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News Analysis (15 Apr, 2021)

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Depreciation in Rupee

Why in News

Recently, the **Indian Rupee depreciated to a nine-month low** of 75.4 against the USD, it is **one of the biggest losers among the emerging market currencies.**

Over the last three weeks **since 22nd March 2021**, Rupee has **lost 4.2%** against the USD.

Currency movement against USD

	Mar 22	Mar 22	Change Since Mar 22
Turkish New Lira	7.80	8.14	4.36
Indian Rupee	72.38	75.42	4.20
Brazilian Real*	5.51	5.73	3.99
Russian Ruble	74.77	77.20	3.25
Thai Baht	30.87	31.59	2.33

Key Points

- **Reasons for the Decline:**

- **Rising Covid Cases:**

Rising **Covid-19** cases have emerged as a key concern. As several states are now considering more stringent **lockdown** measures, market participants are **concerned over delay in the recovery of the economy**, which was hit hard in 2020-21 by the **pandemic**.

- **Strengthening of USD:**

The strengthening of USD in line with expectations of **better growth in the US economy**, has also put pressure on the Rupee.

- **Reserve Bank of India's (RBIs) G-SAP:**

- **RBI's** announcement of **Government Securities Acquisition Programme (G-SAP)** programme to infuse liquidity has also put additional pressure on the Rupee.
 - This is being read as a sort of **quantitative easing policy** the global central banks had followed, in which the RBI will **support the government's elevated borrowing programme** through infusion of liquidity.

- **Decreasing FPI Investments:**

Another factor that is putting additional pressure is the **decreasing support of the Foreign Portfolio Investors (FPIs)**, who pumped huge inflows into Indian equity markets between October 2020 and February 2021.

While the FPIs invested a net of Rs. **1.94 lakh crore between October 2020 and February 2021** (in the Indian markets), in the month of **April 2021 they have pulled out a net of Rs 2,263 crore** (till date).

- **Impact of Depreciating Rupee:**

- **Losers:**

- People **Importing** from outside.
 - People seeking **foreign education**.
 - People **travelling abroad**.
 - People **investing abroad**.
 - People seeking **medical treatment abroad** etc.

- **Gainers:**

- People **exporting** from India.
 - People receiving **remittances** from **Non Resident Indian (NRI)**.
 - Foreign tourists as **travel to India** gets cheaper.

Currency Depreciation

- Currency depreciation is a **fall in the value of a currency** in a **floating exchange rate system**.

In a floating exchange rate system, **market forces (based on demand and supply of a currency) determine the value of a currency**.

- Rupee depreciation means that **rupee has become less valuable** with respect to dollar.
 - It means that the rupee is now weaker than what it used to be earlier.
 - **For example:** USD 1 used to equal to Rs. 70, now USD 1 is equal to Rs. 76, implying that the rupee has depreciated relative to the dollar i.e. it takes more rupees to purchase a dollar.
- Some of the factors that influence the value of a currency:
- Currency **depreciation increases a country's export activity** as its products and services become cheaper to buy.
- The **RBI intervenes** in the currency market **to support the rupee as a weak domestic unit can increase a country's import bill**.
- There are a **variety of methods** by which RBI intervenes:
 - It can intervene **directly in the currency market by buying and selling dollars**.

If the RBI wishes to increase the rupee value, then it can sell dollars and when it needs to bring down rupee value, it can buy dollars.
 - The central bank can also **influence the value of rupee** by the way of **monetary policy**.

RBI can adjust the **repo rate** (the rate at which RBI lends to banks) and the liquidity ratio (the portion of money banks are required to invest in government bonds) to control rupee.

Source: IE

Child Labour and Forced labour in India

Why in News

A recent study has raised the **issue of ambiguity about definitions of child labour and forced labour** in India, especially for sugarcane producing states of Bihar, Karnataka, Maharashtra, Punjab, and Uttar Pradesh.

The study was commissioned by the **United Nations Development Programme (UNDP)** and **The Coca-Cola Company**.

Key Points

- **Findings from the Study:**

- Authorities discounted **underage child labour** as “**children helping parents in the field**”.
- Similarly, confusion was about the **advance payment to migrant workers**, and **associated risks of forced or bonded labour**.
- Most of the interventions in the sugarcane sector, either by government authorities or by the **Corporate Social Responsibility (CSR)** arm of companies, were focused just on “improving farming techniques to ensure an increase in cane productivity”.

- **Child Labour and Forced Labour (Meaning):**

- The term “**child labour**” is often defined as work that deprives children of their childhood, their potential and their dignity, and that is harmful to physical and mental development.
- **Forced labour** is defined as “all work or service which is exacted from any person under the menace of any penalty and for which the said person has not offered himself voluntarily”.
 - The term forced labour **includes slavery and practices similar to slavery as well as bonded labour or debt bondage**.
 - **Bonded Labour** is a practice in which **employers give high-interest loans** to workers who **work at low wages to pay off the debt**.



- **Provisions of Child Labour (Prohibition and Regulation) Amendment Act, 2016:**
 - According to the **Act**, employment of **children below the age of 14 years in any commercial enterprise is illegal.**
 - The Act also **bars the employment of adolescents** in occupations that deal with **hazardous working conditions** such as chemical plants and mines.
 - The Act says that **children can only work after school hours or during holidays** and that **children are allowed to work in family owned secure sectors.**
 - **Criticism:**
 - It is criticised that the Act allows child labour in “**family or family enterprises**” or allows the child to be “**an artist in an audio-visual entertainment industry**”.
 - Itt **excludes** a section of toiling children in the unorganized sectors including **agriculture as well as the household work.**
 - The Act **does not define the hours of work** and it simply states that children may work after school hours or during vacations.
- **Bonded Labour in India:**
 - The **Supreme Court of India** has **interpreted bonded labour as the payment of wages that are below the prevailing market wages** and legal minimum wages.
 - The **Constitution of India prohibits forced labour under Article 23** (Fundamental Rights).
 - Article 23:** Prohibition of traffic in human beings and forced labour.
 - Bonded labour was historically associated with rural economies where peasants from economically disadvantaged communities were bound to work for the landlords.
 - Bonded labour is found to **exist in both rural and urban pockets** in unorganized industries such as brick kilns, stone quarries, coal mining, agricultural labour, domestic servitude, circus, and sexual slavery.

Sugarcane Cultivation in India

- It is a tropical as well as a subtropical crop. It grows well in hot and humid climate with a temperature of 21°C to 27°C and an annual rainfall between 75cm and 100cm
- In India, sugarcane is primarily grown and cultivated in Bihar, Karnataka, Maharashtra, Punjab and Uttar Pradesh.
- Of these, **Uttar Pradesh is the largest sugarcane producer** and accounts for **nearly 40%** of the cash crop grown in the country, followed by Maharashtra and Karnataka, which account for 21% and 11% of the total domestic production.

Other Child Labour Laws/Programmes in India

- **Article 24 of the Constitution:** No child below the age fourteen years shall be employed in work in any factory or mine or engaged in any other hazardous employment.
- **National Policy on Child Labour (1987):** It focuses more on rehabilitation of children working in hazardous occupations and processes, rather than on prevention.
- **Juvenile Justice (Care and Protection of Children) Act 2015:** It includes the working child in the category of children in need of care and protection, without any limitation of age or type of occupation.
- **National Child Labour Project (NCLP) Scheme 2007:** Under it, children in the age group of 9-14 years, rescued/withdrawn from work are enrolled in the NCLP Special Training Centres, where they are provided with bridge education, vocational training, mid day meal, stipend, health care, etc. before being mainstreamed into formal education system.
- The **Right to Education Act, 2009** has made it mandatory for the state to ensure that all children aged 6 to 14 years are in school and receive free education.
- According to the **Mines Act of 1952**, employment of children below the age of 18 years is illegal in mines.
- **Platform for Effective Enforcement for No Child Labour (PENCIL) Portal 2017:**
 - It is an electronic platform that aims at involving Centre, State, District, Governments, civil society and the general public in achieving the target of child labour free society.
 - It has been launched for the effective implementation of Child Labour Act and National Child Labour Project (NCLP) Scheme.
- Recently, India has ratified **International Labour Organizations Convention (ILO) no 138** (minimum age for employment) and **Convention no 182** (worst forms of child labour).

Bonded Labour Related Schemes/Acts

- **Bonded Labour System (Abolition) Act 1976:**
 - The Act extends to the whole of India but implemented by respective state governments.
 - It provides for an institutional mechanism at the district level in the form of Vigilance Committees.
 - Vigilance committees advise District Magistrate (DM) to ensure the provisions of this act are properly implemented.
 - The State Governments/UTs may confer, on an Executive Magistrate, the powers of a Judicial Magistrate of the first class or second class for the trial of offences under this Act.

- **Central Sector Scheme for Rehabilitation of Bonded Labourers (2016):**
Under this scheme financial assistance to the extent of Three lakhs Rupees is provided to released bonded labourers along with other non-cash assistance for their livelihood.

Way Forward

- The **cycle of poverty and its implications** must be **addressed properly**, so families can find other means to survive and send their children to schools.
- Many NGOs like **Bachpan Bachao Andolan, ChildFund, CARE India, Kailash Satyarthi Children Foundation** etc. have been working to eradicate child labour in India. Right kind of **focus and orientation with state level authorities** is also needed to avoid the practice of child labour.
- **Forced Child Labour** requires an urgent action from governments and the international communities.
- A **very robust, reliable and fairly decent social security package** and **strict implementation** of the acts is needed.

Source: IE

MANAS Mobile App

Why in News

Recently, the government of India launched a mobile app, **MANAS (Mental Health and Normalcy Augmentation System)** to **promote mental wellbeing across age groups**.

MANAS was endorsed as a national program by the **Prime Minister's Science, Technology, and Innovation Advisory Council (PM-STIAC)**.

PM-STIAC: It is an overarching Council that **facilitates the Principal Scientific Adviser's Office to assess the status in specific science and technology domains**, comprehend challenges in hand, formulate specific interventions, develop a futuristic roadmap and advise the Prime Minister accordingly.

Key Points

- **About:**
 - It is a **comprehensive, scalable, and national digital wellbeing platform** and an app **developed to augment mental well-being of Indian citizens.**
 - It **integrates the health and wellness efforts of various government ministries**, scientifically validated indigenous tools with gamified interfaces developed/researched by various national bodies and research institutions.
 - It is **based on life skills and core psychological processes**, with **universal accessibility**, delivering **age-appropriate methods** and promoting positive attitude focusing on wellness.
- **Developed By:**
National Institute of Mental Health and Neuro Sciences (NIMHANS), Bengaluru, Armed Forces Medical College (AFMC) Pune and Centre for Development of Advanced Computing(C-DAC) Bengaluru.
- **Beneficiaries:**
 Catering to the overall wellbeing of people of **all age groups**, the **initial version of MANAS focuses on promoting positive mental health in the age group of 15-35 years.**
- **Aim:**
 To build a healthier and happier community, to empower it to nurture its innate potential for building a **Swasth and Atmanirbhar Bharat.**
- **Motto of MANAS:**
 Uttam Mann, Saksham Jan.

CAUSE FOR CONCERN

13.7% Prevalence of mental illness in India as per National Mental Health Survey (2016)

28% of global suicides occur in India

Access to mental healthcare

49% had a mental health facility within 20km radius

26% reported no mental health facility within 50km radius

59% reported lack of any de-addiction service in their area

Awareness about mental health

57% not aware of any person with mental illness

28% did not consider suicide to be associated with mental illness

Insurance for mental healthcare

80% had no health insurance or thought mental health treatment was not covered



Mental Health in India

- **Data Analysis:** A report published in **The Lancet Psychiatry** in February 2020 indicates that in 2017, there were **197.3 million people with mental disorders in India**.
 - The **top mental illnesses were depressive disorder** (45.7 million) and **anxiety disorder** (44.9 million).
 - The contribution of mental disorders to the total **Disability-Adjusted Life Years (DALYs)** in India increased from 2.5% in 1990 to 4.7% in 2017.
 - Depressive disorder and anxiety disorder contributed the most to the total mental disorders DALYs.
 - **DALYs:** The burden of disability associated with a disease or disorder can be measured in units called DALYs.

DALYs **represent the total number of years lost** to illness, disability, or premature death within a given population.
- **Other Indian Initiatives to Improve Mental Health:**
 - **The Mental Health Care Act (MHCA) 2017:**

The **Mental Health Care Act (MHCA) 2017** came into force in 2018 to meet the requirements of the **United Nations Convention on the Rights of Persons with Disabilities** which India ratified in 2007.
 - **KIRAN:**

The Ministry of Social Justice and Empowerment has launched a **24/7 toll-free helpline** to provide support to people facing anxiety, stress, depression, suicidal thoughts and other mental health concerns.
 - **Manodarpan Initiative:**
 - **Manodarpan** is an initiative of the Ministry of Education under Atmanirbhar Bharat Abhiyan.
 - It is aimed to provide psychosocial support to students, family members and teachers for their mental health and well-being during the times of **Covid-19**.
 - **NIMHANS RAAH APP:**

It is a **one-stop source of data on mental health centres and professionals**. It is developed by the NIMHANS.

Way Forward

- Although developing apps to cater mental well-being of citizens on scalable, secure and digital platforms is the need of the hour the **app must be integrated with the public health schemes** like the **National Health Mission, Poshan Abhiyan, e-Sanjeevani** and others so that it is used widely. Besides, the **application must be made multi-lingual**.

- Increasing the number of psychologists and psychiatrists, and Apps alone won't help. **Stigma and awareness** are two separate issues although interlinked. They **need to be addressed in parallel in order to tackle the burden of mental illness.**

Source:PIB

Online Grievance Management Portal: NCSC

Why in News

The Government launched the “**Online Grievance Management Portal of National Commission for Scheduled Castes (NCSC)**” on the occasion of **130th birth anniversary of Dr. B R Ambedkar.**

The portal would make it easier for the SC population to register their complaints.

Key Points

- **About the Online Portal:**
 - It has been **designed in collaboration with the Bhaskaracharya Institute for Space Applications and Geoinformatics (BISAG-N)**, a Centre of Excellence under the Ministry of Electronics and Information Technology.
 - It will **facilitate an end-to-end e-filing of complaints** and grievances and **their tracking.**
 - It is for **submission of complaints about atrocities** against citizens who belong to the Scheduled Castes.
 - It is “intended to make the hearing processor” similar to **India’s e-Courts project** and allow grievance redressal for the country’s scheduled caste population in a “time bound manner”.
 - It will **supplement the physical submission of complaints** and grievances.

- **About the National Commission for Scheduled Castes (NCSC):**
 - **NCSC is a constitutional body** that works to **safeguard the interests of the Scheduled Castes (SC)** in India.
 - **Article 338 of the Constitution** of India deals with this commission.
 - It provided for a National Commission for the Scheduled Castes and Scheduled Tribes with duties to investigate and monitor all matters relating to safeguards provided for them, to inquire into specific complaints and to participate and advise on the planning process of their socio-economic development etc.
 - By the **amendment in 2003**, the erstwhile National Commission for SC and ST was replaced by two separate Commissions **from the year 2004** which are: National Commission for Scheduled Castes (NCSC) and **National Commission for Scheduled Tribes (NCST)**-under **Article 338-A**.
- **Functions of the NCSC:**
 - **Monitoring and investigating** all issues concerning the safeguards provided **for the SCs** under the Constitution.
 - **Enquiring into complaints** relating to **the deprivation of the rights and safeguards of the SCs**.
 - **Taking part in and advising** the central or state governments with respect to the planning of **socio-economic development of the SCs**.
 - **Regular reporting to the President** of the country on the implementation of **these safeguards**.
 - Any other function with respect to the welfare, protection, development and **advancement of the SC community**.
 - The Commission is also required to discharge similar functions with regard to the **Anglo-Indian Community** as it does **with respect to the SCs**.
 - Till 2018, the commission was also required to discharge similar functions with regard to the **Other Backward Classes (OBCs)**. It was relieved from this responsibility by the **102nd Amendment Act of 2018**.

Other Constitutional and Legal Provisions For Upliftment of the Schedule Caste

- **Article 15(4)** refers to the special provisions for their advancement.
- **Article 16(4A)** speaks of “**reservation in matters of promotion to any class or classes of posts in the services under the State in favour of SCs/STs**, which are not adequately represented in the services under the State’.
- **Article 17** abolishes Untouchability.
- **Article 46** requires the State ‘**to promote with special care the educational and economic interests of the weaker sections** of the people, and, in particular, of the Scheduled Castes and the Scheduled Tribes, and to protect them from social injustice and all forms of exploitation.

- **Article 335** provides that the claims of the members of the Scheduled Castes and the Scheduled Tribes shall be taken into consideration, consistently with the maintenance of efficiency of administration, in the making of **appointments to services and posts** in connection with the affairs of the Union or of a State.
- **Article 330** and **Article 332** of the Constitution respectively provide for **reservation of seats in favour of the Scheduled Castes and the Scheduled Tribes in the House of the People and in the legislative assemblies** of the States.
- Under **Part IX** relating to the **Panchayats** and **Part IXA** of the Constitution relating to the Municipalities, reservation for SC and ST in local bodies has been envisaged and provided.
- The **SC and the ST (Prevention of Atrocities) amendment Act, 2018**.

Source: PIB

Narrow-Line Seyfert 1 (NLS1): Farthest Gamma-Ray Emitting Galaxy

Why in News

Recently, Astronomers have discovered a **new active galaxy** called **Narrow-Line Seyfert 1 (NLS1)** which has been identified as the **farthest gamma-ray emitting galaxy**.

Key Points

- **The Study:**

Scientists from **Aryabhata Research Institute of Observational Sciences (ARIES)** in collaboration with researchers from other institutions, studied around 25,000 luminous **Active Galactic Nuclei (AGN)** from the **Sloan Digital Sky Survey (SDSS)**.

- **AGN** are the most **powerful, long-lived objects and steady sources of luminosity in the Universe**. The emission is spread widely across the **electromagnetic spectrum**, often peaking in the Ultra-Violet , but with significant luminosity in the x-ray and infrared bands.
- **SDSS** is a major **multi-spectral imaging and spectroscopic redshift survey** using a dedicated 2.5-m wide-angle optical telescope at Apache Point Observatory in New Mexico, United States.

It has created the **most detailed three-dimensional maps of the Universe** ever made, with deep multi-color images of one third of the sky, and spectra for more than three million astronomical objects.

- **Findings:**

They found **a unique object that emits high-energy gamma rays** located at a **high redshift (more than 1)**

- It was identified as a **gamma-ray emitting NLS1 galaxy**, which is a rare entity in space.
- The new gamma-ray emitting NLS1 was **formed when the Universe was only about 4.7 billion years old** as compared to its current age of about 13.8 billion years.

Redshift

- **About:**

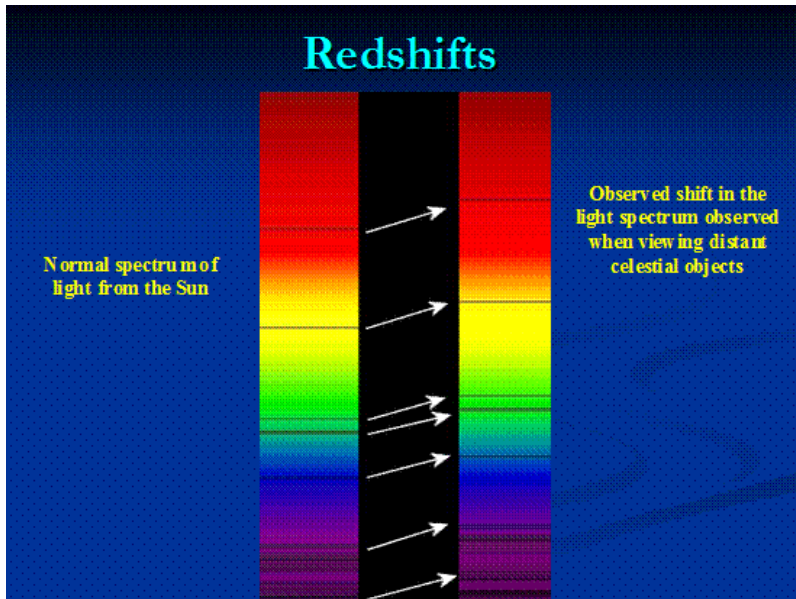
- It is the **displacement of spectral lines towards longer wavelengths** (the red end of the spectrum) in radiation from distant galaxies and celestial objects.
- It **reveals how an object is moving in space and enables astronomers to discover otherwise-invisible planets and the movements of galaxies**, and to uncover the beginnings of our universe.

- **Significance:**

Astronomers use redshifts **to measure how the universe is expanding**, and thus to **determine the distance to our universe's most distant (and therefore oldest) objects**.

- **Measurement:**

- The most accurate way to measure redshift is by using **spectroscopy**.
When a beam of white light strikes a triangular prism it is separated into its various components (**ROYGBIV**). This is known as a spectrum (plural: spectra).
- Astronomers can look at the **spectra created by different elements and compare these with the spectra of stars**. If the absorption or emission lines they see in the star's spectra are shifted, they know the object is moving either towards us or away from us.



Astronomers calculate redshift in terms of the redshift parameter (z) which helps in calculating the distance of the object (galaxy, planet etc).

With **increasing value of z the distance of the object increases.**

- **Instrument Used:**

- The scientists used the Japanese **8.2 m Subaru Telescope** which is one of the **largest ground-based telescopes in the world**, located at Hawaii, USA.
- Its powerful light collecting capability can capture weak light from celestial objects. A **major feature** of the Subaru Telescope is that its **prime focus boasts an overwhelming wide field of view compared to other large telescopes**

- **Significance:**

- Detection of gamma-ray emission from NLS1 **challenges the idea of how relativistic jets** are formed because **NLS1s are a unique class of AGN** that are powered by **black holes** of low mass and hosted in spiral galaxies.

Relativistic Jets:

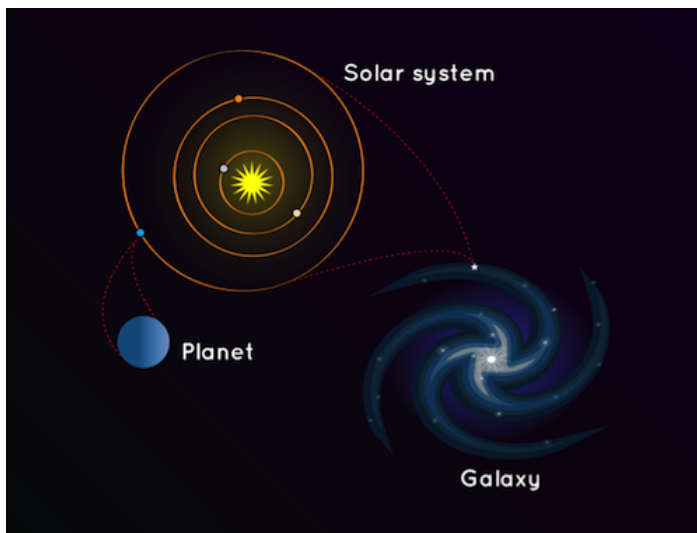
- Supermassive black holes in the centers of some active galaxies that create **powerful jets of radiation and particles travelling close to the speed of light** are called relativistic jets.
- These jets are believed to be the **sources of the fastest-travelling particles in the Universe that are cosmic rays.**
- No method was present till date to find **NLS1 at redshifts larger than one.**
- This discovery **opens up a new way to find gamma-ray emitting NLS1 galaxies** in the early Universe.

Aryabhatta Research Institute of Observational Sciences

- ARIES is one of the **leading research Institutes** which **specializes in observational Astronomy & Astrophysics and Atmospheric Sciences** situated in **Nainital**, Uttarakhand.
- It was **established in 1955** and its primary objective has been **to develop facilities for modern astrophysical research in stellar, solar & theoretical branches of astrophysics**. On some selected clear nights the visitors are also shown some celestial objects through the telescopes.

Galaxy

- A galaxy is a **huge collection of gas, dust, and billions of stars and their solar systems, all held together by gravity**.
- Earth is the part of the **Milky Way Galaxy**, which also has a super Massive Blackhole in the middle.



Black Hole

- It refers to a point in space where the **matter is so compressed as to create a gravity field from which even light cannot escape**.
- The concept was **theorized by Albert Einstein in 1915** and the term 'black hole' was coined in the mid-1960s by American physicist John Archibald Wheeler.
- All the black holes observed so far belong to **two categories**:
 - One category ranges between a few solar masses and tens of solar masses. These are thought to form when massive stars die.
 - The other category is of **supermassive black holes**. These range from hundreds of thousands to billions of times that of the sun from the Solar system to which Earth belongs.

Gamma Ray Astronomy

- It is the study of astronomical objects and **phenomena that emit gamma rays**. Gamma-ray telescopes are designed to **observe high-energy astrophysical systems**.
- As Earth's atmosphere blocks most gamma rays, **observations are generally conducted by high-altitude balloons or spacecraft**.
- Gamma-ray astronomy presents unique **opportunities to explore exotic objects**. By exploring the universe at these high energies, **scientists can search for new physics, testing theories and performing experiments which are not possible in earth-bound laboratories**.

Source:PIB

Research on Lithium Ion Battery Performance

Why in News

Researchers from IIT Guwahati have developed a technique to improve the performance of rechargeable lithium-ion batteries, which power most of the portable devices used today.

Key Points

- **Lithium Ion Batteries:**
 - **Development:**
 - The **2019 Nobel Prize in Chemistry** was jointly awarded to **Stanley Whittingham, John Goodenough and Akira Yoshino** for work that led to the development of **lithium-ion batteries**.
 - The **foundation of the lithium-ion (Li-ion) battery was laid during the oil crisis of the 1970s**, around which time Whittingham started working on developing methods that could lead to fossil fuel-free energy technologies.
 - The **first commercially viable Li-ion battery** was created by Yoshino **in 1985**.
 - **Utility:**
 - Li-ion batteries provide portable electricity, powering electronic gadgets such as mobile phones, laptops and tablets.
 - Today, most **Electrical Vehicles (EV) use Li-ion batteries** as well, but are slowly reaching their theoretical limits of being able to provide roughly up to **300-watt hour per kilogram** of energy.
 - These batteries can also be used to **store solar and wind power**, which means that with their widespread use it may even be possible to **live in a fuel free society**.
 - **Disadvantage:**
 - Some of the disadvantages of Li-ion batteries include their **susceptibility to overheating** and their **being prone to damage at high voltages**.
Since they are made with **flammable and combustible materials**.
 - Such batteries also start **losing their capacity over time**—for instance, a laptop battery in use for a few years does not function as well as a new one.
- **New Research:**
 - Researchers **from IIT Guwahati** have developed a technique which can **precisely estimate** one of the most important battery internal states known as **SOC, state of charge**.
 - **SOC reflects the remaining capacity of the battery**, that is how much more charge can be withdrawn from the battery before it gets fully discharged.
 - The knowledge of remaining capacity helps to optimize battery's capacity utilization, prevent overcharging and undercharging of the battery, **increases its lifespan, reduces cost, and ensures safety of the battery and its surroundings**.
 - To improve a battery's lifespan and optimize its capacity, it is **important to predict its various states accurately. One of these states is the SOC**, which has so far been difficult to estimate.
 - Through their work, the **researchers have proposed** an approach that avoids overestimation and therefore helps in **taking accurate measurements**.

State Of Charge

- The state of charge (SOC) of a cell denotes the capacity that is currently available as a function of the rated capacity.
- The value of the SOC varies between 0% and 100%. If the SOC is 100%, then the cell is said to be fully charged, whereas a SOC of 0% indicates that the cell is completely discharged.
- In practical applications, the SOC is not allowed to go beyond 50% and therefore the cell is recharged when the SOC reaches 50%.
- Similarly, as a cell starts aging, the maximum SOC starts decreasing. This means that for an aged cell, a 100% SOC would be equivalent to a 75%–80% SOC of a new cell.
- **Related Developments:**
 - The **Johns Hopkins Applied Physics Laboratory** developed a **Lithium-ion battery that does not catch fire**.
 - Earlier in January 2020, researchers from **Australia** claimed that they developed the world's most efficient **lithium-sulfur (Li-S) battery**, capable of powering a smartphone for five continuous days.
 - While the materials used in the **Li-S batteries** are not different from those in **Li-ion batteries**, the Australian researchers **reconfigured the design of the sulfur cathodes** (a type of electrical conductor through which electrons move) to accommodate higher stress without a drop in overall capacity.
 - India, through a newly-floated state-owned company **Khanij Bidesh India Ltd**, has **inked a pact with an Argentine firm** to jointly prospect lithium in Argentina, a country that has the one of the largest reserves of Lithium in the world.

- **Potential Alternatives to Li-ion Technology:**

- **Lithium-Sulfur Batteries:**

- **Li-S batteries** are generally considered **the successors of Li-ion batteries** because of their **lower cost of production, energy efficiency and improved safety.**

Their cost of production is lower because sulfur is abundantly available.

- Even so, there have been some difficulties when it comes to commercialising these batteries, mainly **due to their short life cycle** and poor **instantaneous power capabilities.**

- **Graphene Batteries:**

Graphene batteries may be an important alternative to lithium-ion batteries, with the latter having limitations due to the frequency with which lithium requires charging. Graphene is a newly stabilized and isolated material.

- **Fluoride Batteries:**

Fluoride Batteries have the potential to last eight times longer than lithium batteries.

- **Sand Battery:**

This alternative type of lithium-ion battery **uses silicon** to achieve three times better performance than current graphite Li-ion batteries. The battery is still lithium-ion like the one found in a smartphone, but it uses silicon instead of graphite in the anodes.

- **Ammonia-powered Batteries:**

- Ammonia-powered batteries may not be coming any time soon, but the chemical commonly known as a household cleaner is still an alternative to lithium in the way it can power fuel cells in vehicles and other equipment.
- If scientists can figure out a way to produce ammonia without creating the greenhouse gas emissions that result right now, they can ship it anywhere in the world to be converted into hydrogen to power those fuel cells.

- **Vertically Aligned Carbon Nanotube Electrode:**

These are good candidates for lithium-ion battery electrodes which require high rate capability and capacity.

- **Solid-state Batteries:**

- It uses alternatives to aqueous electrolyte solutions, an innovation that could lower the risk of fires, sharply increase energy density and potentially take only 10 minutes to charge an EV, cutting the recharging time by two-thirds.
- These cells can extend the driving distance of a compact electric vehicle while maintaining legroom - a quantum leap in battery tech.

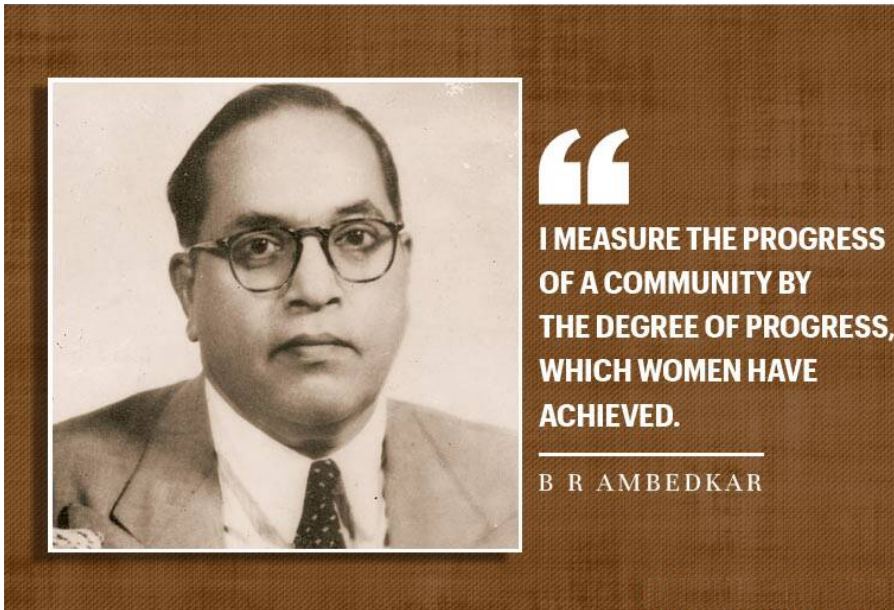
Source: IE

B R Ambedkar: 130th Birth Anniversary

Why in News

The nation celebrated the **130th birth anniversary of B R Ambedkar** on 14th April 2021.

Dr. Ambedkar was a **social reformer, jurist, economist, author, polyglot** (knowing or using several languages) orator, a **scholar** and **thinker of comparative religions**.



Key Points

- **Birth:** Babasaheb Dr. Bhimrao Ambedkar was born in **1891 in Mhow, Central Province** (now Madhya Pradesh).
- **Brief Profile:**
 - He is known as the Father of the Indian Constitution and was **India's first Law Minister**.
 - He was the **Chairman of the Drafting Committee** for the new Constitution.
 - He was a **well-known statesman who fought for the rights of the Dalits** and other socially backward classes.

- **Contributions:**

- He led the **Mahad Satyagraha in March 1927 against Hindus** who were opposing the decision of the Municipal Board.

In 1926, Municipal Board of Mahad (Maharashtra) passed an order to throw open the tank to all communities. Earlier, the untouchables were not allowed to use water from the Mahad tank.

- He participated in **all three Round Table Conferences**.
- **In 1932**, Dr. Ambedkar signed the **Poona pact with Mahatma Gandhi**, which abandoned the idea of separate electorates **for the depressed classes** (Communal Award).

However, the seats reserved for the depressed classes were increased from **71 to 147 in provincial legislatures** and to **18% of the total in the Central Legislature**.

- His ideas before the **Hilton Young Commission served** as the foundation of the **Reserve Bank of India (RBI)**.

- **Election and Designation:**

- **In 1936**, he was elected to the **Bombay Legislative Assembly** as a legislator (MLA).
- He was **appointed** to the **Executive Council of Viceroy** as a Labour member **in 1942**.
- **In 1947**, Dr. Ambedkar accepted **PM Nehru's invitation to become Minister of Law** in the first Cabinet of independent India.

- **Shift to Buddhism:**

- **He resigned** from the cabinet in **1951**, over differences on the **Hindu Code Bill**.
- He **converted to Buddhism**. He **passed away on 6th December 1956** (**Mahaparinirvan Diwas**).

Chaitya Bhoomi is a memorial to B R Ambedkar, located in Mumbai.

- He was awarded India's highest civilian honour the **Bharat Ratna** in 1990.

- **Important Works:**
 - **Journals:**
 - Mooknayak (1920)
 - Bahishkrit Bharat (1927)
 - Samatha (1929)
 - Janata (1930)
 - **Books:**
 - Annihilation of Caste
 - Buddha or Karl Marx
 - The Untouchable: Who are They and Why They Have Become Untouchables
 - Buddha and His Dhamma
 - The Rise and Fall of Hindu Women
 - **Organisations:**
 - Bahishkrit Hitkarini Sabha (1923)
 - Independent Labor Party (1936)
 - Scheduled Castes Federation (1942)
- **Relevance of Ambedkar in Present Times:**
 - Caste-based inequality in India still persists. While Dalits have acquired a political identity through **reservation** and forming their own political parties, they lack behind in social dimensions (health and education) and economic dimension.
 - There has been a rise of communal polarization and communalization of politics. It is necessary that Ambedkar's vision of constitutional morality must supersede religious morality to avoid permanent damage to the Indian Constitution.

Round Table Conferences

- **First Round Table Conference:** It was held in London on 12th November, 1930 but the Congress did not participate in it.
 In March 1931, Mahatma Gandhi and Lord Irwin (Viceroy of India 1926-31) entered into a Pact, called **Gandhi-Irwin Pact**, by which the Congress called off the Civil Disobedience Movement and agreed to participate in the Round Table Conference.
- **Second Round Table Conference:** It was held in London on the 7th of September, 1931.
- **Third Round Table Conference:** It was held in London on the 17th of November, 1932 to consider the reports of various sub-committees appointed from time to time. It ultimately led to the passage of **Govt. of India Act, 1935**.
 The Congress did not participate as most of the leaders were in jail.

Source IE

Sputnik V Vaccine

Why in News

Sputnik V, the vaccine against **Covid-19** developed by Russia, has been cleared for emergency use by the **Drugs Controller General of India (DCGI)**.

It is now the third coronavirus vaccine to get emergency use approval, after **Covishield (Serum Institute of India) and Covaxin (Bharat Biotech)**.

Key Points

- **About the Sputnik V Vaccine:**

- The **Sputnik V vaccine** has been **developed by Gamaleya National Research Institute of Epidemiology and Microbiology** in Moscow.
- It **uses two different viruses** that cause the **common cold (adenovirus)** in humans.
 - The **adenoviruses** are weakened so they cannot replicate in humans and cannot cause disease.
 - They are also modified so that the vaccine delivers a code for making the coronavirus spike protein. This aims to ensure that when the real virus tries to infect the body, it can mount an immune response **in the form of antibodies**.
- Sputnik uses a **different vector** for each of the **two shots** in a course of vaccination. This **provides immunity with a longer duration than vaccines using the same delivery mechanism** for both shots.

The two shots are **given 21 days apart**.
- Sputnik **V is to be stored at -18°C in its liquid form**. However, in its freeze-dried form, **it can be stored at 2-8°C**, in a conventional refrigerator without any need to invest in additional cold-chain infrastructure.

- **Efficacy:**

- **Phase 3 trials** conducted in Russia, with the results published in The Lancet, have found it has **an efficacy of 91.6%**.
- In India, Dr Reddy's conducted a bridging study after which it applied for emergency use approval.

Trial **participants** were given the **first dose (rAd26-)** followed by a **booster dose (rAd5-S) 21 days later**.

Adenoviruses

- Adenoviruses (ADVs) are **DNA viruses ranging from 70-90** nanometre in size, which induce many illnesses in humans like cold, respiratory infection etc.

- Adenoviruses are **preferred for vaccines** because their **DNA is double stranded** which makes them **genetically more stable** and the chances of them changing after injection are lower.
- **Rabies vaccine** is an adenovirus vaccine.
- Adenovirus vaccines are **a type of viral vector vaccine**.
In this vaccine, adenovirus is used as a tool to deliver genes or vaccine antigens to the target host tissue.
- However, there are **drawbacks of adenovirus vector** vaccines like **pre-existing immunity in humans, inflammatory responses etc**.
Just as human bodies develop immune responses to most real viral infections, they also develop immunity to adenoviral vectors. Since adenoviral vectors are based on natural viruses that some humans might already have been exposed to, these vaccines might not work for everyone.

Source IE
