal activities.**

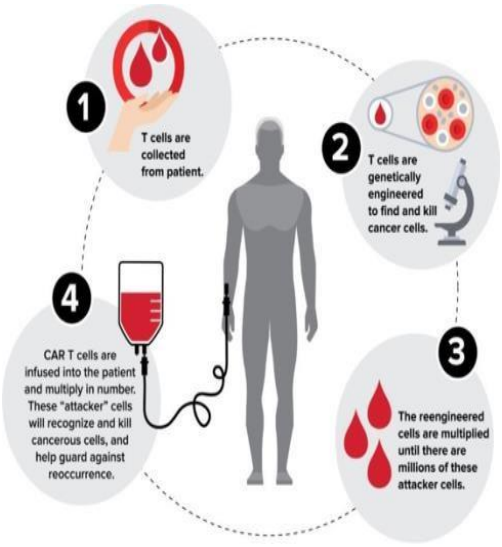
In **modern DNA profiling,** a technique employs **polymorphisms** known as **short tandem repeats (STRs)**. **These STRs** are **sections of non-coding DNA** that **consist of repeating sequences of nucleotides.** For instance, consider the **sequence GATAGATAGATAGATAGATAGATA,** where the sequence **"GATA" repeats six times.** Such repetitive sequences are what **we refer to as STRs.** These STRs are **located at various genetic loci** within an individual's DNA.

CHIMERIC ANTIGEN RECEPTOR T (CAR-T) CELL THERAPY

In **India, for the first time,** researchers conducted trials of **CAR-T therapy,** which was **developed by IIT Bombay** and **Tata Memorial Centre**. The research was **funded through the National Biopharma Mission (NBM)** by the **Biotechnology Industry Research Assistance Council (BIRAC),** a **Public Sector Enterprise established by the Department of Biotechnology (DBT)** to support emerging biotech enterprises

- **CAR-T therapy** involves **modifying immune cells known as T cells in the laboratory**, with the aim of getting **them to combat cancer.**
- **T cells are a type of white blood cell that naturally targets foreign pathogens.**
- In this process, **T cells are extracted from a patient's** blood and then **edited by introducing** a **man-made receptor gene** known **as CAR (Chimeric Antigen**

Receptor). CAR is a special receptor created in the lab, designed to bind to **specific proteins** on **cancer cells,** which helps T cells recognize and target these cancer cells more effectively . The modified T cells are referred to as CAR-T cells.



- Finally, **the CAR-T cells are reintroduced** into the **patient's body to enhance the immune response against cancer.**

NATIONAL BIOPHARMA MISSION

The **National Biopharma Mission (NBM)** is a **collaborative initiative** between **industry** and **academia** with the goal of expediting biopharmaceutical development in India. **Launched in 2017,** it has **a total cost of Rs 1500 crore** and is co-**funded by a 50% World Bank loan.** The Biotechnology Industry Research Assistance Council **(BIRAC) is responsible for its implementation.**

INDIAN BIOLOGICAL DATA CENTRE

The Indian Biological Data Center (IBDC) has been inaugurated in Faridabad, Haryana. Here's some key information about IBDC:

- **Data Storage:** The digitized data will be stored on a powerful four-petabyte supercomputer named 'Brahm.'
- **Supported by:** The Department of Biotechnology (DBT) is providing support for this initiative.
    - **Data Sharing:** IBDC follows the FAIR (Findable, Accessible, Interoperable, and Reusable) principle to ensure data is easily accessible and reusable. The FAIR Data Principles aim to make digital assets more reusable.
- **Genomic Data:** IBDC contains genomes sequenced by the Indian Sars-CoV-2 Genomic Consortium (INSACOG).
- **Sections:** Currently, IBDC comprises two sections:
    1. **Indian Nucleotide Data Archive (INDA):** This section archives data generated from publicly funded research projects in India and provides internationally accepted data accession numbers, including digitized genetic information of humans, plants, animals, and microbes.
    2. **Indian Nucleotide Data Archive – Controlled Access (INDA-CA):** This section may have restricted access.
- **Data Access:** IBDC provides different types of data access, including open access/time-release access and restricted access, depending on the nature of the data and its intended use.

Biological Research Regulatory Approval Portal (BioRRAP):

Developed by the Department of Biotechnology to centralize regulatory approvals for research proposals on a single portal.

- BioRRAP streamlines the process by directing applicants to relevant regulatory agencies.
- A unique BioRRAP ID generated through this portal is linked to various regulatory agency portals.
- Aims to enhance the credibility of biological research, improve interdepartmental coordination, and enhance the efficacy of agencies regulating different aspects of biological research.

Molecular Motor:

Scientists have constructed a molecular-scale motor using the DNA origami method, which involves folding DNA to create nanoscale 2D and 3D objects.

- Molecular motors are a type of proteins that facilitate intracellular movement by converting chemical energy into mechanical work.
- Examples of molecular motors' roles in the human body include muscle contraction, cell division (mitosis), and other critical biological processes.

India's First mRNA Vaccine Approval:

- India's Drugs Controller General (DCGI) has granted Emergency Use Authorization (EUA) for GEMCOVAC-OM, an mRNA COVID-19 booster vaccine developed by Gennova Biopharmaceuticals Ltd.
- GEMCOVAC-OM is a lyophilized (freeze-dried) vaccine that remains stable at temperatures between 2-8°C.
- It is administered using a device called "Tropis," which utilizes high-pressure technology to deliver vaccines through the skin, eliminating the need for

needles.
- The clinical trials and approval process for new drugs and vaccines in India are governed by the New Drugs and Clinical Trial Rules of 2019 under the provisions of the Drugs and Cosmetics Act of 1940.
- The Central Drugs Standard Control Organisation (CDSCO), led by the DCGI, is the authority responsible for granting vaccine approvals.

The vaccine testing and approval process includes a preclinical phase (not involving human testing) and three phases of human clinical trials to ensure safety and efficacy.

Public Acceptance of Phage Therapy:

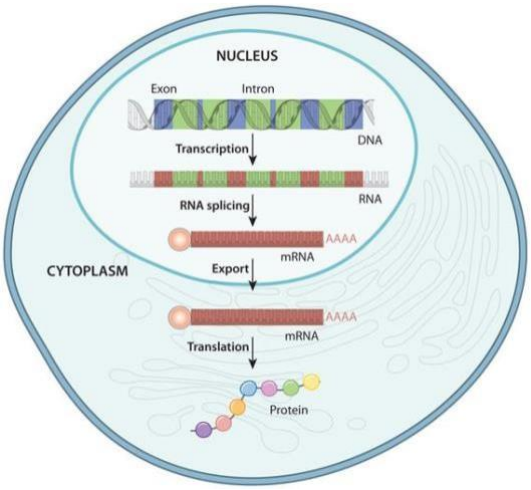
- A study has revealed that the public is increasingly accepting the use of bacteriophages (bacteria- killing viruses) as an alternative to antibiotics for treating bacterial infections.
- The improper use of antibiotics has led to a surge in Antimicrobial Resistance (AMR), which poses a significant health threat.
- In response to the rise of AMR, bacteriophages are becoming a popular alternative for controlling bacterial diseases.
- It is projected that by 2050, antibiotic resistance may lead to the deaths of 10 million people annually due to drug-resistant diseases.
- Bacteriophages, or phages, are viruses that specifically infect and replicate within bacterial cells. Phage therapy involves using these viruses to treat bacterial infections.
- Bacteriophages were discovered by Frederick William Twort in 1915 (Great Britain) and Felix d'Herelle in 1917 (France).
- Unlike many antibiotics, which can indiscriminately eliminate both harmful bacteria and beneficial microbiota (leading to new issues), each phage has evolved to selectively target specific bacterial strains or species. This precision is a key advantage of phage therapy.

Medicine Nobel Prize 2023 for mRNA Vaccine Discovery

- **Katalin Kariko** and **Drew Weissman**, recipients of the **2023 Nobel Prize in Medicine,** have gained recognition for their pioneering advancements in **mRNA technology.**

Their research has revolutionized our comprehension of how **mRNA interacts with the immune system, propelling the swift creation of vaccines, notably crucial during the Covid-19 outbreak.**

What is mRNA?



- **Messenger RNA (mRNA)** is a **single-stranded RNA (Ribo Nucleic Acid) molecule** that is **complementary to one of the DNA strands of a gene.**
- The **mRNA is an RNA version of the gene that leaves the cell nucleus** and **moves to the cytoplasm where proteins are made.**
- During protein synthesis, an organelle called a ribosome moves along the mRNA, reads its base sequence, and uses the genetic code to translate each three-base triplet, or codon, into its corresponding amino acid.
- **mRNA vaccines** make use of the messenger RNA molecules that tell the body's cells what proteins to build.
- The mRNA, in this case, is coded to tell the cells to recreate the spike protein of the coronavirus SARS-CoV-2, which causes Covid-19.
- It is the spike protein — which appears as spikes on
- the surface of the coronavirus — that initiates theprocess of infection; it allows the virus to penetrate cells, after which it goes on to replicate.
- A coronavirus vaccine based on mRNA, once injected into the body, will instruct the body's cells to create copies of the spike protein.
- In turn, this is expected to prompt the immune cells to create antibodies to fight it.
- These antibodies will remain in the blood and fight the real virus if and when it infects the human body

What are other types of vaccines?

(1) Vector vaccine:

- In this type of vaccine, genetic material from the COVID-19 virus is placed in a modified version of a different virus (viral vector).
- When the viral vector gets into your cells, it delivers genetic material from the COVID-19 virus that gives your cells instructions to make copies of the S protein.
- Once your cells display the S proteins on their surfaces, your immune system responds by creating antibodies and defensive white blood cells.
- If you later become infected with the COVID-19 virus, the antibodies will fight the virus.

(2) Protein subunit vaccine:

- Subunit vaccines include only the parts of a virus that best stimulate your immune system.
- This type of COVID-19 vaccine contains harmless S proteins.
- Once your immune system recognizes the S proteins, it creates antibodies and defensive white blood cells. If you later become infected with the COVID-19 virus, the antibodies will fight the virus.

Biotechnological Applications in Agriculture

1. **Genetically Modified (GM) Crops**:
   - **Bt Cotton**: Incorporates genes from *Bacillus thuringiensis* to resist bollworms. Introduced as Bollgard I in 2002, with Bollgard II (double-gene technology) following in 2006.
   - **Golden Rice**: Enhanced with vitamin A to address malnutrition issues.
   - **Bt Brinjal**: Engineered with the cry1Ac gene from *Bacillus thuringiensis* to resist the Brinjal Fruit and Shoot Borer.
2. **Pest and Disease Resistance**:
   - Biotech crops like those with Cry proteins resist pests such as cotton bollworms and corn borers.
3. **Herbicide Resistance**:
   - Crops like Roundup Ready soybeans are genetically modified to tolerate specific herbicides, enabling more effective weed control without harming the crop itself.
4. **Improved Nutritional Content**:
   - Genetic modifications enhance nutritional profiles, such as increasing protein or iron content in wheat and rice.
5. **Tissue Culture and Micropropagation**:
   - Techniques that assist in rapid, uniform, and disease-free plant propagation.
6. **Biofertilizers and Biopesticides**:
   - Utilize microbial cultures to naturally fix nitrogen or target pests, reducing chemical input and enhancing sustainability.
7. **Food Fortification**:
   - Enhances the nutritional content of food during processing. Key projects focus on biofortification to increase levels of iron, zinc, amino acids, and provitamin A in crops like rice, beans, and sweet potatoes.

Regulations of GMs in India:

- **Environment Protection Act, 1986 (EPA)**: Outlines rules for managing genetically modified organisms (GMOs), established in 1989 with subsequent guidelines.
- **Genetic Engineering Appraisal Committee (GEAC)**: Operates under the Ministry of Environment, Forest and Climate Change, overseeing the use of hazardous microorganisms and recombinants in research and industry from an environmental perspective.

BIOTECHNOLOGICAL APPLICATION IN ENVIRONMENT

Environmental biotechnology, specifically, refers to the use of procedures to safeguard and restore the environment's quality.

- **Biorock Technology: [UPSC 2022]**

  Biorock is the name given to the substance formed by the electro-accumulation of

Other Techniques	
Bioremediation	**Bioremediation is the process of using microorganisms to remove or detoxify toxins from soils, water, or sediments that would otherwise be harmful to human health.**
Phytoremediation	**Phytoremediation is a bioremediation process that uses various types of plants to remove, transfer, stabilise, and/ or destroy contaminants in the soil and groundwater.**
Phyto-degradation	**In this process, plants actually metabolize and destroy contaminants with in plant tissues.**
Phyto-volatilization	**In this process, plants take up water containing organic contaminants and release the contaminants into the air through their leaves.**
Biosensors	**A biosensor is an analytical device that converts a biological response into a physical, chemical or electrical signal.**

minerals dissolved in seawater on steel structures that are lowered onto the sea bed and are connected to a power source, e.g., solar panels that float on the surface. It has been used for **Coral restoration.**

Genetic Disorders

1. **Types of Genetic Disorders**:
   - **Single Gene Disorders**: Caused by mutations in a single gene. These often follow predictable inheritance patterns. Examples include:
     - Huntington's Disease: A neurodegenerative disorder.
     - Cystic Fibrosis: A condition affecting the lungs and digestive system.
   - **Chromosome Disorders**: Result from changes in the structure or number of chromosomes. Examples include:
     - Down Syndrome: Typically caused by an extra copy of chromosome 21, leading to developmental and physical features distinct to the syndrome.
   - **Multifactorial Disorders**: These disorders involve multiple genes and are often influenced by environmental factors. Example:
     - Cancer: Various types can be influenced by genetic predispositions combined with environmental factors like smoking or radiation exposure.
2. **Mutation and Its Impact**:
   - Mutations are permanent alterations in the DNA sequence that make up genes. They can lead to genetic diversity and are responsible for many genetic disorders.
   - Example of mutation impact:
     - Sickle Cell Anemia: Caused by a mutation in the gene that tells the body how to make hemoglobin, the protein in red blood cells that carries oxygen. The mutation causes red blood cells to become rigid and shaped like a sickle, leading to severe pain and potential complications.
3. **Sickle Cell Anemia Specifics**:
   - **Inheritance**: This condition is inherited in an autosomal recessive pattern.
   - **Symptoms**: Includes episodes of pain, frequent infections, delayed growth, and fatigue.
   - **Complications**: Risk of stroke, acute chest syndrome, and organ damage due to blocked blood flow caused by sickle-shaped cells.

HEALTH AND DISEASES

Health, as defined by the World Health Organization (WHO), is not merely the absence of disease or infirmity but a state of complete physical, mental, and social well-being. It encompasses the ability to handle stress, acquire skills, and maintain relationships, contributing to overall life satisfaction and functionality across various dimensions of life.

Pathogens

Pathogens are disease-causing microorganisms that can infect both plants and animals. There are several types, each with unique characteristics and implications for health:

- **Bacteria:** These are single-celled, prokaryotic microorganisms capable of causing infections such as strep throat, tuberculosis, and urinary tract infections. Example: *Streptococcus* bacteria, which causes strep throat.
- **Viruses:** Microscopic, obligate intracellular parasites that require living host cells to reproduce. They cause a wide range of diseases, from the common cold to more severe illnesses like HIV/AIDS and influenza. Example: The influenza virus, responsible for seasonal flu epidemics.
- **Protozoans:** These are unicellular eukaryotic organisms, often parasitic and causing diseases such as malaria and giardiasis. Example: *Plasmodium* spp., transmitted by mosquitoes, causes malaria.
- **Helminths:** Multicellular parasitic worms that can live in the gastrointestinal tract or other tissues. Infections might be chronic and debilitating. Example: Tapeworms, which can cause nutritional deficiencies and digestive issues.
- **Fungi:** Eukaryotic organisms that can be free-living or parasitic, often causing infections in the skin, lungs, or mucous membranes. Example: *Candida*, a fungus that can lead to opportunistic infections like thrush.[UPSC 2021]

Immunity and Its Mechanisms

Immunity involves various defense mechanisms that protect the body against infections, functioning in several ways:

- **Humoral Immunity:** This aspect of adaptive immunity involves B lymphocytes that produce antibodies to neutralize pathogens. Antibodies can target specific pathogens, neutralizing them or marking them for destruction by other immune cells. [UPSC 2022]
- **Cellular Immunity:** Involves T lymphocytes which can directly attack infected or malignant cells or coordinate other parts of the immune system through cytokines. [UPSC 2022]
- **Innate Immunity:** The body's first line of defense includes physical barriers such as skin and mucous membranes, and internal defenses like phagocytes and natural killer cells.
- **Acquired Immunity:** Develops either through natural infection or vaccination, leading to long-lasting immunity. It can be:
    - *Active Immunity:* Results from the introduction of antigens into the body, as with vaccination.
    - *Passive Immunity:* Obtained by the transfer of antibodies, as from mother to child or via treatments like immunoglobulin therapies.

Vaccines

Vaccines are biological preparations that provide active acquired immunity to particular diseases. They can be classified into several types based on their preparation:

- **Weakened (Attenuated) Vaccines:** Contain live, weakened microbes that do not cause the disease but can induce immunity. Example: Oral polio vaccine (OPV) and MMR (measles, mumps, rubella).
- **Inactivated Vaccines:** Consist of microorganisms that have been killed which still can provoke an immune response. Example: Hepatitis A and rabies vaccines.
- **Subunit Vaccines:** Include only parts of the pathogen, like protein or sugar molecules, to trigger an immune response. Example: HPV and whooping cough vaccines.
- **Recombinant DNA Technology Vaccines:** Employ genetic engineering to produce antigens in a form that can be used as vaccines. Example: Hepatitis B vaccine.
- **Conjugate Vaccines:** These link antigens to carrier proteins to enhance the immune response in populations with weaker immune systems, such as children. Example: Haemophilus influenzae type B (Hib) and pneumococcal vaccines.

- **mRNA Vaccines:** These vaccines deliver mRNA sequences that instruct cells to produce antigens that lead to an immune response. Example: COVID-19 vaccines such as GEMCOVAC-19 in India.

Mission Indradhanush

Launched in 2014 by the GoI, **Mission Indradhanush** aims to enhance vaccination coverage for children and pregnant women, particularly in underserved areas. The program targets ten diseases, including:

- Tuberculosis,
- Polio
- Hepatitis B
- Diphtheria
- Pertussis
- Tetanus
- Measles
- Rubella
- Rota virus
- Haemophilus Influenzae type b
- Japanese Encephalitis (sub national) and
- Pneumococcal Pneumonia (sub national).

COMMUNICABLE DISEASES

Infectious Diseases

Infectious diseases, notably lower respiratory infections, diarrhoeal diseases, and tuberculosis, are major causes of morbidity and mortality worldwide, particularly impacting children and young adults. These diseases are categorized based on their causative agents:

- **Bacterial:** Single-celled organisms, can be aerobic or anaerobic, with some forming spores to survive adverse conditions. Examples include *Streptococcus pneumoniae* in pneumonia and *Salmonella spp.* in food poisoning.
- **Viral:** Microscopic pathogens consisting of nucleic acids within a protein coat, requiring host cells to replicate. Examples include the influenza virus for the flu and HIV for AIDS.
- **Parasitic:** Organisms living on or inside a host at the host's expense, such as *Plasmodium spp.* for malaria and *Leishmania spp.* for leishmaniasis.
- **Fungal:** Organisms absorbing nutrients from organic materials, causing infections like candidiasis from *Candida* species and athlete's foot from *Trichophyton* species.

Viral Diseases

- **Structure and Replication:** Viruses, which may have DNA or RNA genomes, replicate by hijacking the host cell's machinery. The HIV virus, a retrovirus, uses reverse transcriptase to integrate its RNA into the host's DNA.
- **Impact and Transmission:** Viral infections can affect various organisms, including bacteria and plants. Viruses like the Human Papillomavirus (HPV) lead to conditions such as cervical cancer.

VIRAL DISEASED			
Dengue	**Dengue virus (RNA Virus)**	**Aedes aegypti or Aedes albopictus female mosquitoes**	**(Not Approved in India yet.)**
Chikungunya [UPSC 2013]	**Chikungunya virus (RNA Virus)**	**Aedes aegypti or Aedes albopictus female mosquitoes**	**(Not Approved in India yet.)**
Poliomyelitis (Polio)	**Polio virus (RNA Virus)**	**Person to person: faecal-oral route. Contaminated water/ food.**	**Inactivated poliovirus vaccine (IPV) Oral poliovirus vaccine (OPV)**
AIDS [UPSC 2019, 2013]	**Human Immunodeficiency Virus (HIV) (RNA Virus)**	**Exchange of body fluids (excluding saliva)**	**Anti Retroviral Therapy (ART) with: Fostemsavir Ibalizumab-uiyk Lenacapavir Lamivudine Cabotegravir Zidovudine etc.**
Hepatitis- A, B, C, D, E, G [UPSC 2019, 2013]	**Hepatitis - A, B, C, D, E, G Viruses [All are RNA viruses except Hepatitis B- a DNA virus]**	**Hepatitis A and E- contaminated food or water Hepatitis B, C, D, G- Parenteral contact with body fluids/blood**	**HAV Vaccine HBV Vaccine- also for Hepatitis D No Vaccines- Hepatitis C, E, G**

Chickenpox [UPSC 2014]	Varicella-Zoster Virus	Air-borne Direct Contact	Varivax, ProQuad (MMRV)
Ebola	Zaire ebolavirus (deadliest strain) Sudan ebolavirus Taï Forest ebolavirus Bundibugyo ebolavirus All are RNA Viruses	Zoonosis & Body fluids	Ervebo Zabdeno+ Mvabea
Nipah	Nipah virus (NiV) (RNA Virus)	Zoonosis, Direct contact and Food contaminated by body fluid of infected animals	No approved Vaccines
COVID-19	SARS-CoV-2 (many strains) (RNA Virus)	Contact and droplet transmission Air-borne Fomite transmission	Covaxin, Covishield, Sputnik-V, GEMCOVAC- OM (mRNA vaccine)
Japanese Encephalitis	Japanese encephalitis virus [RNA Virus]	Culex tritaeniorhynchus mosquitoes	Inactivated Vero cell culture-derived Vaccine (IXIARO)
Zika Fever	Zika Virus (RNA Virus)	Aedes aegypti or Aedes albopictus female mosquitoes	No approved Vaccines
Influenza	Influenza virus	Airborne droplets, direct contact	Antiviral medications (e.g., oseltamivir), supportive care
Measles	Measles virus	Airborne droplets	Supportive care, vitamin A
Mumps	Mumps virus	Airborne droplets, direct contact	Supportive care
Rubella	Rubella virus	Airborne droplets	Supportive care
Herpes Simplex	Herpes simplex virus	Direct contact (oral and genital)	Antivirals (e.g., acyclovir)
Rabies	Rabies virus	Animal bites (usually from bats or dogs)	Post-exposure prophylaxis, supportive care

Parasitic Diseases

- **Types of Parasites:** Include protozoa like *Giardia*, which causes gastrointestinal issues, and helminths like tapeworms, which lead to nutritional deficiencies.
- **Transmission and Effects:** Parasites may be transmitted through contaminated water, food, or vector organisms like mosquitoes, which spread malaria.

Sleeping Sickness (Trypanosomiasis)	Trypanosoma brucei	Tsetse fly	Pentamidine
Chagas Disease	Trypanosoma cruzi	Triatomine bugs	No Vaccine
Ascariasis	Ascaris lumbricoides (Hookworm)	Soil-Transmitted Helminths (STH) [Worm Eggs-Faecal Route]	Albendazole and Mebendazole
Elephantiasis (Lymphatic filariasis)	Wuchereria bancrofti, Brugia malayi, Brugia timori	Mosquitoes (various)	Diethylcarbamazine (DEC)

Kala-azar (Leishmaniasis)	**Leishmania species (protozoans)**	**Phlebotomine Sand flies**	**Miltefosine**
Malaria	**Plasmodium parasites- P. falciparum, P. vivax, P. malariae, P. ovale and P. knowlesi. P. falciparum is the deadliest malaria parasite (common in Africa) P. vivax is dominant- outside sub-saharan Africa.**	**Female Anopheles mosquitoes**	**R21/Matrix-M and RTS, S against P. Falciparum (not for other strains)**
Primary Amebic Meningoencephalitis (PAM)	**Naegleria fowleri**	**Water containing Naegleria fowleri enters the nose (not by drinking)**	**Combination of Drugs**
River Blindness (Onchocerciasis)	**Onchocerca volvulus**	**Blackflies (Simulium)**	**Ivermectin**
Giardiasis	**Giardia lamblia**	**Fecal-oral route, contaminated water**	**Antiparasitic (e.g., metronidazole)**
Loa loa filariasis	**Loa loa**	**Deerfly bites**	**Antiparasitic (e.g., ivermectin)**
Ascariasis	**Ascaris lumbricoides**	**Fecal-oral route**	**Antiparasitic (e.g., albendazole)**

Bacterial Diseases

Bacterial diseases are caused by prokaryotic organisms that reproduce rapidly under various environmental conditions. These organisms can exist either with oxygen (aerobic bacteria) or without it in environments that lack oxygen (anaerobic bacteria). Some bacteria are capable of forming protective spores that enable them to survive in harsh conditions for extended periods. Bacteria can infect virtually any part of the body, leading to a wide range of illnesses, from mild skin infections to life-threatening diseases.

Tuberculosis	Mycobacterium tuberculosis (usually attacks lungs but can affect any part of body)	Air-Borne	**Prevention: Bacille Calmette-Guérin (BCG) Vaccine**
Diphtheria [UPSC 2014]	Corynebacterium diphtheriae	Person to person-usually through respiratory droplets	**Diphtheria, tetanus, and pertussis (DTaP/DTP) vaccine**
Cholera	Vibrio cholerae	Contaminated water or food	**Dukoral Vaccine and Adequate Sanitation**
Leprosy (Hansen's Disease)	Mycobacterium leprae	Droplets (from nose and mouth)	**Multidrug therapy (MDT)**
Whooping cough (Pertussis)	Bordetella pertussis	Air-borne	**Diphtheria, tetanus, and pertussis (DTaP/DTP) vaccine**
Tetanus	Clostridium tetani	Through spores in environment	**Diphtheria, tetanus, and pertussis (DTaP/DTP) vaccine**
Plague	Yersinia pestis	Flea bites, Direct Contact, Infectious Droplets	**Sanitaion and rodent control**

Gonorrhea	Neisseria gonorrhoeae	Sexually transmitted disease (STD)	**Intramuscular ceftriaxone**
Syphilis	Treponema pallidum	Sexually transmitted disease (STD)	**Benzathine penicillin G**
Typhoid (Enteric Fever)	Salmonella typhi	Contaminated drinking water and food	**Oral Vaccine, Injectable Vaccine**
Pneumococcal Disease [UPSC 2020]	Streptococcus pneumoniae	Direct Contact-Respiratory Secretions	**Pneumococcal Conjugate Vaccines (PCV13, PCV15, and PCV20)**
Streptococcal Pharyngitis	Streptococcus pyogenes	Direct contact, respiratory droplets	**Penicillin, amoxicillin**
Bacterial Meningitis	Various (e.g., Neisseria meningitidis, Streptococcus pneumoniae)	Respiratory droplets, direct contact	**Antibiotics (e.g., ceftriaxone)**
Leptospirosis	**Leptospira spp.**	**Contact with contaminated water**	**Antibiotics (e.g., doxycycline)**

Vector-Borne Diseases

- **Transmission:** Diseases transmitted by vectors like mosquitoes, ticks, and fleas. These vectors carry pathogens like viruses, bacteria, or parasites from one host to another, often exacerbated by environmental factors such as climate change.
- **Global Impact:** Diseases such as dengue, Zika, and chikungunya are prevalent in over 100 countries, affecting millions annually and contributing significantly to global infectious disease burdens.

Wolbachia Method- Wolbachia are safe, naturally occurring bacteria, which have evolved to live inside the cells of many insect species. The World Mosquito Program (WMP) discovered that Wolbachia blocks viruses like dengue, chikungunya and Zika from growing in the bodies of Aedes aegypti mosquitoes. This means that if Wolbachia is established in a mosquito population, it results in decreasing incidence of dengue, Zika, and chikungunya. **[UPSC 2023]**

COVID 19

Category	Details
Virus Name	SARS-CoV-2, causes COVID-19, part of the coronaviruses like SARS and MERS.
Virus Entry	Utilizes ACE2 receptor to infect various human cells.
Testing Methods	1. **RT-PCR:** Detects viral RNA, gold standard with high sensitivity. 2. **RT-LAMP:** Simplified and rapid test, constant temperature. 3. **TMA:** Fast RNA amplification.
Vaccines in India	1. **COVAXIN:** Inactivated virus vaccine. 2. **Covishield:** Viral vector vaccine using modified adenovirus. 3. **ZyCoV-D:** India's first DNA plasmid vaccine.
Vaccine Technologies	- **Sputnik V:** Uses two adenoviruses enhancing immune response. - **Corbevax:** Protein sub-unit vaccine. - **Covovax:** Based on Novavax technology.

Fungal Diseases

- **Mycoses:** Infections caused by molds and yeasts (types of fungi).
- **Common Fungal Infections:**
  - **Mucormycosis (Black Fungus):**
    - Caused by molds from the Mucorales order.
    - Affects sinuses, brain, and lungs, primarily in immunocompromised individuals.
  - **Pneumocystis Pneumonia (PCP):**
    - Caused by *Pneumocystis jirovecii*.
    - Affects the lungs, common in HIV/AIDS patients.
  - **Aspergillosis:**
    - Caused by *Aspergillus* species.
    - Primarily impacts the lungs and respiratory system.

- **Dermatophytic Infections (Tinea):**
  - Caused by fungi invading hair, skin, or nails.
  - Common across various living organisms.
- **Fungal Infections in HIV:**
  - Major contributors include Cryptococcus, Candida, Aspergillus, and Mucor, causing significant morbidity.

NON-COMMUNICABLE DISEASES (NCD)

Category	Details and Examples
Non-communicable Diseases (NCDs)	- **Cancer**: Uncontrolled cell division forming benign or malignant tumors. - **Cardiovascular Diseases (CVDs)**: Includes heart attacks and strokes, often caused by atherosclerosis. - **Chronic Respiratory Diseases (CRDs)**: Examples include asthma and Chronic Obstructive Pulmonary Disease (COPD), which lead to chronic airflow limitations. - **Diabetes Mellitus**: Characterized by high blood sugar levels due to insulin resistance (Type 2) or lack of insulin production (Type 1).
Epidemiology of NCDs	- Most NCD deaths occur in low- and middle-income countries, with the highest proportion from CVDs, followed by cancer, CRDs, and diabetes. - **Risk Factors**: Tobacco use, inactivity, harmful alcohol use, unhealthy diets, air pollution.
Cancer Details	- **Types**: Benign (non-cancerous and localized) and Malignant (cancerous, can spread). - **Common in India**: Cervical, Breast, and Oral Cancer. HPV vaccination is a preventive tool against cervical cancer. - **Causes**: Genetic mutations, exposure to carcinogens like tobacco, UV radiation, and certain viruses.
Cardiovascular Diseases	- **Heart Attack**: Occurs when blood flow to the heart is blocked. - **Stroke**: Disruption in blood flow to the brain, can be ischemic (blockage) or hemorrhagic (bleed). - **Risk Factors**: High blood pressure, cholesterol, diabetes, family history.
Chronic Respiratory Diseases	- **COPD**: Persistent respiratory symptoms and airflow limitation due to airway and/or alveolar abnormalities. - **Asthma**: Chronic inflammation of airways causing episodic wheezing, breathlessness, chest tightness, and coughing.
Diabetes Types	- **Type 1 Diabetes**: Autoimmune, requires daily insulin. - **Type 2 Diabetes**: More common, linked to obesity and lifestyle, managed by diet and medication.
Food Fortification	- The practice of adding essential nutrients to foods to prevent micronutrient deficiencies, such as iron, iodine, and vitamins, to improve public health outcomes.
Probiotics and Prebiotics	- **Probiotics**: Live beneficial bacteria or yeasts that improve digestive health, immune function, and nutrient absorption. - **Prebiotics**: Non-digestible fibers that feed beneficial gut bacteria, supporting gut health and enhancing the efficacy of probiotics.[UPSC 2022]
Drugs and Medicines	- **Drugs**: Substances that alter physiological functions for treatment or prevention, can be natural or synthetic. - **Medicines**: Drugs used therapeutically to treat or prevent diseases, includes over-the-counter and prescription drugs.
Regulatory Framework in India	- **CDSCO**: Central Drugs Standard Control Organization oversees the regulation of drugs and cosmetics. - **DPCO**: Drug Price Control Order, under the Essential Commodities Act, regulates essential drug prices to ensure affordability.

Micronutrient	Deficiency Disease/Symptoms
Vitamin A	**Xerophthalmia, Bitot spots, night blindness, keratomalacia, and permanent blindness**
Vitamin B1	**Beriberi (wet beriberi affects cardio-vascular system; dry beriberi affects CNS, causing impaired motor function and numbness)**
Vitamin B3	**Pellagra (dermatitis, dementia, diarrhea)**
Vitamin B6	**Anaemia, peripheral neuropathy, sebo- rrheic dermatitis, glossitis, depression, seizures**
Vitamin B12	**Megaloblastic anaemia, fatigue, weakness**
Vitamin B9	**Megaloblastic anaemia, pancytopenia, glossitis, oral ulcers**

Vitamin C	**Scurvy (gum disease), behavioural and mood changes**
Vitamin D [UPSC-2014]	**Hypocalcemia, hypophosphatemia, rickets (children), osteomalacia (adults)**
Vitamin E [UPSC-2014]	**Ataxia, myopathy, pigmented retinopathy, vision loss**
Vitamin K [UPSC-2014]	**Coagulation disorder, hemorrhagic disease of newborns**
Calcium	**Cataracts, dental changes, osteoporosis, rickets, brain alterations**
Iron	**Microcytic hypochromic anaemia (small red blood cells, low hemoglobin)**
Iodine	**Goiter (thyroid enlargement)**
Zinc	**Skin lesions, infection susceptibility, night blindness, low sperm count, slow wound healing**
Magnesium	**Linked with colorectal cancer, osteoporosis, hypertension, metabolic syndrome, diabetes**
Selenium	**Keshan disease (cardiomyopathy), Kashin-Bek disease (arthritis), thyroid issues, immune problems**
Fluoride	**Dental caries, bone problems**
Biotin	**Metabolic acidosis, developmental delay, seizures, hair loss, dermatitis**

Assisted Reproductive Technology (ART) and Surrogacy

- **ART Techniques**: Includes procedures such as IVF (in vitro fertilization), ICSI (intracytoplasmic sperm injection), GIFT (gamete intrafallopian transfer), and artificial insemination techniques.
- **Surrogacy Types**:
  - **Altruistic Surrogacy**: No monetary compensation other than medical expenses.
  - **Commercial Surrogacy**: Involves monetary compensation beyond medical costs.
- **Surrogacy (Regulation) Bill, 2019**:
  - Prohibits commercial surrogacy and permits altruistic surrogacy.
  - Sets eligibility criteria for couples and surrogates, including marriage duration, age limits, and conditions regarding previous children and family relations.

CAR-T Cell Therapy

- **Overview**: A form of cellular immunotherapy where T cells are genetically modified in a lab to enhance their ability to detect and destroy cancer cells.
- **NexCar19**: An indigenous CAR-T cell therapy developed by Immuno ACT at IIT Bombay and approved by the Central Drugs Standard Control Organization (CDSCO) under stringent regulations.

ANIMAL BEHAVIOUR

BY ADITYA SIR (KARMAYOGI IAS)

Nocturnal Animals (Active at Night)

Species	Behavior	Habitat/Region
Malabar Civet	Nocturnal	Western Ghats, India
Indian Pangolin	Nocturnal	Indian Subcontinent
Slender Loris	Nocturnal	India and Sri Lanka
Rusty-spotted Cat	Nocturnal	India and Sri Lanka
Fishing Cat	Nocturnal	South and Southeast Asia
Striped Hyena	Nocturnal	Africa, Middle East, India
Indian Porcupine	Nocturnal	Southern Asia, Middle East
Barn Owl	Nocturnal	Worldwide

KARMAYOGI IAS
REVOLUTIONISING EDUCATION

Diurnal Animals (Active During Day)

Species	Behavior	Habitat/Region
Lion-tailed Macaque	Diurnal	Western Ghats, India
Nilgiri Tahr	Diurnal	Western Ghats, India
Indian Gaur (Bison)	Diurnal	South and Southeast Asia
Chinkara (Indian Gazelle)	Diurnal	Indian Subcontinent
Hanuman Langur	Diurnal	Indian Subcontinent

Crepuscular Animals (Active at Dawn and Dusk)

Species	Behavior	Habitat/Region
Sambar Deer	Crepuscular	South and Southeast Asia
Snow Leopard	Crepuscular	Central and South Asia

Special Behaviors & Adaptations

Species	Unique Traits	Habitat/Region
Great Indian Bustard	Ground-dweller, strong eyesight	Indian Subcontinent
Olive Ridley Turtle	Mass nesting (arribada), nocturnal nesting	Tropical Oceans
Indian Flying Fox	Frugivorous, nocturnal bat	Indian Subcontinent
Indian Cobra	Active in early morning/evening	Indian Subcontinent
Monitor Lizard	Diurnal, strong climber	Africa, Asia, Oceania

Civil Rebellions and Tribal Uprisings

During British colonial rule, India witnessed widespread resistance through civil rebellions, tribal uprisings, and peasant movements. These struggles emerged from economic exploitation, social oppression, and cultural erosion. Driven by resentment against colonial policies, they highlighted the resilience of marginalized communities and their fight for autonomy and justice.

Causes:

1. **Economic and Administrative Exploitation**:
    - High revenue demands and land dispossession.
    - Decline of handicrafts and artisanship due to British policies.
    - Frequent famines (e.g., 1770–1857).
2. **Oppression**:
    - Police atrocities and judicial exploitation.
    - Alienation of traditional leaders and scholars.
3. **Loss of Identity**:
    - Erosion of agrarian systems and tribal autonomy.
    - Influx of missionaries and restrictions on shifting agriculture.

KARMAYOGI IAS

Major Rebellions:

CIVIL UPRISINGS **(Native rulers/descendants, Zamindars etc)**

UPRISING/ REVOLT	***AREA***	***DETAILS***
Sanyasi 1763-1800	**Eastern India**	• **Fakir Rebellion** • During Warren Hastings • Majnu Shah and Chirag Ali • Debi Cahudhurain (Anandmath by Bankim Chandran Chattopadhyaya)
Midnapore and Dalbhum 1766-74	**Bengal**	• By Zamindars • hurt by new land revenue system (1772) • Damodar Singh and Jagannath Dhal
Moamarias 1769-99	**Assam**	• low caste peasants (followers of Anirudh Deva) • weakened **Ahom Kingdom**=> later burmese Invasion. • Krishna-narayan important leader
Gorakhpur, Basti and Bahraich	**Awadh**	• By Zamindars and Cultivators. **1781** • Against **Izara System** (Warren Hastings)- revenue farming

Raja of Vizianagaram 1794	**Northern Circar**	• Breach of treaties by British • demanded tributes and disbanding of troops from raja • Battle of Padmanabham- Vijayaramaraju Died
Dhundia in Bednur 1799	**Mysore**	• Dhundia Wagh- local maratha leader • converted to Islam by Tipu

Kerala Varma Pazhassi Raja 1797; 1800-05	**Malabar**	• Kerala Simbham/ Psyche Raja (1805- died)
		• de-facto head of Kottayam
		• 3rd Anglo Mysore war- british Paramountcy
		• revolt by peasants under him-
		  ○ exorbitant tax rates
		• insurgent warfares
		  ○ Nairs, Mapillas and Pathans

Awadh Rebelion 1799	Awadh	• Massacre of Benaras • by Wazir Ali (Nawab) • killed Resident George Frederick Cherry, 2 Europeans and attacked Magistrate • Jailed in Fort William
Ganjam and Gumsur 1800; 1835-1837	Orissa	• Strikara Bhanj (Zamindar) • refused to pay revenues • 1835- Dhananjay Bhanj (Son)
Palamau 1800-02	Jharkhand	• crisis of agrarian Landlordism and feudal system • Bhukhan Singh (Chero Chief)

Poligar's Revolt 1795- 1805)	Carnatic	• management and control of british
		• resentment amongst Poligars
		  ○ deprived of their right to collect Karal fees
		  ○ local militia=got land in exchange of military service
		• Kattabomman Nayakan
		• rebellion of Murudas
		• british replaced it with Zamindari System

Bhiwani 1809	Harayana	• Jats
Diwan Velu Thampi's Revolt 1809	Travancore	• Subsidiary alliance • Support of Nair Troops to PM (Veluthampi) • Kundara Proclamation • Maharaja Cheated • Velu Killed Himself
Kutchh Rebellion 1816-1832	Gujarat	• Treaty- british + Maharaja Bharamal 2 • power struggle between Maharaja and Chieftans • raised Arab and African Troops to fight British (Later) • british de facto ruler (defeated Maharaja) • Chieftans rebelled for long • At the End- Conciliatory Policy by British
Bareilly 1816	Awadh	• Police tax • Mufti Muhammad Aiwaz • Armed Muslims • Son of Judge Murdered

Hathras 1816	Awadh	• 2nd Bharatpur (Fort very strong) • high revenue demands

Paika Rebellion 1817	Orissa	• Bakshi Jagabandhu Bidyadhar
		  ○ Military Chief of Raja of Khurda
		  ○ Paiks- Landed Militia

Waghera rising 1820	Gujarat	• Against Gaekwad of Baroda and British • Waghera Cheifs took up arms
Ahom Revolt	Assam**1828**	• By prince Gomdhar Konwar
Surat Salt Agitation 1840s	Gujarat	• extra salt tax • attack on europeans • Popular Movement • British withdrew tax
Kolhapur and Sawantwadi	Western Ghats of Maharashtra	• Gadkaris (Military Class). **1844 onwards**
Wahabi Movement 1840s	NW Patna, Deccan, Bengal, Madras and Bombay	• Islamic rivalist • Syed Ahmed Barelvi (Rai Barielley) • 1st against Sikhs then British • Inspired by Abdul Wahab of Saudi and Shah Walliullah of Delhi • Return to pure Islam
Kuka Movement	Punjab- **1840s**	• Bhagat Jawahar Mal (Sian Saheb) • **Baba Ram Singh (Namdhari Sect)**- deported to rangoon • **Swadeshi and Non Co-operation** • Social reforms- later political against british

Peasant Movements

Narkelberia	**1782-1831**	**Bengal**	• Mir Nithar Ali/ titu Mir's Movement • Armed Peasants (1st) • against landlords and British Indigo Planters • Merged into Wahabi • social reform
Pagal Panthis	**1825-35**	**Bengal**	• Semi religious group- Hajong and Garo tribes • By Karam Shah • Tribal peasant organised under his son Tipu • Attacked Zamindars (no rent above limit)

Faraizi Movement		**East Bengal**	• Followers of Haji Shariat Allah (muslim sect)
			  ○ Faridpur
			  ○ Radical religious and Political changes
			• Son of Dadu Mian
			• Most joined Wahabi
			• fought against british as paramilitary Force

Moplah	**1836-54**	**Malabar**	• oppression of officials
2nd Moplah	**1920s**	**Malabar**	• congress Khilafat (NCM)

Tribal Revolts

Paharias	**1778**	**Rajmahal Hills**	• British declared their territory as Damni-Kol area
Chuar 1766-1772 1795-1816		**Bengal**	• Famines- enhanced land revenue demand and economic distress- Midnapore • Zamindar Jagannath Singh • **Durjan/Durjol SIngh** • Chuar- derogatory word • **Revolt of Jungle Mahal**
Koya	**1803-1862; 1880**	**modern AP**	• eastern godavari track- police, moneylenders and denial of forest rights. 1886- Raja Anantayyar
Bhil	**1817-1819**	**Western Ghats**	• against company- famine, economic distress and misgovernance • Revolted again- 1825, 1831, 1846. • Govind guru (Reformer) • Helped bhils of S Rajasthan to fight for Bhil Raj- 1913
Ramosi	**1822**	**Western Ghats**	• Chittur Singh, Umaji Naik and Bapu Sawant (1825-26) • against police annexation and Administration • Related to Marathas
Koli	**1829, 1835, 1844-48**	**Western Ghats**	• Unemployment and dismantle of forts
Kol Mutiny	**1831**	**Chhotanagpur**	• Against outsiders and BritishBuddho Bahgat
Khond	**1837-1856**	**Odisha-AP**	• Chakra Bishnoi- 1914- Another uprising
Santhal rebellion		**Rajmahal Hills**	• Agriculturists against Zamindars, later Anti-British- • Sidhu and Kanhu
Ho and Munda	**1899-1900**	**Chhotanagpur**	• both different tribes, farming revenue policy, entry of Bengalis Mundas under Birsa Munda • 1st religious then Political • Ulgulam Uprising- 1860-1920
Khasi	**1830s**	**Jaintia and Gao hills**	• Tirath Singh against occupation of Hilly regions
Singphos	**1830s**	**Assam**	
Tribal Revolts- North East			
Kukis		**Manipur and tripura**	• Manipur- 1917. Tripura- Parikshit Jamatia (1863), Reangs (1942), Bharti Singh (1920s)
Zeliangsong	**1920s**	**Manipur**	• Liangmei and Rongmei tribes
Naga	**1905-31**	**Manipur**	• Jadonang
Heraka Cult	**1930s**	**Manipur**	• Gaidinlui, Zamenglong, Kabui Naga Association- 1946

OTHER IMPORTANT REVOLTS (kisan movements included)

Indigo Revolt	**1860**	**Bengal**	• Digambar and Bishnu Bishwas • against planters and Lathiyals • Counter force and rent strike • legal machinery use • Govt fovoured- Indigo Commission
Pabna Agrarian leagues	**1870s-80s**	**Eastern Bengal**	• against heavy rents • use of legal machinery • very little violence • 1885- Bengal tenancy Act
Deccan Riots	**1870s**	**Maharashtra-Telangana-Karnataka**	• Heavy Taxation on Ryots • against moneylenders (social boycott movement) • effect of End of American Civil war (cotton prices • govt repressed • Deccan Agriculturists Relief Act- 1879
Tana Bhagat Movement	1914	**Jharkhand**	• by Jatra Oraon (Tribal leader) • opposition to the economic policies, outsiders • non violent- based on Gandhi's ideologies
UP Kisan Mov	1918	**Awadh**	• GS Mishra, IN Dwivedi, Baba Ramchandra, Malaviya
Awadh Kisan Sabha	1920	**Awadh**	• Differences with Nationalist rank • earlier stage- mass meeting, mobilization • later- looting, clashes with police
Eka Movement	1922	**Awadh**	• Madari Pasi (low caste) • 1922- repression- End
Rampa Rebellion Aka Manyam Rebellion	1922	**Andhra Pradesh**	• Alluri Sitarama Raju- Andhra Folk Hero. Modern India- Book. Killed 1924 • Tribal Uprising. Attack on Police, Success= Guerrilla
Telangana Movement	1946	**Andhra+ Telangana**	• biggest peasant guerrilla warfare. Communist led • Village Sanghams. Brutal repression

Failures:

1. Lack of coordination and local focus.

2. Absence of political vision or unity among leaders.

3. Repression by British forces, preventing widespread impact.

STUDENTS NOTE

Socio-Religious Reforms and Indian Renaissance

• **Indian Renaissance**: The socio-religious reforms in 19th-century India are often referred to as part of the Indian Renaissance, a period marked by efforts to rejuvenate Indian society amidst colonial rule. However, these reforms were not solely created by British influence but were a response to the existing social conditions.

Two Streams in the Socio-Religious Reform Movement:

(a) **The reformists l**ike the Brahmo Samaj, the PrarthanaSamaj, the Aligarh Movement.
(b) **The revivalist** like Arya Samaj and the Deoband movement.

Reformism	**Revivalism**
Social reform	Against social reform
Help of British colonial state	Brought against colonial state
Influenced by western enlightenment	Ancient Indian religion revival, Indian spirituality superior
Not critical of colonial state	Self-confidence to Indian by declaration
Moderates	Extremist

KARMAYOGI IAS

Limitations of Socio-Religious Reform Movement
1. Main target was middle class 2. They used religion to support them 3. Based on colonial legislation 4. Not unified; in different area the priority of reform was different 5. Led to religious revivalism.

Socio-Religious Reform Movements in India

Time Period	**Reformer/Organization**	**Key Features/Movements**	**Significance/Contributions**
1820s-1830s	Raja Ram Mohan Roy	**Brahmo Samaj (1828)**: Advocated monotheism, rationality, abolition of Sati, women's rights, and education.	Led to the abolition of Sati (1829) by Lord William Bentinck. Promoted modern education and a scientific outlook. Emphasized Hindu-Muslim unity.
		Abolition of Sati (1829): Regulation introduced under William Bentinck with Roy's support.	Marked a significant legislative intervention for women's rights.
	Radhakant Deb	**Dharma Sabha (1830)**: Orthodox society opposing reforms like	Represented conservative opposition to progressive changes but advocated for limited educational reforms.

		Sati abolition while supporting female education.	
		Tattvabodhini Sabha (1839) by Debendranath Tagore.	Promoted systematic studies of India's past with a rational outlook. Led to the formation of **Adi Brahmo Samaj (1866)**.
1850s-1860s	Ishwar Chandra Vidyasagar	**Widow Remarriage Act (1856)**, started 35 girls' schools, opposed child marriage and polygamy.	Major advocate for women's education and rights. Broke barriers by opening Sanskrit College to non-Brahmins and promoting widow remarriage.
	Keshab Chandra Sen	**Brahmo Samaj of India (1866)**: Aimed at broadening reform activities but caused factionalism within Brahmo Samaj.	Opened branches outside Bengal. Advocated inter-religious cooperation but faced criticism for personal inconsistencies like his daughter's child marriage.
1860s-1870s	Atmaram Pandurang	**Prarthana Samaj (1867)**: Advocated social reforms like abolition of caste, widow remarriage, and women's education.	Social reforms gained momentum under figures like M.G. Ranade, R.G. Bhandarkar, and Vishnu Shastri. Promoted the Bhakti tradition with rationalism.
	Dayanand Saraswati	**Arya Samaj (1875)**: Revivalist movement promoting Vedic values, rejecting idolatry, and advocating education, gender equality, and widow remarriage.	Popularized the slogan *"Go back to the Vedas."* Played a significant role in educational initiatives like DAV institutions.
1870s-1880s	Jyotiba Phule	**Satyashodhak Samaj (1873)**: Advocated for the rights of lower castes and women, supported widow remarriage, and opposed Brahmanical dominance.	His work, including *Gulamgiri*, emphasized the parallels between the oppression of African slaves and India's lower castes. His wife, Savitribai, pioneered women's education in Maharashtra.
	Sir Syed Ahmed Khan	**Aligarh Movement (1875)**: Established Muhammadan Anglo-Oriental College (later AMU), emphasized rational interpretation of Islam and modern education.	Advocated Hindu-Muslim unity, opposed purdah and polygamy, but later distanced from Congress. Emphasized adaptability of religion to modern ideas.
1890s-1920s	Swami Vivekananda	**Ramakrishna Mission (1897)**: Bridged spirituality with practical social service, emphasizing Vedanta philosophy.	Represented India on the global stage at the Parliament of Religions (Chicago, 1893). Advocated social upliftment through education, equality, and nationalism.
	Narayana Guru (SNDP)	**Sree Narayana Dharma Paripalana Movement (1903)**: Advocated for Ezhavas in Kerala, opposing caste discrimination and promoting temple entry and education.	Showcased temple consecration by lower castes as a symbol of caste equality. Registered SNDP in 1903 under Indian Companies Act.
Modern Era	Gandhi	**Harijan Sewak Sangh (1932)**: Fought for untouchability eradication and temple entry.	Highlighted caste discrimination and emphasized dignity of labor.

	B.R. Ambedkar	**Depressed Classes Mission, All India SC Federation (1942)**: Advocated Dalit rights, temple entry, and legislative reforms.	Drafted key provisions for social equality in the Indian Constitution.

Reform Movements by Woman

Name	Founder	Significance	Objective
Arya Mahila Samaj 1882	Pandita Ramabai Saraswati	Medical education for women which started in Lady Dufferin College	Improvement in the educational syllabus of Indian women
Ladies Social Conference (Bharat Mahila Parishad), Bombay 1904	Ramabai Ranade	Parent organisation was National Social Conference	
Bharat Stree Mahamandal All ahabad (1910).	Sarla Devi Chaudhurani	First major Indian women's organisation set up by a woman.	1. Promotion of education for women 2. Abolition of the purdah system. 3. Improvement in the socioeconomic and political status of woman all over India
National Council of Women in India, 1925	Mehribai Tata	National branch of the International Council of Women	Removal of purdah system, caste differences and lack of education of women
All India Women's	Margaret Cousins, Maharani ChimnabaiGaekwad	1st women's org with an	1. Society should be based on

Women	Movements
Swarnakumari D/O.Debendranath Tagore	• Devi • Widow and poor women • Journal Bharati
Saraladevi	• Bharat struggle Mahamada • Against parda • Spreading of education
Annie beasant& Margaret cousin	Women India Association
Dorothy Jinarajadasa	Theosophical movement • Aim is to secure voting right to women
Margaret cousin	• All India women conference • Education • Journal Roshni
Aryamahilasamaj founded by PanditaRamabai	• High caste Hindu women • Mukti mission • Sharada Sadan • Medical education

Conference (AIWC), 1927	, Rani Sahiba of Sangli, Sarojini Naidu, Kamla Devi Chattopadhyaya Lady DorabTata.	egalitarian approach. Worked before as well as after Independence	principles of social justice, integrity, equal rights and opportunities 2. Secure for every human being, the Essentials of life, not determined by accident of birth or sex but by planned social distribution.

	among women • Widow home in bombay
Begum Rokeya Hussain	• Muslim women in Bengal • Muslim education • Muslim women association in 1916. • Suthan Dream book

• **Core Ideas**:

• **Rationalism and Religious Universalism**: Reformers were influenced by rationalism, which challenged the traditional practices and emphasized the universality of religious ideas.

• **Secularization and Modernization**: The reformers focused on improving the social and economic conditions of the people without dwelling on otherworldly salvation.

• **Opposition to Caste and Gender Inequality**: The reform movements aimed at eradicating caste discrimination and improving the position of women in society.

Development under British Rule

• **Initial Collaboration with British**: Many Indian intellectuals initially cooperated with the British, believing that their rule would modernize India. However, the reality of colonial exploitation led to disillusionment.

ALL INDIA UNTOUCHABILITY LEAGUE- **HARIJAN SEWAK**	**GANDHI**
ALL INDIA DEPRESSED CLASS ASS. 1926	**M C RAJA**
ALL INDIA DEPRESSED CLASS CONFERENCE **BAHISKRIT HITKARINI [OUTCASTE WELFARE ASS. 1923]** **SAMAJ SAMTA SANGH 1927** **INDEPENDENT LABOUR PARTY 1942** **ALL INDIA SC FEDERATION**	**B R AMBEDKAR**
DEPRESSED CLASS MISSION	**VITHHAL RAMJI SHINDE**

Governors-General & Viceroys	Events During Regime
Warren Hastings (1773-1785)	Regulating Act of 1773 Pitt's India Act of 1784 The Rohilla War of 1774 1st Maratha War in 1775-82, Treaty of Salbai 1782 2nd Mysore War in 1780-84 ASIATIC SOCIETY OF BENGAL
Lord Cornwallis (1786-1793)	3rd Mysore War (1790-92), Treaty of Seringapatam (1792) Cornwallis Code (1793) Permanent Settlement of Bengal, 1793
Lord Wellesley (1798-1805)	Introduction of the Subsidiary Alliance System (1798) 4th Mysore War (1799) Second Maratha War (1803-05)
Lord Minto I (1807-1813)	Treaty of Amritsar with Ranjit Singh (1809)
Lord Hastings (1813-1823)	Anglo-Nepal War (1814-16) and Treaty of Sagauli, 1816 3rd Maratha War (1817-19) and dissolution of Maratha Confederacy. Establishment of Ryotwari System by Thomas Munro, governor of Madras (1820).
Lord Amherst (1823-1828)	First Burmese War (1824-1826)
Lord William Bentinck (1828-1835)	Charter Act of 1833 • Abolition of sati and other cruel rites (1829). • Suppression of thugi (1830). educational reforms and introduction of English as the official language. • Annexation of Mysore (1831), Coorg (1834) and Central Cachar (1834). • Treaty of 'perpetual friendship' with Ranjeet Singh.

KARMAYOGI IAS

	REMOVED CIRCUIT COURTS AND SP
Lord Auckland (1836-1842)	First Afghan War (1838-42)
Lord Hardinge I (1844-1848)	First Anglo-Sikh War (1845-46), Treaty of Lahore (1846). Social reforms like the abolition of female infanticide, human sacrifice
Lord Dalhousie (1848-1856)	Second Anglo-Sikh War (1848-49) Annexation of Lower Burma (1852) Introduction of the Doctrine of Lapse [ssujn] Wood's Despatch 1854 First railway line connecting Bombay and Thane in 1853 Establishment of PWD ganges canal
Lord Canning (1856-1862)	Revolt of 1857 Establishment of 3 universities at Calcutta, Madras and Bombay in 1857 Government of India Act, 1858- EIC to Crown Indian Councils Act of 1861
Lord John Lawrence (1864-1869)	Bhutan War (1865) High Courts at Calcutta, Bombay and Madras (1865)
Lord Mayo {1869-72}	• Establishment of Statistical Survey of India. • Establishment of Department of Agriculture and Commerce. • Introduction of state railways.
Lord Lytton (1876-1880)	The Vernacular Press Act (1878) The Arms Act (1878) The Second Afghan War (1878-80) Queen Victoria- title of 'Kaiser-i-Hind' famine [satarchey comm]
Lord Ripon (1880-1884)	Repeal of the Vernacular Press Act (1882) The first Factory Act (1881) Government resolution on local self-government (1882) The Ilbert Bill controversy (1883-84) Hunter Commission on education (1882) father of lsg

Lord Dufferin (1884-1888)	The Third Burmese War (1885-86). **Establishment of the Indian National Congress (1885)**
Lord Lansdowne (1888-1894)	Factory Act (1891). Indian Councils Act (1892). Durand Commission (1893)
Lord Curzon (1899-1905)	Police Commission (1902) Universities Commission (1902) Indian Universities Act (1904). Partition of Bengal (1905) dept of trade and commerce , younghusband mission to tibet , curzon kitchener controversy, ancient monuments act
Lord Minto II (1905-1910)	Swadeshi Movements. (1905-11) **Surat Split of Congress (1907)** Establishment of Muslim League (1906) Morley-Minto Reforms(1909)
Lord Hardinge II (1910-1916)	Annulment of Partition of Bengal (1911) Transfer of capital from Calcutta to Delhi (1911). Establishment of the Hindu Mahasabha (1915) delhi darbar 1911 [coronaration]
Lord Chelmsford (1916-1921)	Lucknow pact (1916) Champaran Satyagraha (1917) Montagu's August Declaration (1917) Government of India Act (1919) **The Rowlatt Act (1919)** **Jallianwalla Bagh massacre (1919)** Launch of Non-Cooperation and Khilafat Movements , saddler comm
Lord Reading (1921-1926)	Chauri Chaura incident (1922) Withdrawal of Non-Cooperation Movement (1922) Establishment of Swaraj Party(1922) Kakori train robbery (1925) repeal press act 1910 , rowlatt act
Lord Irwin (1926-1931)	Simon Commission to India (1927) Harcourt Butler Indian States Commission (1927) Nehru Report (1928) Deepavali Declaration (1929) Lahore session of the INC (Purna Swaraj Resolution) 1929

	Dandi March and the CDM (1930) **First Round Table Conference (1930)** Gandhi-Irwin Pact (1931)
Lord Willingdon (1931-1936)	Communal Award (1932) **2nd & 3rd Round Table Conference (1932)** **Poona Pact (1932)** Government of India Act of 1935
Lord Linlithgow (1936-1944)	Congress ministries resigned- outbreak of the World War II (1939) **Tripuri Crisis & formation of Forward Bloc (1939)** Lahore Resolution -Muslim League (demand for a separate state for Muslims) 1940 'August Offer' (1940) Formation of the Indian National Army (1941) **Cripps Mission (1942)** **Quit India Movement (1942)**
Lord Wavell (1944-1947)	C. Rajagopalachari's CR Formula (1944) Wavell Plan and the Simla Conference (1942) **Cabinet Mission (1946)** Direct Action Day (1946) End of British rule in India, Attlee's Declaration (1947)
Lord Mountbatten (1947-1948)	June Third Plan (1947) , Redcliff commission (1947) India's Independence (15 August 1947)
C Rajagopalachari (1948-1950)	Last Governor-General of India was permanently abolished in 1950

Important Congress Sessions.

Year	Place	President	Details
First	Bombay in 1885.	W.C. Bannerjee	Formation of Indian National Congress.

Second	Calcutta in 1886.	: Dadabhai Naoroji	
Third	Madras in 1887.	Syed Badruddin Tyabji,	First muslim President.
Fourth	Allahabad 1888.	George Yule,	First English President.
1896:	Calcutta.	Rahimtullah Sayani	'Vande Mataram' sung for the first time by Rabindranath Tagore.
1899:	Lucknow.	Romesh Chandra Dutt.	Demand for permanent fixation of Land revenue
1905:	Benaras.	Gopal Krishan Gokhale	Formal proclamation of Swadeshi movement against government
1907:	Surat.	Rash Bihari Ghosh	Split in Congress- Moderates & Extremist Adjournment of Session
1901:	Calcutta.	Dinshaw E.Wacha	First time Gandhiji appeared on the Congress platform
1906:	Calcutta.	Dadabhai Naoroji	4 resolutions Swaraj, Boycott, Swadeshi & National Education
1910:	Allahabad.	Sir William Wedderburn	M.A Jinnah--the separate electorate system by act of 1909
1911:	Calcutta.	President: B.N. Dhar	First time recital of Jan-Gan-Man in Congress session
1915:	Bombay.	Sir S.P. Sinha	Constitution of Congress altered to admit extremist section
1916:	Lucknow.	A.C. Majumdar	Moderates and Extremists together. Lucknow Pact b/w ML and INC- political concensus. , INC accepted Muslim league demand of separate electorate
1917:	Calcutta.	Annie Besant,	First Woman President of Congress
1918 (Spl session)	Bombay.	Syed Hasan Imam	To deliberate Montagu– Chelmsford Reforms Scheme
1919:	Amritsar.	Motilal Nehru	Congress extended support to Khilafat Movement
1920 (Spl Session):	Calcutta.	Lala Lajpat Rai	Mahatma Gandhi moved the Non cooperation resolution
1920:	Nagpur.	C. Vijayaraghavachariar	Congress Working Committee- Linguistic basis, Jinnah left INC.

KARMAYOGI IAS

1922:	Gaya.	President: C.R. Das	CR Das and ML Nehru broke away, Formation of Swaraj Party
1924:	Belgaum.	M.K. Gandhi	Only Session presided over by Mahatma Gandhi
1925	Kanpur.	Sarojini Naidu,	First Indian Woman President
1927:	Madras.	Dr. M.A. Ansari	Passed a resolution against the use of Indian troops in China, Iran and Mesopotamia. Passed a resolution against boycott of Simon Commission Adoption of resolution on Purna Swaraj
1928:	Calcutta.	Motilal Nehru	Formation of All India Youth Congress
1931:	Karachi.	Vallabhbhai Patel	Resolutions- Fundamental Rights & National Economic Programme Endorsement of Gandhi-Irwin pact. Gandhi was nominated to represent INC in the 2nd RTC.
1934:	Bombay	Rajendra Prasad	Amendment in the Constitution of Congress
1936:	Lucknow.	Jawahar Lal Nehru	Push towards socialist ideas by Jawaharlal Nehru
1937:	Faizpur.	Jawahar Lal Nehru	First Session to be held in a village
1938:	Haripura.	Subhas Chandra Bose	National Planning Committee set up under Jawahar Lal Nehru.
1939:	Tripuri.	Rajendra Prasad	Bose was re-elected but had to resign Rajendra Prasad was appointed. Bose formed Forward Bloc
1940:	Ramgarh.	Abul Kalam Azad	CDM to be launched at appropriate time and circumstances.
1941–45:			Quit India movement, RIN Mutiny & INA trials. Cripps Mission, Wavell Plan and Cabinet Mission. No congress session was held.
1946	Meerut.	J.B Kripalani	Last session before independence

KARMAYOGI IAS

KARMAYOGI IAS