



Nobel Prize 2020

The Nobel Prizes regarded as the most prestigious awards given for intellectual achievement in the world are awarded annually from a fund bequeathed for that purpose by the Swedish inventor and industrialist Alfred Nobel.

- It is announced every year for excellence in Physics, Chemistry, Medicine, Literature, Economics, and a distinguished achievement towards humanity – commonly known as the Nobel Peace Prize.

Physiology/Medicine

- The Nobel Prize has been awarded to American medical researchers and virologists **Harvey J Alter** and **Charles M Rice**, and British scientist **Michael Houghton** for the discovery of Hepatitis C which was discovered in 1982 by screening millions of DNA samples.
 - The discovery of **Hepatitis C** virus revealed the cause of the remaining cases of chronic hepatitis and made possible blood tests and new medicines that have saved millions of lives.
- **Hepatitis:**
 - Hepatitis refers to an **inflammatory condition of the liver**.
 - It's commonly caused by a **viral infection**, but there are other possible causes of hepatitis like autoimmune responses, medications, drugs, toxins, and alcohol.
 - There are 5 main **hepatitis** viruses, referred to as types A, B, C, D, and E.
 - **World Hepatitis Day** is observed each year on 28th July to enhance awareness of viral hepatitis.
- Hepatitis C is caused by the **Hepatitis C Virus (HCV)**.
 - The first, (hepatitis A), is transmitted by polluted water or food and generally has little long-term impact on the patient.
 - The second type is transmitted through blood and bodily fluids and represents a much more serious threat since it can lead to a chronic condition.
 - This form of hepatitis is insidious, as otherwise healthy individuals can be silently infected for many years before serious complications arise.
 - It is transmitted through direct contact with infected body fluids, typically through injection drug use and sexual contact.

Physics

- The **Nobel Prize in Physics** for the year 2020 was awarded to three astrophysicists **Roger Penrose** from the UK, **Reinhard Genzel** from Germany, and **Andrea Ghez** from the USA.
- Roger Penrose received half of this year's prize for the discovery that a **black hole** formation is a robust prediction of the general theory of relativity.

- The theory explains gravity, as objects try to follow a straight line through a universe whose geometry is warped by matter and energy. As a result, planets, as well as light beams, follow curving paths.
- Genzel and Ghez received the second half of the prize for the discovery of a **supermassive black hole** at the centre of the Milkyway galaxy, now known to be the Sagittarius A*.
- It has a mass four million times that of the Sun and is confined to an area roughly the size of our Solar System.

What is a black hole?

- The term 'black hole' was coined in the mid-1960s by American Physicist **John Archibald Wheeler**.
 - Black hole refers to a point in space where matter is so compressed as to create a gravity field from which even light cannot escape.
 - Black-holes were **theorized** by **Albert Einstein** in 1915.
- 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.
- In April 2019, the scientists at the Event Horizon Telescope Project released the **first-ever image of a Black Hole** (more precisely, of its shadow).
 - The image was made possible by the Event Horizon Telescope which is a group of 8 radio telescopes (used to detect radio waves from space) located in different parts of the world.
- **Gravitational waves** are created when two black holes orbit each other and merge.

Chemistry

- **Emmanuelle Charpentier** of France and **Jennifer A Doudna** of the USA have been awarded the 2020 **Nobel Prize** in Chemistry for developing CRISPR/Cas9 genetic scissors, one of gene technology's sharpest tools.
 - It is for the first time a Nobel science prize has gone to a women-only team.
- The **CRISPR/Cas9 genetic scissors** can be used to change the **deoxyribonucleic acid** (DNA) of animals, plants and microorganisms with extremely high precision.
 - The CRISPR/Cas9 tool has already **contributed to significant gains in crop resilience**, altering their genetic code to **better withstand drought and pests**.
 - The technology has contributed to new **cancer** therapies.

CRISPR Technology

- The CRISPR (short for **Clustered Regularly Interspaced Short Palindromic Repeats**) technology for gene-editing was first developed in 2012.
- It makes gene sequencing very easy, simple and extremely efficient providing nearly endless possibilities.
 - Editing, or modifying, gene sequences is not new and has been happening for several decades now, particularly in the field of agriculture, where several crops have been genetically modified to provide particular traits.
- The technology replicates a natural defence mechanism in *Streptococcus pyogenes* that use a similar method to protect itself from virus attacks.

- A DNA strand, when broken, has a natural tendency to repair itself but the auto-repair mechanism can lead to the re-growth of a problematic sequence.
- Scientists intervene during this auto-repair process by supplying the desired sequence of genetic codes, which replaces the original sequence.

Peace

- The 2020 Nobel Peace Prize has been awarded to the [World Food Programme](#) (WFP), a [United Nations](#) (UN) agency, for its efforts to combat hunger, bettering conditions for peace in conflict-affected areas and preventing the use of hunger as a weapon of war and conflict.
 - The WFP is the UN's primary agency that works upon **Eradicating Hunger** which is one the UN's [Sustainable Development Goals](#).
 - The WFP provided assistance to close to 100 million people in 88 countries who are victims of acute food insecurity and hunger.
- **WFP in India:** It has been working in India since 1963 where it has focused upon reforms in the [Targeted Public Distribution System](#) (TPDS) and provided policy inputs, advocacy and technical assistance for improving access to food.
 - The WFP has proposed unique initiatives like **Automatic Grain Dispensing Machine (Annapurthi)** and **Mobile Storage Units** for the effective implementation of TPDS.

World Food Programme

- It was established in 1961 by the [Food and Agriculture Organisation](#) (FAO) and the **United Nations General Assembly (UNGA)** and became a full-fledged UN programme in 1965.
- **Headquarter:** Rome, Italy.

Economic Sciences

- American economists, **Paul Milgrom and Robert Wilson** have been awarded the **Sveriges Riksbank Prize in Economic Sciences**, 2020 for their work on commercial auctions.
 - The award is **popularly but incorrectly** known as Nobel Prize in Economic Sciences, (as it is not one of the five Nobel prizes that Alfred Nobel established in his will in 1895, it is not a Nobel Prize).
- It was created in 1968 by a donation from Sweden's central bank Sveriges Riksbank to the **Nobel Foundation to commemorate the bank's 300th anniversary** and includes a **10 million Swedish kronor award money** (₹8.33 crores roughly).
- Milgrom and Wilson improved the auction theory and invented new auction formats for auctioning off many interrelated objects simultaneously, on behalf of a seller motivated by broad societal benefit rather than maximal revenue.
 - **Robert Wilson** developed the theory for auctions of objects with a common value – a value which is uncertain beforehand but, in the end, is the same for everyone.
 - **Paul Milgrom** formulated a more general theory of auctions that not only allows common values, but also private values that vary from bidder to bidder.
 - Their work will benefit **sellers, buyers and taxpayers** around the world. It will help in auctioning goods and services, such as **radio frequencies**, which are difficult to sell in traditional ways.

Auction Theory

- Auction theory studies how auctions are designed, what rules govern them, how bidders behave and what outcomes are achieved.
 - Auctions are important to economists because they are the most widely used and also the **most efficient mechanism to allocate scarce resources**.
 - The allocation of scarce resources, in turn, matters to economists because there is a limited supply of resources on earth when compared to unlimited human needs, and hence they need to be allocated only to the most urgent needs of society.
- **Application of auction:** Auctions happen almost everywhere in the modern world. Even the sale of groceries in retail stores is based on an auction, albeit an implicit one that is relatively slow to adjust to changing market conditions.
 - The oldest form of auction is the auction of a bankrupt person's property to pay off his creditors. This simple design of such an auction is the highest open bidder getting the property (or the commodity in question).
 - **Allocation of capital good:** More sophisticated and explicit auction mechanisms are used in the allocation of capital goods such as spectrum and minerals.
 - Over time, the format of auctions has widened to include other commodities such as carbon dioxide emission credits, electricity or the right to collect the local garbage etc.
 - **For e.g.** a supermarket manager, just as an auctioneer, tries to price his goods based on how much of it is sold during a certain day, week, or month. If there is a huge demand for a certain product and shelves empty quickly, the supermarket manager will raise its price to prevent a shortage. If another product fails to sell as fast as expected, its price may be lowered in order to clear any unsold inventory.
 - But whether it is the auction of spectrum waves or the sale of fruits and vegetables, auctions are at the core of allocation of scarce resources in a market economy.
- **Auction models:** Different auction models are needed for depending upon the commodities, purpose of the auction and the entities conducting the auction.
 - **For e.g.** Maximizing the profit may be the motive of a private auction while making a service affordable can be the purpose of auctioning a service by the government. Wrong auction design can lead to a second-hand market where companies trade among themselves with little revenue accruing to the government or little benefit to the public.
- How an auction is designed, has a tremendous impact not just on the buyers and the sellers but also on the broader society.
- **Key variables:** Three key variables need to be understood while designing an auction.
 - **Rules of Auction** i.e. closed/sealed bids, single bids versus multiple bids.
 - **Commodity or service** being put up for auction i.e. how does each bidder value an item.
 - **Uncertainty** regarding which bidder has what information about the object, or even the value another bidder associates with the object.

Literature

- The Nobel Prize in Literature 2020 has been awarded to the USA poet **Louise Glück** "for her unmistakable poetic voice that with austere beauty makes individual existence universal."
 - Her poetry focuses on the painful reality of being human, dealing with themes such as death, childhood, and family life.
 - She is the fourth woman to win the prize for literature since 2010, and only the 16th since the Nobel prizes were first awarded in 1901.
- The Nobel Prize comes with a medal and a prize sum of 10 million Swedish kronor.

Contribution of Indians

- Poet and writer **Rabindranath Tagore** was the **first non-European and Indian** to get a Nobel Prize in 1913 in literature.
- India received its first Nobel Prize in physics in 1930, when scientist Sir **Chandrasekhara Venkata Raman** was awarded “for his work on the scattering of light and for the discovery of the effect named after him”. This phenomenon is now known as Raman Effect.
- **Har Gobind Khorana** shared his 1968 Nobel Prize in physiology or medicine with Robert W Holley and Marshall W Nirenberg. The trio was honoured “**for their interpretation of the genetic code and its function in protein synthesis**”.
- **Mother Teresa** won the 1979 Nobel Peace Prize. She was a Roman Catholic nun who was born in Albania. She founded the Missionaries of Charity in Kolkata and worked all her life for the poor. She became an **Indian citizen** as well. She received the prize for her “work in bringing help to suffering humanity”.
- Indian physicist **Subramanyan Chandrasekhar** was awarded the 1983 Nobel Prize in Physics, which he shared with physicist William Alfred Fowler. He was awarded “**for theoretical studies of the physical processes of importance to the structure and evolution of the stars**”.
- **Amartya Sen** was the winner of the 1998 Sveriges Riksbank Prize in Economic Sciences. He was rewarded “for his contributions to welfare economics”.
- India’s first Nobel Prize in the field of chemistry was won by **Venkatraman Ramakrishnan**. He received the 2009 Nobel Prize “**for studies of the structure and function of the ribosome**”. He shared the award with Thomas A Steitz and Ada E Yonath.
- **Kailash Satyarthi**, along with Malala Yousafzai, received the Nobel Peace Prize in 2014. He received the honour “for the struggle against the suppression of children and young people, and for the right of all children to education.”
- The Indian-American economist **Abhijit Banerjee** was awarded the Nobel Prize in economics along with Esther Duflo and Michael Kremer. The trio received the award for their “**experimental approach to alleviating global poverty.**”

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